Modular Messaging Concepts and Planning Guide

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Chapter 1: Overview of Modular Messaging

Changes to this guide for Modular Messaging Release 5.2

This document has been updated to incorporate details on the following new or changed features that have been introduce in Modular Messaging Release 5.2 and subsequent service packs.

Modular Messaging single server configuration

Modular Messaging Release 5.2 offers single server configuration for MSS systems, which uses a single server to host both MSS and MAS. The Web Client and Web Subscriber Options servers can also run on the same single server. Modular Messaging Release 5.2 also offers multi-server configuration for MSS systems. For existing Modular Messaging systems upgraded to release 5.2, the existing multi-server configurations will be retained.

S8800 hardware support

With Modular Messaging Release 5.2, Avaya introduces the S8800 family servers. All new installations of Modular Messaging Release 5.2, including Modular Messaging single server configuration, use Avaya S8800 family servers. These S8800 servers are specifically configured for Modular Messaging. The S8800 server configured for any other Avaya product must not be used for Modular Messaging.

Changes to switch integrations

New installations and migrations to Modular Messaging single server configuration and multi-server configuration use only the SIP integration. However, all previously available integrations are supported for upgrades to Release 5.2.

Capability to remotely install Modular Messaging system

With Modular Messaging single server configuration, installs, upgrades and updates can be done remotely; thus removing the need for on-site implementations. The installation has been made simpler and faster.

WebLM licensing

Modular Messaging Release 5.2 uses WebLM as its licensing mechanism. As WebLM is Web-based, it facilitates easy and faster tracking of licenses. Using WebLM, an administrator can track and manage licenses of multiple Avaya software products installed in an organization from a single location. Remote Feature Activation (RFA) is replaced by the Product Licensing and Delivery System (PLDS) which is used to obtain the new license file.

Support for Secure Access Link (SAL 1.5)

Modular Messaging Release 5.2 uses Secure Access Link (SAL 1.5) to provide remote alarming and serviceability. New installations of Modular Messaging single server configuration and multi-server configuration use SAL only.

Logging Enhancements

In Modular Messaging Release 5.2, the Modular Messaging Voice Mail Domain configuration enables a set of syslog servers to be configured to receive syslog events from Modular Messaging servers.

Ability to block messages when an EAG is active

When Extended Absence Greeting (EAG) is enabled, customers can specify whether to allow callers to leave messages in their mailbox or not. This option can be configured using Subscriber Options, Web Subscriber Options, and TUI settings.

Ability to turn off outcalling for Broadcast messages

In the Modular Messaging Release 5.2 systems, Call Me rules within Subscriber Options and Web Subscriber Options can be defined to exclude broadcast messages from the set of message types that trigger an outcall.

Abbreviated Prompt Option for Aria TUI subscribers

In Modular Messaging Release 5.2, Aria TUI users can select their preferred Aria prompting with selections of English US for 'normal prompting' and English – US Terse for 'abbreviated prompting.' Users can select the normal prompting and abbreviated prompting using Subscriber Options and Web Subscriber Options. Abbreviated prompts are available only in the English language.

Enforce the separation of e-mail and voice messages

Restricted Outlook Client (ROC) restricts e-mail messages from being delivered to a Message Storage Server (MSS) voice mailbox. ROC thus enables the separation of an e-mail message and a voice message.

Display part information in Restricted Outlook Client

Restricted Outlook Client provides the capability to display part information of a multipart voice message delivered to the subscriber’s mailbox. The details displayed to the subscriber are:

- Name of the sender
- Date and time when the message was sent
- Recipients' names and to whom the message was copied
- Subject
- Length of the voice message part in minutes and seconds

Personal Operator Zero Out

Modular Messaging Release 5.2 supports the Personal Operator Zero Out feature which redirects call coverage for QSIG or SIP integration. When a caller transfers the call to a personal operator and the operator does not answer the call, the Modular Messaging systemwide settings determine where the original called party can deposit the message. After the call covers to the Modular Messaging system, the caller's message is deposited either in

the original called party's mailbox or in the personal operator's mailbox, based on the system configuration.

SIP Direct Connect

Modular Messaging 5.2 Single Server Configuration or a Single MAS configuration with any message store , support SIP integrations to Avaya Communication Manager 5.2.1 or 6.0 without the need for a Session Enablement Server (SES) or Session Manager.

TTY support for SIP

Modular Messaging Release 5.2 supports TTY for SIP integration.

Support for Outlook 2010

Modular Messaging Release 5.2 supports Microsoft Outlook 2010. Modular Messaging Release 5.2 has dropped support for Microsoft Outlook 2000 and 2002.

Support for Microsoft Exchange 2010

Modular Messaging Release 5.2 supports Microsoft Exchange 2010 for new installation of Modular Messaging. Modular Messaging Release 5.2 also supports migration from the existing Exchange 2003 or Exchange 2007 systems to the Exchange 2010 systems. Modular Messaging supports mixed environments where Microsoft Exchange 2003 or Microsoft Exchange 2007 coexist with Microsoft Exchange 2010.

Support for HP DL360 G7 Server

With Modular Messaging Release 5.2 Service Pack 8, Avaya introduces the HP DL360 G7 Server. All new installations of Modular Messaging Release 5.2 SP8 use either the Avaya S8800 family servers or the HP DL360 G7 server.

Support for Multitech MT9234ZBA-USB Modem

Modular Messaging Release 5.2 Service Pack 7 or later supports the Multitech modems for the Avaya S8800, S8730, S3500, and HP DL360 G7 servers only in the MSS multi-server configurations. Modular Messaging single server configuration does not support modems as that configuration is based on System Platform.

Administrators must use only the installed drivers on the Avaya Images or the 89000429L media to install the MT9234ZBA modems on the Modular Messaging MAS. More information is available at http://www.avaya.com/support.

Support for Avaya CS1000

Modular Messaging Release 5.2 supports the SIP Integration to Avaya CS1000 using an Avaya Avaya Aura® Session Manager.

Support for Microsoft Windows 7 64bit

Modular Messaging Release 5.2 provides support for Microsoft Windows 7 64bit on all Modular Messaging clients, including Web Client.

Note:

Microsoft Outlook and Lotus Notes client must be 32-bit version.

Support for Microsoft Internet Explorer 9.0

Modular Messaging Release 5.2 provides support for Microsoft Internet Explorer 9.0 on all Modular Messaging clients, including Web Client.

Support for performing an FTP backup on a Windows 2008 R2 based FTP Server

Modular Messaging Release 5.2 provides support for performing an FTP backup on a Windows 2008 R2 based FTP Server.

Automatic Deletion Notification feature

Modular Messaging—MSS Release 5.2 Service Pack 9 supports the Automatic Deletion Notification feature for the Aria TUI. The Automatic Deletion Notification feature allows subscribers to be notified of messages that are earmarked for automatic deletion after a defined period. Subscribers are notified of such messages and are given the option to restore the messages to a new age, so that the system aging algorithm does not automatically delete the messages. For more information, see Automatic Deletion Notification feature on page 129.

Fax Sender Service updates

Fax Sender Service only supports the G.711 μ-law. Fax Sender Service does not support the G.711 A-law and digital fax machines.

RAID battery and write cache alarms

Modular Messaging Release 5.2 Service Pack 10 includes a new set of RAID battery and write cache alarms. The MSS and MAS servers generate the RAID battery and write cache alarms when the MSS and MAS servers detect problems with the RAID battery and write cache with the S8730, S8800, or HP DL360 G7 servers.

For more information, see MAS alarms and logs on page 91 and MSS alarms and logs on page 93.

Document change history

The following table lists the changes made to the Modular Messaging Concepts and Planning guide after the Modular Messaging Release 5.2 Service Pack 10.

Issue	Date	Change description
1	December 19, 2011	Initial issue published for Modular Messaging Release 5.2 Service Pack 10.
2	March 14, 2012	Updated the *Appendix C: Customer environment* to state that Modular Messaging Release 5.2 provides support for Microsoft Internet Explorer 9.0.
3	December 18, 2012	Updated the Backup capabilities on MSS topic to add a note on backup and restore of the local administration accounts on MSS.

Issue	Date	Change description
		Updated the Call Answer greetings topic and the Switch integration features topic for the personal operator zero out feature.

Modular Messaging versions

Modular Messaging is a unified messaging solution that addresses the different unified messaging needs of customers.

To suit the particular architectural needs and e-mail infrastructure of customers, Modular Messaging is available in the following versions:

- Modular Messaging—Avaya Message Storage Server (Modular Messaging—MSS)

  Modular Messaging Release 5.2 system for MSS is available in two configurations:

  - Single server configuration that provides both MSS and MAS on a single server.
  - Multi-server configuration that provides MSS and MAS as separate servers.

  The multi-server configuration contains one or more Avaya Messaging Application Server (MAS) units and a single Avaya MSS. For MSS systems upgraded to Modular Messaging Release 5.2, the MSS can either be a high-availability configuration (MSS—H) or a standard-availability configuration (MSS—S). The MAS units are provided either by Avaya or by the customer. The MSS hardware must be provided by Avaya. A private Ethernet local area network (LAN) connects the MAS and the MSS. The Modular Messaging system must have access to a Windows domain, which can be either an existing corporate domain, or its own private domain.

  Note:

  In a configuration with multiple MAS units, all the MAS units must be physically co-located with the MSS and must be on the same LAN segment as the MSS.

- Modular Messaging—Microsoft Exchange (Modular Messaging—Exchange)

  This configuration contains one or more MAS units that interact with one or more Microsoft Exchange servers. The MAS units are provided either by Avaya or by the customer. Avaya provides the Modular Messaging software that must be installed on the customer-provided MAS. The Microsoft Exchange servers are provided by the customer.

- Modular Messaging—IBM Lotus Domino (Modular Messaging—Domino)

  This configuration contains one or more MAS units connected to one or more IBM Lotus Domino servers. The MAS units are provided either by Avaya or by the customer. Avaya provides the Modular Messaging software that must be installed on the customer-provided MAS. The IBM Lotus Domino servers are provided by the customer.

For information on the hardware and software requirements of a customer-provided MAS, see Minimum hardware requirements for an MAS on page 355.

Although these versions have functionality in common, such as Call Answer and telephone access to voice messages, they differ in their implementation, architecture, and configuration.

Depending on the version, Modular Messaging can be used as any one of the following solutions:

- A voice and fax messaging system, in which all voice and fax messages are stored on the Avaya MSS.
- A part of a corporate messaging solution for access to messages. Voice, text, and fax messages are stored on the Avaya MSS, and corporate e-mail is maintained on a separate corporate e-mail system.
- A voice, fax, text, and e-mail messaging system, in which all messages are stored on a common message store—either Microsoft Exchange or IBM Lotus Domino.

Avaya Aura® System Platform

Modular Messaging Release 5.2 offers Avaya Aura® System Platform based Modular Messaging, which uses a single server to host both MSS and MAS. These systems use the S8800 server or the HP DL360 G7 server. With Modular Messaging single server configuration, installs, upgrades, and updates can be done remotely, thus removing the need for onsite implementations. System Platform makes these installations possible using product specific templates. A template is a definition of a set of one or more applications to be installed on the System Platform.

Note:

System Platform must be installed before installing the Modular Messaging single server configuration.

System Platform is a generic virtual server software platform that provides a common set of features and services that allow pre-installed and configured virtual applications, called solution templates, to co-reside on a single physical server.

System Platform is a Xen-based platform that includes a:

- Base CentOS 5.2 Linux system running the Xen hypervisor (dom 0)
- Web-based management console for installing and managing templates
- Virtual machine for System Platform system utilities

The System Platform features include the following:

- Secure Access Link (SAL) that handles alarming and remote access
- Patches and upgrades that use a consistent upgrade method for all products in the solution template
- Security that conforms to Avaya product security standards
- A WebLM server for managing product licenses
- A Network Time Protocol (NTP) clock sync to a customer-provided NTP server

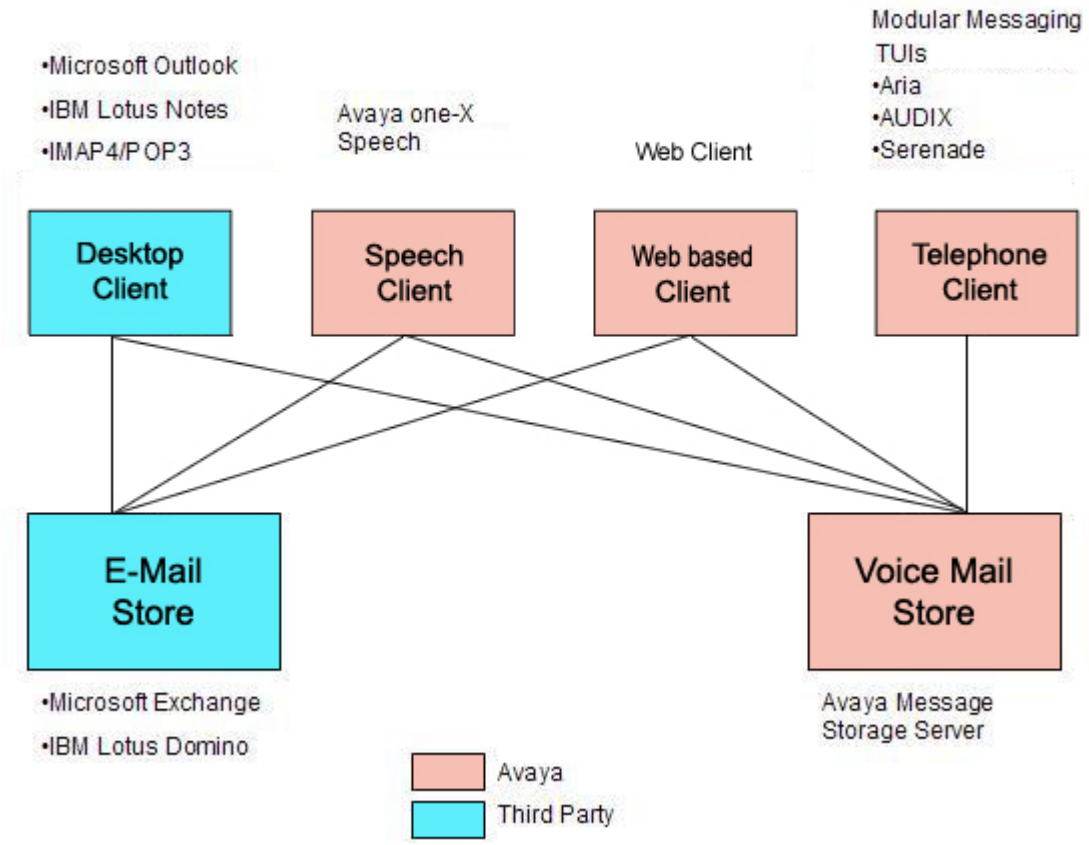
For more information, see the *Installing Avaya Modular Messaging on a Single Server Configuration Guide*.

Modular Messaging—MSS

A Modular Messaging—MSS system can be configured for use as:

- A voice mail system providing only voice and fax messaging
- Part of a unified messaging solution for access to messages

In the latter scenario, voice, text, and fax messages are stored on the MSS, and corporate e-mail is stored on the corporate e-mail system.



As a stand-alone messaging solution, Modular Messaging—MSS is an ideal solution for organizations that have traditional voice mail usage and that intend to maintain separate e-mail and voice mail systems.

This configuration is likely to be attractive to customers that want independent voice mail and corporate e-mail systems for overall messaging reliability. Modular Messaging mailboxes on the Avaya MSS store voice, fax, and text messages that subscribers receive. These Modular Messaging mailboxes are independent of the mailboxes on the corporate e-mail system that receive and store corporate e-mail messages. Because the voice mail and e-mail systems are independent of each other in this configuration, if one of the systems is not operating, the other is still likely to be available.

Subscribers can use different devices, such as a touchtone telephone or a desktop computer, to access messages stored in their Modular Messaging mailboxes.

The following access media provide subscribers with unified access to messages:

- Touchtone telephone that uses the Modular Messaging TUIs for access to voice and fax messages.
- one-X Speech for telephone access to voice and fax messages and to corporate e-mail messages.

- Modular Messaging Microsoft Outlook Client and Modular Messaging Restricted Outlook Client for Outlook access to voice, fax, and text messages. Users can access all messages stored in their Modular Messaging inbox with the same client that is used to access corporate e-mail messages.
- Modular Messaging IBM Lotus Notes Client for Lotus Notes access to voice, fax, and text messages. Users can gain access to all messages stored in their Modular Messaging inbox with the same client that is used to obtain access to corporate e-mail messages.
- Modular Messaging Web Client for access to voice, fax, and text messages from a Web browser.
- Standards-based e-mail client for desktop access to voice, text, and fax messages. Modular Messaging—MSS supports IMAP4 and Post Office Protocol 3 (POP3) e-mail standards and text messages, allowing subscribers to access their Modular Messaging mailbox by means of standards-based e-mail clients. These messages are stored in an inbox separate from the corporate inbox that receives e-mail messages from the corporate e-mail system.

  Note:

  Through administrative settings, administrators can restrict access to a subscriber mailbox from standards-based clients. For more information, see The Privacy Enforcement Level parameter on page 120.

- Native fax server allows subscribers to send fax messages. It also allows callers to leave fax messages. Callers can also leave a message that contains a voice introduction, followed by a fax. This results in a single message with both voice and fax components.

  Note:

  H.323 integration currently does not support fax messaging.

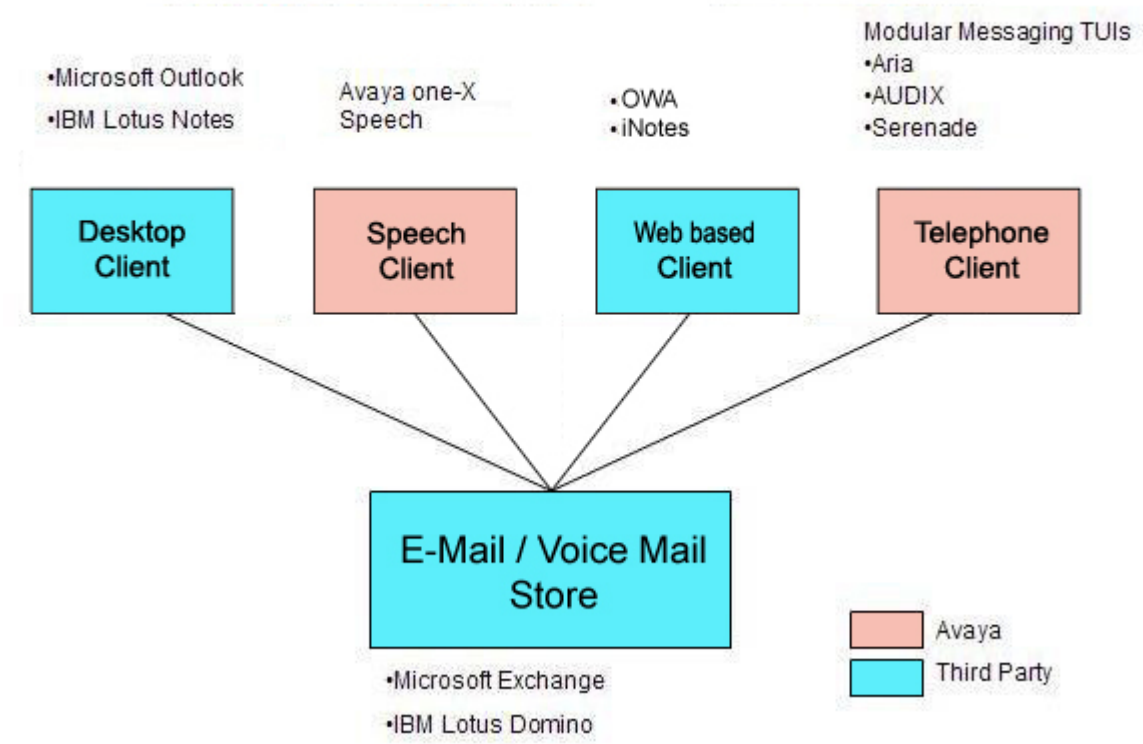
Modular Messaging—Exchange and Modular Messaging—Domino

Modular Messaging—Exchange and Modular Messaging—Domino integrate with an existing Microsoft Exchange or IBM Lotus Domino e-mail system, providing a unified message store for all messages.

The existing e-mail system serves as the message store for corporate e-mail messages, voice messages, and fax messages.

In Modular Messaging with e-mail servers, voice mail is merged into, and therefore relies on, the Microsoft Exchange or IBM Lotus Domino e-mail infrastructure. Modular Messaging is designed in a store-and-forward fashion, so it continues to operate during network or e-mail outages. During such outages, full functionality is not available, but the system continues to provide basic Call Answer service and limited access to recent Call Answer messages.

Modular Messaging—Exchange and Modular Messaging—Domino provide subscribers with access to voice, fax, and e-mail messages from their existing e-mail client and from Modular Messaging TUIs.



For unified access to messages, subscribers can use the following access media:

- A touchtone telephone for access to all messages.
- one-X Speech for telephone access to all messages.
- The Modular Messaging—Exchange Microsoft Outlook Client allows subscribers to use Microsoft Outlook for desktop access to all of their messages, including voice messages.
- IBM Lotus Notes with IBM Lotus Domino Unified Communications (DUC) can be used with Modular Messaging—Domino to allow subscribers to access all of their messages, including voice messages.
- Web access to messages by using Outlook Web Access, for Microsoft Exchange message stores only, and iNotes, for IBM Lotus Domino message stores only.
- Any desktop client supported by Microsoft Exchange or IBM Lotus Domino.

Characteristics of Modular Messaging versions

The following table compares the characteristics of the three Modular Messaging versions.

Characteristic	Modular Messaging —MSS	Modular Messaging —Exchange	
Storing messages	Voice, text, and fax messages are stored on the MSS. Corporate e-mail messages, if any, are usually stored on a separate e-mail server.	All messages are stored on the Microsoft Exchange e-mail server.	
Retrieving messages	Subscribers use a telephone (Modular Messaging TUIs) or a desktop computer to retrieve messages. Subscribers cannot use the TUIs to retrieve corporate e-mail messages stored on a separate e-mail server.	Subscribers use a telephone to retrieve voice messages (Modular Messaging TUIs). Subscribers use a telephone or desktop computer to retrieve voice, fax, and corporate e-mail messages.	
Available TUIs	Aria TUI, AUDIX TUI, and Serenade TUI.		
Desktop GUIs for accessing the inbox	The Modular Messaging inbox containing voice, fax, and text messages is separate from the corporate e-mail inbox. With the Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, the Modular Messaging Lotus Notes Client, or with standards-based e-mail clients, subscribers have the benefit of accessing two separate inboxes	Voice and fax messages in the subscriber's e-mail mailbox are accessible by using any Microsoft Exchange client, such as Microsoft Outlook.	

Characteristic	Modular Messaging —MSS	Modular Messaging —Exchange	
	in the same e-mail client.		
Text-to-speech (TTS) conversion	TTS is required for playing sender and recipient names (unless they are subscribers with recorded names), fax header information, and any text messages in the Modular Messaging mailbox.	TTS is required for playing sender and recipient names (unless they are subscribers with recorded names), fax header information, and corporate e-mail messages.	
Web messaging	Modular Messaging Web Client provides Web-browser access to voice, text, and fax messages.	Outlook Web Access (OWA) provides a single interface for access to voice mail and corporate e-mail messages, stored in a common inbox on the Microsoft Exchange message store.	
Compatibility with one-X Speech	one-X Speech provides: • Speech access to voice mail and corporate e-mail messages • Launching of telephone calls • Conferencing		

Benefits of Modular Messaging

Modular Messaging is compatible with many industry telecommunications systems, offering service from 4 to 288 ports and up to 40,000 subscribers. Modular Messaging provides multilingual capabilities, thus supporting international operations.

Scalability

Modular Messaging—MSS multi-server configuration supports a maximum of 144 ports per VMD when a S3500 server is used and 288 ports per VMD when a S8730, a S8800, or a HP DL360 G7 server is used. However, Modular Messaging single server configuration supports only 48 ports, thus limiting the capacity to 2,500 subscribers.

Modular Messaging—Exchange and Modular Messaging—Domino support a maximum of 288 ports per VMD.

A VMD can serve a network of switches, provided that the administrator ensures that the network uses a single switch as a gateway to the VMD. However, when MultiSite is enabled, Message Application Servers (MASs) in a single VMD communicate with multiple switches with different dial plans, in different locations. For more information on a VMD, see Voice mail domain on page 46.

Mobility

With Modular Messaging, subscribers can send and retrieve messages even when they are away from the office.

Modular Messaging provides subscribers with mobile access to their messages from any touchtone telephone, using the Modular Messaging TUIs. With the Microsoft Exchange or IBM Lotus Domino versions, the TUIs provide access to voice mail and corporate e-mail messages.

With the MSS version, the TUIs provide access only to voice, fax, and text messages stored on the Avaya MSS and *not* to corporate e-mail messages stored on the corporate e-mail system. However, MSS subscribers that want mobile access to corporate e-mail messages can use Avaya one-X Speech. The one-X Speech server provides speech access and voice control of corporate e-mail and voice mail messages, regardless of whether they are stored in separate or unified message stores. For more information, see one-X Speech on page 86.

Modular Messaging also provides enhanced notification functionality, allowing quick response to any type of incoming communication, whether on site or remote. Subscribers can reply to a message, regardless of its original form.

Modular Messaging supports real-time Find Me capability, telephone notification, Message Waiting Indicator (MWI), and other advanced notification mechanisms, thus increasing subscriber availability.

Note:

Find Me is not supported for analog integrations.

Familiar telephone user experience

Subscribers can use the Modular Messaging TUIs from any touchtone telephone to gain access to, compose, and send messages and to configure their mailboxes.

The subscribers of the following TUIs will have a familiar telephone user experience with the Modular Messaging TUIs:

- Avaya Octel 200/300, using the Serenade TUI
- Avaya Octel 250/350, using the Aria TUI
- Intuity AUDIX
- DEFINITY AUDIX

Modular Messaging comes with the followings TUIs:

- Aria TUI for Modular Messaging
- AUDIX TUI for Modular Messaging
- Serenade TUI for Modular Messaging

Administrators can assign subscribers their preferred TUI, based on class of service (COS). The Modular Messaging TUIs are similar to, but not exactly the same as, the respective Aria, AUDIX, or Serenade product.

For more information on the TUIs, see Telephone user interfaces on page 49.

Multilingual support

Modular Messaging supports multiple languages and allows multinational organizations to use the system in virtually any worldwide office.

The following table describes the different languages that Modular Messaging supports for announcements and for visual interfaces.

Languages		Voice Interfaces							Visual Interfaces									
		Aria Caller interface MM[1] Release 1.1	Common Caller Interface MM[1] Release 3	MM[1] Aria TUI	MM[1] AUDIX TUI	MM[1] Sonnade TUI	Message Networking[2]	Text-to-Speech (TTS)[3]	Subscriber Options	Web Subscriber Options (WSO) and Restricted WSO	MM[1] Microsoft Outlook Client[4]	MM[1] Microsoft Restricted Outlook Client[4]	MM[1] IBM Lotus Notes Client[5]	Web Client	Avaya Voice Player	Fax Cover Page[5]	MAS Administration	MSS Administration
Arabic			Y	Y	Y	Y												
Chinese																		
	Mandarin (China)	Y	Y	Y	Y	Y	Y	Y										
	Mandarin (Taiwan)	Y	Y	Y	Y	Y	Y	Y										
	Simplified								Y	Y	Y			Y	Y	Y		
	Traditional								Y	Y	Y			Y	Y	Y		
Czech			Y	Y	Y	Y												
Danish			Y	Y	Y	Y		Y										
Dutch		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y		
English																		
	Australia	Y	Y	Y		Y	Y											
	UK	Y	Y	Y	Y	Y	Y	Y										
	Standard								Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	US-123	Y	Y	Y	Y	Y	Y	Y										
	US-ABC				Y			Y										
	US-TTY[6]	Y	Y	Y	Y	Y	Y											
	US-Terse			Y[7]														
French																		
	Canada	Y	Y	Y	Y	Y	Y											
	France	Y	Y	Y	Y	Y	Y											
	Standard							Y	Y	Y	Y			Y	Y	Y		
German		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y		
Hebrew			Y	Y	Y	Y												
Italian		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y		
Japanese		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y		
Korean			Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y		
Portuguese Brazilian		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y		
Russian			Y	Y	Y	Y		Y										
Spanish																		
	Castilian		Y	Y	Y	Y	Y	Y										
	Latin American	Y	Y	Y	Y	Y	Y	Y										
	International								Y	Y	Y			Y	Y	Y		

1 MM = Modular Messaging.

2 Message Networking includes audio and text announcements indicated in this column. Message Networking administrative interfaces are available only in English.

3 The TUIs of Modular Messaging—Exchange and Modular Messaging—Domino automatically provide TTS conversions based on the language of the e-mail message.

4 Applicable only to Modular Messaging—MSS and Modular Messaging—Exchange. The Modular Messaging Outlook Client does not support Microsoft Multilingual User Interface (MUI) packs.

5 Applicable only to Modular Messaging—MSS.

6 Customer systems that use TTY must use G.711 audio encoding.

7 Aria TUI users can select their preferred Aria prompting with selections of English US for 'normal prompting' and English – US Terse for 'abbreviated prompting.'

Of the languages that Modular Messaging supports:

- One language is defined as the system default language.
- Up to three languages can be defined for the system Automated Attendant.
- Up to three languages per mailbox can be defined for Call Answer. One assigned Call Answer language can be Teletypewriter (TTY).
- Multilingual greetings, which allows subscribers to record each optional greeting (such as busy, no answer, and out-of-hours) for each Call Answer language.
- One language can be specified per mailbox for logged-in messaging sessions.

Modular Messaging—MSS administration

Modular Messaging—MSS is based on industry standards, including Lightweight Directory Access Protocol (LDAP). Modular Messaging—MSS interoperates with the following Avaya administrative tools to facilitate common administration across multiple Avaya products:

- Avaya Site Administration Release 2 or later and Avaya MultiSite Administration Release 2.1 or later: These applications support Modular Messaging subscriber data. For more information, see Avaya Integrated Management on page 87.
- ProVision: This application is used to provision users on an Avaya Aura® Communication Manager or a DEFINITY switch and Modular Messaging.
- 2nd Nature: Modular Messaging—MSS administrators can use the 2nd Nature application from Unimax for mailbox administration.
- Directory Enabled Management (DEM): This interface, an add-on to Communication Manager, connects the Avaya Directory Server with the Modular Messaging system. DEM periodically queries the Modular Messaging—MSS for changes to the subscriber administrative attributes, through LDAP. If a change occurs, DEM updates customer directories with the changed information.

Web-based administration of the MSS facilitates common organization-wide administration, diagnostics, and reporting. Administrators can use these Web-based administration pages to perform general system administration for the MSS and subscriber administration. Administration tasks include subscriber management and password administration. These administration pages also provide diagnostic logs.

Role-Based Access Control (RBAC) gives customers the ability to control privileges on the MSS and MAS based on customer-defined roles.

Modular Messaging—Exchange and Modular Messaging—Domino administration

Modular Messaging—Exchange and Modular Messaging—Domino offer the following administrative benefits:

- Leveraging the existing Microsoft Exchange or IBM Lotus Domino infrastructure eliminates the need to retain and manage separate voice and corporate e-mail systems.
- For each subscriber, all voice mail, telephone answering, corporate e-mail, and fax messages are stored on the same message store server.
- A single administrator can handle all messaging administration.
- Role-Based Access Control (RBAC) gives customers the ability to control privileges based on customer-defined roles.
- A single directory for addressing voice mail and corporate e-mail simplifies system management.
- Updates to the directory are replicated automatically to all systems, so that changes need to be made only once for voice mail and e-mail.

Switch integration

Modular Messaging supports multiple switch integrations (SWINs) for switches and private branch exchanges (PBXs) from several major manufacturers. Customers can choose a SWIN that requires only minimal changes to the current infrastructure to implement Modular Messaging.

Industry standards

Modular Messaging supports the following industry standards:

- Industry-standard platforms, telephony interfaces, and operating systems:
  - Intel processors
  - AMD processors
  - Dialogic Tip/Ring boards, Dialogic T1 and E1 port boards, and Dialogic Digital Set Emulation (DSE) port boards (Upgraded Modular Messaging systems only)

- Linux operating system for Avaya MSS and Microsoft Windows operating system for MAS

• IP and Internet standards:

- IPv4 for server-to-server transport
- IMAP4 and POP3 client access to messages
- SMTP/MIME for sending and receiving messages
- LDAP for attribute storage and directory queries. Attribute storage includes user and system data, and directory queries include name and address.

Note:

IMAP4, POP3, SMTP/MIME are used for the Message Storage Server. LDAP is used for the Message Storage Server and Exchange. For Exchange IMAP4, POP3, SMTP/MIME, and LDAP are supported by the message store but not by Modular Messaging. MIME is used for the Domino.

• SWINs:

Note:

New installations of Modular Messaging Release 5.2 support only SIP integration although other forms of integration are available via a gateway device. Modular Messaging systems upgraded to Release 5.2 support the following telephony protocols and switch integrations for connecting the MAS to the switch.

- Session Initiation Protocol (SIP)
- H.323
- Q.Signaling (QSIG)
- Enhanced Inband Analog
- RS-232 for serial SWINs such as Simplified Message Desk Interface (SMDI) or Simplified Message Service Interface (SMSI)
- DSE

• LAN constraints: TTY messaging is supported only when TTY signals are transported by a reliable network to and from the Modular Messaging system. This is accomplished by using Analog Inband, Analog serial/SMDI, Analog CLAN, DSE, T1 QSIG, or E1 QSIG telephony integration. These switch integrations are available only on the Modular Messaging systems upgraded to Release 5.2 systems. Avaya also supply Modular Messaging 5.1 on S8730 servers with appropriate telephony interface cards, which can then be upgraded to Modular Messaging 5.2. Alternatively, Modular Messaging 5.2 can be used with SIP and G.711 audio encoding, providing that the packet loss rate is less than 0.12%. To keep the packet loss rate less 0.12%, Modular Messaging system must be connected to Communication Manager through a LAN.

- Avaya's Common Logging Architecture (CLA)
  - Operation History, Audit Logs, Windows Event Log, Alarms Logs conform to the Common Logging Architecture
  - CLA format includes the standard syslog headers and new headers for more information
- Fax standard: Tag Image File Format (TIFF)/F Profile for Facsimile Dialogic format
- Audio encoding formats: Global System for Mobile Communications (GSM) 6.10 and G.711, A-law and µ-law. GSM 6.10 has a coding rate of approximately 13 kilobits per second (kbps) or 1.6 Kilobytes per second (KBps). G.711 has a coding rate of approximately 64 kbps or 8 KBps. As GSM 6.10 requires only 13 kbps to encode, GSM 6.10-encoded messages require a considerably smaller amount of storage, as compared to G.711-encoded messages. For example, a 60-second voice message requires approximately:
  - 95.2 KB when encoded using the GSM 6.10 format
  - 468.8 KB when encoded using the G.711 format

  G.711 provides higher voice quality than GSM 6.10 even in heterogeneous networks that require multiple audio encoding and decoding. Therefore, Avaya recommends the use of G.711 as the audio encoding format for Modular Messaging.
- Modular Messaging complies with standards established by the U.S. government and standards bodies for mandatory compliance areas, such as:
  - Product Safety
  - Electro Magnetic Compliance (EMC)
  - Telecommunications
- Compliance with Section 508 and Section 255: Modular Messaging AUDIX TUI complies with Section 508 of the Rehabilitation Act. Modular Messaging also complies with Section 255 of the Communications Act. These sections deal with the usability of a product by people with disabilities.

Survivable Modular Messaging

Survivable Modular Messaging provides a disaster recovery solution for Modular Messaging. The survivable configuration consists of a primary Modular Messaging system at one site and a Survivable Modular Messaging at another site. The primary system actively handles the calls and all the Modular Messaging services, while the survivable system is kept on standby. The survivable system periodically duplicates the data and configuration from the primary system, which keeps the survivable system in a suitable standby state. On the event of a disaster of the primary system, the calls can be routed to the survivable system. The survivable system

assumes the role of the active system and thereon handles the calls and all the Modular Messaging services.

Survivable Modular Messaging is supported only for the MSS and Exchange stores. Survivable Modular Messaging is designed to work in conjunction with the Communication Manager running on an Avaya Enterprise Survivable Server (ESS) or Avaya Local Survivable Processor (LSP).

Note:

The survivable system for the MSS store is as good as the last restore of data and configuration backup. To continuously replicate the data and configuration in this configuration, third-party mirroring applications like Message Mutare Mirror can be used.

For additional information on installing, upgrading and maintaining the Survivable Modular Messaging configuration, see the *Implementing Survivable Modular Messaging for the Microsoft Exchange Server Release 5.2* guide and the *Implementing Survivable Modular Messaging for the Avaya Message Storage Server (MSS) Configuration Release 5.2* guide.

Chapter 2: Modular Messaging server components

Messaging Application Server

The application server provides an interface between the message store, the directory and the telephone system. In Modular Messaging, the application server is known as the Messaging Application Server (MAS).

A Modular Messaging—MSS multi-server system consists of at least one MAS and an Avaya Message Storage Server (MSS). Modular Messaging—MSS in a multi-server configuration supports a maximum of five MAS units in a voice mail domain (VMD) plus an optional Supplementary Server.

Note:

In a VMD with multiple MAS units, all the MAS units must be physically co-located with the storage server and must be on the same LAN segment as the storage server.

In a Modular Messaging single server configuration only one instance of the MAS can exist and this will be co-located on the same physical machine as the MSS and optional Web Client server.

A Modular Messaging—Microsoft Exchange or Modular Messaging—IBM Lotus Domino system consists of at least one MAS operating with at least one back-end message store server (Microsoft Exchange server or IBM Lotus Domino server). With Microsoft Exchange or IBM Lotus Domino, Modular Messaging supports a maximum of 10 MAS units in a VMD plus an optional Supplementary Server.

Note:

In a VMD with multiple MAS units, the MAS units cannot be physically distributed.

Starting with Modular Messaging Release 5.2, all new installations of the MAS software in a multi-server configuration reside either on the Avaya-provided S8800 or HP DL360 G7 server platform or on customer-provided equipment (CPE). In Modular Messaging single server configuration however only the Avaya-provided S8800 or the HP DL360 G7 server platform is supported. For upgraded Modular Messaging releases, the MAS software can reside on the existing Avaya-provided S8730 or S3500 server platform or on the new Avaya-provided S8800 or the HP DL360 G7 server platform and the CPE equipment.

Customer-provided equipment can have either an AMD or an Intel processor. The specification of the hardware must be at least equal to that of an equivalent Avaya-provided server. For example for new installations of Modular Messaging, CPE will be equal to or greater than the Avaya S8800 in terms of memory, disk, and CPU power. For upgrades from existing systems, depending on the hardware used before performing the upgrade, CPE will be equal to or greater than the Avaya S8800, S8730, S3500, or HP DL360 G7 server in terms of memory, disk, and CPU power. For more information, see Messaging application server requirements on page 355.

Note:

The installation routine for Modular Messaging assumes that the operating system of the customer-provided server is originally configured similar to that of an Avaya-provided server and has not been hardened prior to the installation. Customers can use the *LAN Port Usage* guide, available at http://www.avaya.com/support to help identify further requirements that will lead to successful installation and operation of the Modular Messaging system.

MAS services and functionality

An MAS provides the following services and features:

- Inbound services

  An MAS provides support to inbound services, such as Call Answer, subscriber access, offline access to Call Answer messages, graphical user interface (GUI) access, Automated Attendant, Caller Applications, and inbound fax.

- Outbound services

  An MAS provides support to outbound services, such as Find Me, Call Me, Notify Me, Message Waiting Indicator (MWI), Automated Attendant transfers, and outbound fax.

- Software components

  An MAS hosts server software components, such as Tracing Service, Mailbox Monitor Service, MWI Service, Call Me Service, and Fax Sender Service.

- Key functions and applications

  An MAS provides switch integrations (SWINs), the telephone user interface (TUI), voice encoding and decoding, alarming and event tracking, statistics and performance counters, operation history, fax capability, and text-to-speech (TTS) capability.

  Client applications, such as system administration tools and diagnostic and reporting tools are not uniquely associated with the MAS but are required on each MAS.

Modular Messaging software components

The Modular Messaging software includes the Avaya software components that must be installed on a customer-provided MAS or on an Avaya MAS.

In new installations of Modular Messaging, if a VMD contains more than one MAS, all the components are installed on all the MAS units. However, the administrator cannot enable all the components on all the MAS units. For example, the administrator can enable Tracing Service on an MAS and Call Me Service on another MAS. When you upgrade a Modular Messaging—MSS system, the missing components are installed on all the MAS units but not enabled.

See Distributing MAS software components for information on enabling the MAS components in a multi-MAS VMD. For information on which component should be enabled on which MAS, see Recommended placement of server components on page 267.

The Modular Messaging software components are:

- Administration, diagnostic, and reporting tools
- MAS software and prompt files
- Tracing Service
- Audit Service
- Mailbox Monitor Service
- MWI Service
- Call Me Service
- Fax Sender Service
- Data Collection Tool
- Offline Call Answer Store
- Avaya Diagnostic Tool (ADT)
- Permissions Checker Tool (Modular Messaging—Exchange only)
- WebLM (only needed if there is no other license server)

Administration, diagnostic, and reporting tools

The following table describes the various Modular Messaging administration tools.

Administration tool	Description
Voice Mail System Configuration	Use the Voice Mail System Configuration (VMSC) application to configure and maintain voice mail systems. VMSC facilitates configuration of properties that are shared

Administration tool	Description
	across MASs grouped in a VMD and properties that are specific to an MAS. Properties that are shared across MASs can be configured centrally. Any changes made to a VMD's properties are then updated and replicated automatically to all MASs in the domain. Security permissions are required to access VMSC. For more information about VMSC, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation* CD-ROM.
Subscriber Administration and All Tasks Wizard	For Microsoft Exchange subscribers, use Subscriber Administration and All Tasks Wizard to add, modify, or delete subscribers individually or in groups. Web-based administration of the MSS facilitates common organization-wide administration, diagnostics, and reporting. Administrators can use these Web-based administration pages to perform general system administration for the MSS and subscriber administration. Administration tasks include subscriber management and password administration. These administration pages also provide diagnostic logs. Role-Based Access Control (RBAC) gives customers the ability to control privileges on the MSS and MAS based on customer-defined roles. For more information about managing subscribers, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation* CD-ROM.
Caller Applications Editor	Use the Caller Applications Editor, a software application that consists of Microsoft Management Console (MMC) snap-ins and extensions, to create Caller Applications. For more information on Caller Applications, see Caller Applications on page 52. Install the Caller Applications Editor on any computer, not necessarily an MAS. Caller Applications are saved as UMA files, which are often, though not necessarily, originated and initially stored on the computer that hosts the Editor. To make the application available to callers, administrators use the Caller Applications Editor and associate and deploy a copy of the UMA file to the MAS units in the VMD. This process is called deployment. **Note:** With Modular Messaging Release 5.0 and later, the maximum number of Caller Applications that can be deployed per VMD is 5,000. Use the Editor to create one or more associations to specify the conditions under which a deployed caller application is launched for callers.

Administration tool	Description
	Although anyone with access to a copy of the Caller Applications Editor can create a caller application and save that caller application to a file, only Modular Messaging system administrators with the correct Role-Based Access Control (RBAC) permissions can deploy applications and modify the associations.
Visual Voice Editor	Use the Visual Voice Editor, a software application, to customize the prompts for the Automated Attendant. The application allows you to record and edit prompts. Use the local multimedia capabilities on a personal computer or a telephone to record prompts. For more information about Visual Voice Editor, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation* CD-ROM.

The following table describes the various Modular Messaging diagnostic and reporting tools.

Diagnostic and reporting tool	Description
Operation History Viewer	Use the Operation History Viewer to view events stored in the Operation History Database. The Operation History Database stores events such as port activity that are passed from the MAS units in the VMD. For more information about the Operation History Viewer, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation* CD-ROM.
Port Monitor	Use the Port Monitor application to check the status of ports on a MAS. Additionally ports can be disabled and enabled using this tool. For more information about the Port Monitor, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation* CD-ROM.
MMSnap Utility	The MMSnap Utility collects and distributes fault data from MAS systems.
Reporting Tool	An administrator uses the Reporting Tool application to generate reports that summarize voice mail activity. For more information about Reporting Tool, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation* CD-ROM.

MAS software

The following table describes the various software components of an MAS.

Component	Description
MAS Software	The core MAS software including the Fault Monitor and Service Connector is installed on each MAS.
Front End database (FEDB)	The Front End Database is a local cache of the subscriber directory stored on each MAS as a Microsoft SQL Server Express database. This database contains sufficient information to allow calls to be answered appropriately and messages to be addressed even when it is not possible to communicate with the message store. Data is regularly synchronized between the directory and the FEDB, ensuring that the most up to date information is always available.
Telephone User Interface (TUI)	Each MAS has the software required to provide Telephone User Interfaces including Prompts and Language Packs. For more details of the TUI, see Modular Messaging Interfaces on page 49.
Alarming	The Alarming service provides active monitoring of the MAS and an automatic error recovery mechanism for many software failures. It incorporates the following three services in addition to itself: • Event Monitor Server • Performance Monitor Server • Process Monitor Service For more details of the alarming feature, see Alarms and Notifications on page 90.
Audit Service	The Audit Service records information about the changes to the configuration of the Modular Messaging system. With MAS auditing, an audit event is logged whenever a role-controlled administrative operation is attempted by an MAS. The Audit Service logs only the usage of Modular Messaging administrative applications. It logs user-friendly information as well as the typical system data. For example, the name of a caller application is logged, as well the Globally Unique Identifier (GUID). With the Audit Service, you can configure the use of the syslog protocol which allows third-party system administration tools to be used on the Modular Messaging system. The Audit logs can be configured to purge any events that are older than a specified number of days, automatically. You can store the logged audit events, even if the audit server is temporarily out of service.

Component	Description
	With the Modular Messaging Audit Log Viewer, you can view and filter the results of the audit logging. The Audit Service does not log the following type of data: • Passwords or any similarly sensitive data. • Usage of non-administrative Modular Messaging applications. • Settings changed by subscribers. • MSS Subscriber Administration. This application is audited by the Avaya MSS ATI feature. • Subscriber Administration for IBM Lotus Domino subscribers. To activate Messaging Application Server (MAS) Auditing, the service on one MAS in the voice mail domain must be assigned to be the Modular Messaging Audit Server. This is configured by the Voice Mail System Configuration application's **Syslog** tab on the Serviceability node. The Audit Service is installed to run on each MAS in the voice mail domain, including the supplementary server. The Modular Messaging Voice Mail Domain configuration enables a set of syslog servers to be configured to receive syslog events from the Modular Messaging servers. Syslog events produced by the Audit Service are in the common logging format and are sent to the set of syslog servers.

Tracing Service for Messaging Application Server

The Tracing Service records operational information about activity related to the MAS service of Modular Messaging. Events such as port activity are passed from each MAS unit in the VMD and are stored in an Operation History Database. The Tracing Service maintains connections with all MAS units in a VMD and performs the following tasks:

- Collects all events generated by each MAS in a VMD that are used by an administrator for diagnostic purposes
- Writes the events to the Operation History Database
- Periodically extracts summary information for the entire VMD from the operation history database and writes it to the transaction database (optional)
- Periodically cleans up expired events from the operation history database and from the transaction database (optional)

Administrators must use Tracing Service to periodically clean up expired events from their Operation History Database. For more information on Operation History Database and cleaning up expired events, see the *MAS Administration Guide*.

Mailbox Monitor Service

The Mailbox Monitor Service monitors subscriber mailboxes to determine when new message meet Call Me rules. The MSS, the Microsoft Exchange server, and the IBM Lotus Notes server notify Mailbox Monitor of new messages that meets MWI rules.

The MWI Service and the Call Me Service's Call Me and Notify Me features communicate frequently with the Mailbox Monitor Service. The supported Modular Messaging configuration requires that MWI Service, Call Me and Notify Me feature must all be coresident on the same computer.

During installation of the Modular Messaging system, on installing the Call Me Service or the MWI Service, the Mailbox Monitor Service is automatically installed.

Message Waiting Indicator Service

The MWI Service alerts subscribers when messages meeting specified criteria arrive in their mailboxes. Subscribers are alerted by a lamp indicator on the telephone or by an audible tone when they pick up the receiver. The MWI Service uses the Mailbox Monitor Service to check when new messages arrive and determines the indicator status on a subscriber's telephone.

Note:

This software is installed on each MAS in the VMD, but it must be enabled on only one MAS.

The MWI Service performs the following tasks:

- Maintains a list of subscribers with active MWI rules and stores information about each subscriber mailbox that has MWI enabled
- Frequently receives notifications of mailbox changes from Mailbox Monitor Service. The MSS, Microsoft Exchange, and IBM Lotus Domino notifies Mailbox Monitor of new message that meets MWI rules
- Requests a suitably configured MAS in the VMD to set or reset the indication for MWI

For more information on MWI, see Message Waiting Indicator on page 188.

Call Me Service

With the Call Me Service, Modular Messaging initiates the Call Me and Notify Me features to notify subscribers when messages meeting specified criteria arrive in their mailboxes. The Call Me Service uses Mailbox Monitor Service for checking when new messages arrive.

The Call Me feature causes Modular Messaging to call subscribers at a designated telephone number or list of telephone numbers, or to initiate a paging call. The Notify Me feature causes

Modular Messaging to send a text message to a designated address or to initiate a paging call.

Note:

This software is installed on each MAS in the VMD, but it must be enabled on only one MAS. The Call Me Service and MWI Service software must be enabled on the same MAS. These services must be coresident with the Mailbox Monitor Service. These services must be installed on the MAS with the smallest number of ports.

The Call Me Service performs the following tasks:

- Maintains a list of subscribers with active Call Me and/or Notify Me rules
- Uses the Mailbox Monitor Service to periodically monitor subscriber mailboxes to determine whether a new message meets specified rules
- Requests that an MAS in the VMD use subscriber-configured telephone lists to call the subscriber, subject to Call Me rules
- For Notify Me, requests that a text message be sent to the subscriber-configured address

For more information on Call Me and Notify Me, see Call Me on page 192.

Fax Sender Service

Modular Messaging uses Fax Sender Service to support fax messaging, as described in native fax server on page 165.

Subscribers of Modular Messaging can create, receive, review, send, and print fax messages. When subscribers send a fax, the feature attaches a cover page to the fax message, if enabled.

Subscribers can also use the Fax Print Driver to print from Windows-based applications, using the Windows Fax Service, to Fax Sender Service.

Note:

This software is installed on each MAS in the VMD, but it must be enabled on only one MAS.

Fax Sender Service only supports the G.711 µ-law. Fax Sender Service does not support the G.711 A-law and digital fax machines.

Data Collection Tool

The Avaya Data Collection Tool (DCT) is required for preparing for initial installation of a Modular Messaging system.

The DCT also collects information that is required for an upgrade or catastrophic disk failure recovery of an MAS. The tool queries each MAS unit in a VMD and the supplementary Tracing

Service, if present, to collect the required information. The tool also allows for the MSS configuration to be manually entered. The DCT saves the server information into a data file. Modular Messaging uses the information in this data file during the upgrade of the MAS or to restore the MAS configuration after a catastrophic disk failure.

For more information on DCT, see System design and data collection on page 305 and *Modular Messaging Data Collection Tool Online Help* available on the *Avaya Modular Messaging Documentation* CD-ROM.

Offline Call Answer Store

An MAS caches all Call Answer messages in a local message store for a configured retention period. To improve availability, Avaya recommends a remote Offline Call Answer Store. The Offline Call Answer Store is optional.

In a multi-MAS VMD, each MAS copies the copies of messages in its local message store to a remote Offline Call Answer Store. The Offline Call Answer Store contains copies of messages from all MAS units in a VMD.

For increased availability, Modular Messaging provides Call Answer services to callers, even if a message store is unreachable. Modular Messaging makes these offline Call Answer messages available to subscribers using the TUI.

The Offline Call Answer Store can reside on an MAS that has the required storage capacity or on a separate computer. For more information, see Recommendations for Offline Call Answer Store on page 270.

Note:

All the MAS units in the VMD must have the required permissions to access the Offline Call Answer Store.

The administrator of the Modular Messaging system can configure the location of the Offline Call Answer Store using VMSC. If an invalid path or an empty path is configured as the location, the MAS units will not be able to connect to the Offline Call Answer Store.

If the Offline Call Answer Store becomes unavailable, the Modular Messaging system temporarily disables the offline access of Call Answer messages. The offline access is enabled when the store becomes available again.

An administrator can reconfigure the location of the remote Offline Call Answer Store to a new location. The Modular Messaging system moves all offline Call Answer messages within the retention period to the new location. All offline Call Answer messages in the old location are retained. The administrator can manually delete these messages, as required. For more information on the offline Call Answer messages, see Offline access to Call Answer messages on page 142.

Avaya Diagnostic Tool

Avaya Diagnostic Tool enables a customer to see the basic operating system and Modular Messaging service states from a single location through a standard Web browser. This view of the system helps to quickly identify the state of a Modular Messaging MAS by centralizing state information about the operating system, file system, services, databases, and other elements of the MAS. The customers can also save a file of the viewed state to the local MAS and retrieve it later, if required.

Permissions Checker Tool

Permissions Checker Tool primarily comes for Modular Messaging—Exchange. The tool helps to ensure that proper permissions are assigned to accounts in the Active Directory that are responsible for integration of Modular Messaging with the Exchange server. The Permissions Checker Tool can also assist in identifying the permissions that need to be corrected and facilitates the modification of the identified permissions.

Note:

The Permissions Checker Tool has not been updated to work with Exchange 2010.

Message store

A Modular Messaging—MSS system uses an internal message store.

A Modular Messaging—Exchange system integrates with an existing Microsoft Exchange e-mail system, which acts as the message store.

A message store provides or supports the following functions:

- Modular Messaging mailboxes for subscribers. These mailboxes store messages, including multimedia components such as voice, fax, text, and binary attachments. These mailboxes also store recorded greetings and certain other items of subscriber data.
- Message delivery to local mailboxes.
- Message networking for delivery of messages to remote destinations.
- Directory services, including mailbox account information.
- Desktop messaging clients.
- Directory synchronization with remote systems.
- Backup and restore of subscriber mailboxes.

- Distribution lists.
- Broadcast messages.
- Subscriber administration and system administration.

Avaya Message Storage Server

Starting with Modular Messaging—MSS Release 5.2, all installations of the MSS software reside on the Avaya S8800 or the HP DL360 G7 platform with the operating system based on release 4.7 of Red Hat Inc. version of Linux®. The MSS software of the upgraded Modular Messaging releases can reside on the Avaya S8800, S8730, S3500, or HP DL360 G7 platform with the operating system based on release 4.7 of Red Hat Inc. version of Linux®. Standard protocols such as IMAP4, POP3, SMTP/MIME, and LDAP are used to interact with the MSS.

In the Modular Messaging multiple server configuration, the MSS is used for storing and administering subscriber mailboxes. The MSS stores all voice, fax, and text messages that a subscriber receives. The MSS does not have access to messages that were sent to the subscriber's mailbox on a separate corporate e-mail server.

For MSS systems upgraded to Modular Messaging Release 5.2, the MSS can either be a high-availability configuration (MSS—H) or a standard-availability configuration (MSS—S).

For information on the capacities of the MSS—S and MSS—H, see Avaya Message Storage Server capacities on page 220.

For increased security, performance, control, and application management, the MSS connects to MASs through a private Ethernet local area network (LAN).

Microsoft Exchange Server

Modular Messaging supports Microsoft Exchange Server 2003, Microsoft Exchange Server 2007, and Microsoft Exchange Server 2010. With Exchange Server 2003 and Exchange Server 2007, any Exchange server that is associated with Modular Messaging must host a mailbox store. With Exchange Server 2010, Modular Messaging communicates with a Client Access Server (CAS) or CAS array.

For each Modular Messaging subscriber, the Microsoft Exchange server provides a single mailbox that holds all messages—voice, text, corporate e-mail, and fax—that the subscriber receives. To manage attributes for Modular Messaging subscribers and MAS units, Microsoft Exchange server uses Active Directory.

You can enable Modular Messaging for the following types of Active Directory objects:

- Mail-enabled user — A user who can receive e-mail in Exchange.
- Contact— An Active Directory object capable of receiving e-mail.
- Group — A group of users.

Note:

When an account is hidden from the global address list (GAL), systems that have peer Exchange servers set as Exchange 2010 cannot send messages to the accounts. Before a message is sent to a user, a lookup is performed in the GAL from the account that the user has logged on. In the case of external callers, the External caller account is used. Either way, if the peer Exchange server is 2010, this look up fails when the account is hidden, however, it works when the peer Exchange server is an Exchange 2003 server.

In Modular Messaging—Exchange, the directory server must be an Active Directory Domain controller configured as a global catalog. This server can be the same as the Exchange server, but it will typically be a separate server.

Modular Messaging uses MAPI to communicate with the Exchange server.

Modular Messaging synchronizes the Active Directory with the FEDB once in every 5 minutes.

IBM Lotus Domino server

Modular Messaging—Domino version supports the IBM Lotus Domino Server 7.0.x and IBM Lotus Domino Server 8 and 8.5.2.

For each Modular Messaging subscriber, the IBM Lotus Domino server provides a single mailbox that holds all messages—voice, text, corporate e-mail, and fax—that the subscriber receives.

Modular Messaging uses Notes RPC to communicate with the IBM Lotus Domino server.

To manage attributes for Modular Messaging subscribers and MAS units, Domino uses the Domino Directory. In Modular Messaging—Domino version, the Directory runs on each IBM Lotus Domino server. This Directory manages addressing for IBM Lotus Domino and Modular Messaging subscribers.

Modular Messaging synchronizes the Domino Directory with the FEDB once in every 5 minutes.

Note:

Modular Messaging—Domino requires IBM Lotus Domino Unified Communications (DUC) 1.2.5.

Web server

A Web server allows subscribers to obtain access to Modular Messaging Web Client and Web Subscriber Options. For Modular Messaging Web Client and Modular Messaging Web Subscriber Options, a Web server is a personal computer based server running Windows Server software.

In Modular Messaging multi-server configuration, Modular Messaging Web Client must be installed on a standalone computer, as Modular Messaging Web Client cannot be installed on an MAS or with other MAS applications or services. In Modular Messaging single server configuration, Modular Messaging Web Client can run on the same single server as the MAS, but in a different virtual machine.

In Modular Messaging multi-server configuration, Web Subscriber Options can be installed on an MAS, on the Web server of Modular Messaging Web Client, or on a standalone computer. In Modular Messaging single server configuration, Modular Messaging Web Subscriber Options can run on the same single server as the MAS, but in a different virtual machine.

Virus protection software with the latest updates must be installed on all personal computer based servers in the Modular Messaging domain as well as on an MAS.

Voice mail domain

A voice mail domain (VMD) is a group of MAS units with a common set of properties, that use one or more message stores. A VMD is a single, complete voice-messaging system.

The MAS units in a VMD can be seen as a single “virtual” server for that domain. This allows the system to be highly scalable, in that multiple servers can be configured as part of the VMD to address large capacity requirements. Modular Messaging—MSS supports a maximum of 5 MAS units and a single MSS in a VMD, while Modular Messaging—Exchange or Modular Messaging—Domino supports a maximum of 10 MAS units and multiple storage servers in a VMD.

An incoming call can be handled by any channel on any MAS and have access to call answering, greetings, messaging, fax receipt, auto attendant, Caller Applications, and the full directory.

Outbound services such as fax, Call Me, and MWI can also share the communication facilities across all the servers. This virtual server allows Modular Messaging subscribers in the domain to use the TUI to call in, access their mailboxes, and retrieve their messages. Also, the virtual server can call the telephone of any subscriber who runs desktop client applications, such as Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, and Modular Messaging Lotus Notes Client, to play back voice messages.

Any changes made to the properties of a VMD are automatically updated and replicated to all MAS units in the domain. Voice mail domains provide the ability to store and retrieve properties that belong to a set of MAS units working together to provide integrated call answering.

An enterprise can create multiple voice mail domains, for example, one in each major geographical location. Each VMD must have at least one MAS. An MSS can support only a single VMD, so each Modular Messaging—MSS VMD must have its own MSS. An Exchange or Domino storage server can support multiple VMDs.

A non-MultiSite Modular Messaging Voice Mail Domain (VMD) can support only a single dial plan, limiting it to either a single switch, or multiple switches if they are networked and share a common dial plan. However, with MultiSite-enabled, Message Application Servers (MASs) in a single Voice Mail Domain (VMD) communicate with multiple switches with different dial plans, in different locations. In MultiSite-enabled Modular Messaging systems, the message stores and MASs are centralized in a data center. All MASs in the VMD must integrate using SIP. For additional information on designing voice mail domains, see General rules for voice mail domains on page 207.

Chapter 3: Modular Messaging interfaces

Telephone user interfaces

A telephone user interface (TUI) provides subscribers and callers with access to Modular Messaging, from a touchtone telephone.

The Modular Messaging TUI presents two interfaces:

- Caller interface
- Subscriber interface

Caller interface

Modular Messaging provides three different interfaces for callers:

- Automated Attendant
- Avaya Common Caller Interface (CCI)
- Caller Applications

The caller interface is for callers to the Modular Messaging system who either are not subscribers or have not logged in to the system as subscribers. Logged-in subscribers are presented the Subscriber Interface, also known as the Subscriber TUI.

Automated Attendant

Administrators can configure the Automated Attendant to prompt callers with the system greeting and collect their input, in the form of Dual Tone Multi-Frequency (DTMF) key presses. Administrators can configure the Automated Attendant to offer single-digit menu choices, for transfers or quick messages, and use the Dial-by-Name feature to reach subscribers.

A Modular Messaging system contains only one Automated Attendant. Administrators can use Caller Applications for additional call routing requirements. For information on Caller Applications, see Caller Applications on page 52.

The Automated Attendant interface greets callers and allows them to log onto the TUI. You can assign Custom Prompts for the Automated Attendant, for special holidays, for different

times of day, and in different languages. You can also configure the Automated Attendant properties for DTMF input.

The Automated Attendant interface also allows callers to reach designated system operators, as long as the Time of Day configuration allows for transfers to the system operator at those times of the day.

Administrators should set up the system to use the Automated Attendant if the telephone system does not support Direct Inward Dialing (DID). The Automated Attendant interface is enabled by default.

If the Automated Attendant is disabled, the following call answering functionalities will not be available:

- Transfer to Subscriber's extension; in this case the system transfers callers directly to the subscriber's mailbox, where they can leave a message
- Call Screening
- Call Blocking
- Find Me

Note:

When the Automated Attendant is disabled, Find Me will continue to operate for calls that reach the subscriber mailboxes without passing through the Auto-Attendant.

Scheduling capabilities of Automated Attendant

Administrators can configure the Automated Attendant interface to exhibit scheduled behavior with respect to the prompts that callers hear when connecting to the system.

The Voice Mail System Configuration (VMSC) application can be used for the first level of configuration, which relates to recurrent daily behavior. For each day of the week, the hours in which the office is open can be specified, and the prompts to be played during those specific hours can be configured. These prompts greet callers during designated business hours.

Administrators can also set holiday schedules for Automated Attendant, which override any recurrent daily behavior that may be defined. The Automated Attendant Holiday prompts can be configured to play on specific dates, for example, when the office is closed for a public holiday.

The system supports up to 18 holiday prompts for a VMD.

Avaya Common Caller Interface

Callers who reach the mailbox of a subscriber, either because the extension is busy or because there is no response, are normally prompted to leave a message for the subscriber. Messages that the caller leaves for a subscriber are known as Call Answer messages.

Typically, the caller hears a greeting for the mailbox and is prompted to leave a message for the called subscriber. The caller may record a message and hang up.

The interface that allows callers to leave Call Answer messages is identified as the Common Caller Interface (CCI). This interface allows the callers limited interactions with the messaging system through a set of DTMF commands. These commands are common for all Call Answer callers, regardless of the TUI assigned to the called subscriber.

Options available when using the Common Caller Interface

When a caller reaches a subscriber's mailbox and is presented with the CCI, the CCI plays the options the caller can use to leave a message for the called subscriber.

If a Caller Application is associated with a called extension, then the Caller Application is executed instead of the default CCI call handling.

When presented with the CCI, callers can do the following:

- Select the language in which the Call Answer announcements are made, if multiple languages have been assigned by the subscriber.
- Listen to the active greeting.
- Listen to the instructions for recording messages.
- Record and send a voice message or send a fax message. Modular Messaging—Avaya Message Storage Server (MSS) subscribers can also send a fax message with voice annotations.
- Erase the recorded message and re-record at the prompt.
- Set delivery options and send the message. Delivery options include marking a message urgent, marking a message private, and including a fax message.

  Note:

  An MAS administrative setting determines if callers can leave private Call Answer messages. For more information, see Creating private Call Answer messages on page 120.

- Exit from the CCI.
- Transfer the call to the personal operator or system operator, depending on the active schedule.
- Transfer to another mailbox.

For more information on using the CCI, see the *Avaya Modular Messaging Telephone User Interface Guide*.

Selecting a language when leaving a Call Answer message

The subscriber can define a default Call Answer language and one or two additional languages for the mailbox by using Subscriber Options or Web Subscriber Options. The languages may be any of those installed on the Modular Messaging system. Teletypewriter (TTY) can be one

of the Call Answer languages. If TTY is enabled for the Modular Messaging system, the caller can toggle between TTY and a spoken language by dialling '*1' on the telephone keypad.

Subscribers may define TTY as the default language if they expect to receive calls from persons using TTY devices for the hearing impaired. This setting will allow any caller to leave a message using a TTY device. This capability provides compliance with Section 508 of the Rehabilitation Act and Section 255 of the FCC regulations for Telecommunications Access For People with Disabilities.

When the caller reaches a mailbox with multiple Call Answer languages, one of the following occurs:

- If the caller is recognized as a Modular Messaging subscriber (and if the caller's preferred language is one of the recipient's Call Answer languages), the system selects the default language of the caller's mailbox for all subsequent system prompts, announcements, and greetings.
- If the caller is not a Modular Messaging subscriber, the caller is prompted to select one of the languages for all subsequent system prompts, announcements, and greetings. If the caller does not specify a choice, the default language is used.

For more information on selecting a language, the see *Avaya Modular Messaging Telephone User Interface Guide*.

Caller Applications

Caller Applications are a collection of menus and prompts that allow administrators to extend the Modular Messaging caller interface.

Using Caller Applications, administrators can extend the system Automated Attendant and the CCI, depending on the requirements of the organization.

Some basic functions that a Caller Application can provide include:

- Transferring callers to a specified mailbox
- Allowing callers to record messages
- Sending messages to either a mailbox number or an e-mail address that is configured as part of the Caller Application
- Providing directory assistance to callers with the Dial-by-Name feature

Caller Applications can perform additional functions, such as:

- Automating call handling and routing incoming calls directly to departments within the organization
- Creating daily bulletin board announcements for callers and subscribers
- Allowing greater flexibility and more options for system and personal greetings

Caller Applications are created using the Caller Applications Editor. For more information, see Caller Applications Editor on page 36.

With Modular Messaging Release 5.1, and later, subscribers can play a disclaimer message before the subscriber's greeting. The disclaimer message cannot be interrupted by any Dual Tone Multi-Frequencies (DTMFs) entered by the caller when the disclaimer message is played.

Caller Applications Editor provides an option to enable the Caller Application for Call answered calls only. If a call-answered call is handled by the Common Caller Interface and a caller application is associated with the mailbox, then the application is run, regardless of whether the Call answered calls only option is set.

When caller requests to transfer the call to a mailbox that has an associated Caller Application, the Automated Attendant takes the Call answered calls only option into account. When the Call answered calls only option is enabled, then the call is transferred. If the transferred call is not answered, then the call is treated as a call-answered call. The disclaimer message can be played for all subscribers in a particular class of service.

Difference between a Caller Application and an Aria mailbox type

The Octel 250/350 series of voice mail systems allows extensive customization of the TUI through the use of Enhanced Call Processing (ECP) mailboxes and other types of mailboxes.

A Caller Application is not a mailbox and does not require that a mailbox be created on the message store or be dedicated to its use. A Caller Application contains one or more nodes, each of which can interact with the caller and pass control to another node. The actions that a particular node performs will correspond in many cases to actions performed by a certain Aria mailbox type.

Caller Applications do not emulate all Aria mailbox types. A Caller Application can be considered as a single-digit menu or as nested Automated Attendants, comprising a collection of actions of the various types supported, including:

- Menu (simple, or with extension, mailbox, or Caller Application)
- Transfer (operator, extension, or mailbox)
- Goto
- Conditional goto
- Send message (to mailbox or e-mail address)
- Termination (disconnection, default Automated Attendant, or to mailbox logon)

These actions can be combined as required to produce useful applications. Enough flexibility exists to duplicate, or at least approximate, the functionality of certain Aria mailbox types.

Scheduling capabilities of Caller Applications

Caller Applications provide scheduling capabilities that determine the behavior of Caller Applications, depending on the time of day. The Caller Application routes callers as per the definitions of the schedule created for a conditional branch within the application.

For example, a schedule can be created so that:

- When the schedule is active, callers are transferred to live help.
- When the schedule is inactive, callers are transferred to a mailbox, where they can record a message.

Caller Applications allow administrators to specify the hours in a week during which the schedule is active.

In addition to setting daily and hourly behavior, administrators can specify the behavior of Caller Applications for system-defined holidays. The Caller Applications Holiday prompts can be configured to play on specific dates, for example, when the office is closed for a public holiday.

Subscriber interface

The subscriber interface interacts with authenticated subscribers, providing them with access to mailboxes, from a touchtone telephone or a TTY device. When subscribers are away from the office, they can dial into the TUI to check their messages.

Modular Messaging provide the following TUIs:

- Aria TUI for Modular Messaging, an Octel Aria-based TUI
- AUDIX TUI for Modular Messaging, a TUI option that is similar to the TUI of Intuity AUDIX and DEFINITY AUDIX voice-messaging systems
- Serenade TUI for Modular Messaging, an Octel Serenade-based TUI

Administrators can assign subscribers the TUI of their preference, on a class of service (COS) basis.

The Modular Messaging TUIs make it easier for organizations to migrate from the following systems:

- An Aria (Octel 250/350) system to a Modular Messaging system
- An Intuity AUDIX voice messaging system or a DEFINITY AUDIX system to a Modular Messaging system
- A Serenade (Octel 200/300) system to a Modular Messaging system

Important:

The Modular Messaging TUIs are similar to but not exactly the same as the respective traditional Aria, Intuity AUDIX, and Serenade messaging systems.

Common subscriber log-in interface

Subscribers can directly dial the Modular Messaging system to log in to their mailboxes from their extensions or from other telephones.

All Modular Messaging subscribers use the same interface up to the point of logging in to their mailboxes.

When subscribers dial the access number, the system Automated Attendant greets them. The Automated Attendant announces the options a subscriber must use to reach a mailbox. Depending on whether the extension that the subscriber is using has an associated mailbox on the system, the Automated Attendant prompts the subscriber for either the password or the mailbox number and password.

Subscribers can also log in to their mailboxes from a TTY device with an acoustic coupler. The TTY device converts the announcements of the Automated Attendant to character prompts, which are displayed on the display of the TTY device. Subscribers can then enter their response to the TTY prompt by using the telephone. All key press inputs can be made by using the telephone. The TTY device converts all subscriber responses to TTY tones. The Modular Messaging system records the TTY tones in the same way as messages spoken over the telephone are recorded.

In Modular Messaging Release 5.2, Aria TUI users can select their preferred Aria prompting with selections of English US for 'normal prompting' and English – US Terse for 'abbreviated prompting.' Users can select the normal prompting and abbreviated prompting using Subscriber Options and Web Subscriber Options. Abbreviated prompts are available only in the English language.

Common Offline Access interface

When an MAS is operating in offline mode, subscribers can access the Call Answer messages they have received, using a common interface, regardless of the TUI assigned to them. Using the Common Offline Access interface, subscribers can access the following Call Answer messages:

- New Call Answer messages recorded after the MAS has gone into the offline mode
- New Call Answer messages recorded before the MAS has switched to the offline mode but that are within the configured retention period even if they have since been deleted from the subscriber's mailbox

Subscribers can gain access to only Call Answer messages through the Common Offline Access interface. They cannot access the new subscriber messages or networked messages that are delivered to their mailboxes. Offline access of Call Answer Messages allows subscribers only to listen to the messages. The subscribers cannot delete, save, or respond to the messages. For more information on the offline access to Call Answer messages, see Offline access to Call Answer messages on page 142.

Common Call Me interface

The Call Me feature allows the subscribers to schedule calls to one or more designated telephone numbers when messages that meet certain criteria arrive in their mailbox. When subscribers answer a Call Me call, they are invited to log in to Modular Messaging to review the message or messages.

All Modular Messaging subscribers use a common interface when answering Call Me calls. This interface identifies the called subscriber and provides a set of instructions for performing the following operations:

- Logging in to the mailbox by entering the mailbox number and password. After a subscriber logs in, the TUI assigned to the subscriber is used.
- Canceling further notifications for the current messages. This option deactivates Call Me for only the current messages. Call Me continues to remain active for the next new message.
- Blocking all further calls to the called number by turning off the associated Call Me rule. This option cancels all further calls to the called number or any other number that is configured for the rule. If a subscriber enters a wrong Call Me number while configuring Call Me, the receiver of the call can select the option to stop the nuisance calls. The subscriber can use Subscriber Options to re-activate Call Me. Call Me rules within Subscriber Options and Web Subscriber Options can be defined to exclude broadcast messages from the set of message types that trigger an outcall.

Common Find Me Interface

The Find Me feature allows subscribers to redirect unanswered calls to a list of telephone numbers specified. Subscribers can set up schedules (times for rules) with an associated list of telephone numbers for forwarding unanswered calls. Find Me is implemented only for calls that are not answered because the extension rings, and there is no answer. Find Me is not implemented for calls that are not answered because the extension is busy.

All Modular Messaging subscribers use a common interface when attending Find Me calls.

Features of the subscriber interface

Using the TUIs, subscribers can do the following:

- Initialize their mailboxes. When subscribers log in to their mailboxes for the first time, the Mailbox Initialization feature guides subscribers through the process of changing their password and recording their spoken name. In addition, subscribers of the Modular

Messaging Aria TUI can record their Please Hold prompt and personal greetings from the initialization feature.

- Retrieve, respond to, create, and send messages. The TUIs provide subscribers with an easy way to record, send, reply to, or forward messages.
- Access and respond to voice, fax, and text messages.

  In addition, Modular Messaging—Microsoft Exchange and Modular Messaging—IBM Lotus Domino subscribers can access and respond to corporate e-mail messages as well. The text-to-speech (TTS) feature converts corporate e-mail messages to speech, so that subscribers can listen to them as conveniently as they can to voice messages.
- Reply to a Call Answer message, and call the originator of a Call Answer message if the Modular Messaging system is configured to allow Call Answer responses.

  To reply to a Call Answer message from a remote subscriber, an administrator needs to perform some administrative tasks on the Modular Messaging system for Call Answer responses. For information on administering a Modular Messaging system for Call Answer responses, see Administering Modular Messaging systems for Call Answer responses on page 156.

  Note:

  In a MultiSite-enabled Modular Messaging system, the Call-Answer Message Response Improvements (CAMRI) Feature is not required and hence is disabled. MultiSite translation rules provide functionality similar to the CAMRI Feature. For more information on the MultiSite translation rules, see the *Modular Messaging MultiSite Guide*.
- Call the extension of the sender.
- Access private messages. Subscribers can access private messages from the TUIs. Depending on the Privacy Enforcement Level setting administered for the system, the TUIs might restrict subscribers from forwarding the message and replying to the private message with the original attached. For more information on the Privacy Enforcement Level setting, see The Privacy Enforcement Level parameter on page 120.
- Create private, urgent, or scheduled messages. Subscribers can mark new messages as private (possessing forward or reply restrictions, as described in the previous bullet), urgent, or scheduled to be delivered at a later time.
- Access personal configuration options. Subscribers can set up call handling and customize greetings including the prevention of message receipt during extended periods of absence.

  Certain personal configuration options cannot be modified using a TUI, such as specifying notification rules for Notify Me. These may be modified using Subscriber Options or Web Subscriber Options.
- Create, modify, and delete Personal Distribution Lists (PDLs).
- Address messages to PDLs using the PDL name or the PDL list number.

- Record announcements that are played in the Caller Applications.
- Sort messages by message type. Subscribers of Modular Messaging AUDIX TUI and Modular Messaging Serenade TUI can sort messages by message type. Subscribers of Modular Messaging Aria TUI do not need to sort their messages by message type since the TUI provides separate queues for each message type.

  Subscribers of Modular Messaging AUDIX TUI and Modular Messaging Serenade TUI can configure the sort by message type feature only through Subscriber Options and Web Subscriber Options.
- Configure Personal Operator: Subscribers can assign a mailbox number or extension number as the personal operator and select a schedule for the personal operator.

  Subscribers can configure personal operators for their mailboxes only if the administrator has assigned the required permissions to the subscribers. When using the TUIs, subscribers can select personal operator schedules but cannot view them. To view schedules, subscribers must use Subscriber Options or Web Subscriber Options.

  If the configured personal operator number corresponds to a mailbox number then the time zone assigned to the personal operator's mailbox is used for the associated schedule. Otherwise, the subscriber's time zone is used.
- Access unsent voice messages: If the telephone call drops when a subscriber is composing a voice message, the TUI saves the unsent message in the Drafts folder. During the subscriber's next login to the TUI, the subscriber can either complete and send the message, delete the message, or skip the message for later access. For more information on messages in the Drafts messages category, see Draft messages on page 60.

Common mailbox model

Modular Messaging provides a mailbox model that is common to subscribers of all three *Modular Messaging* TUIs.

A common mailbox model includes:

- Common message categories
- Common Message Waiting Indicator (MWI) status
- Common Call Answer greetings
- Common Audible Hourglass prompt

Message categories

Modular Messaging messages are stored in four message categories: New, Saved, Deleted, and Draft. The New, Saved and Deleted categories are consistent with standards-based e-mail clients. The categories are also common to the Modular Messaging TUIs, with a few minor exceptions described in this section. Modular Messaging stores unsent messages in the Drafts

folder for later editing, delivery, or deletion. For all Modular Messaging systems, Draft messages can be accessed with the Modular Messaging TUIs.

Some of the graphical interfaces, as well as the Aria TUI, provide an additional message category, Admin. In this category, messages that indicate delivery failures or other system or server problems are stored. If the Admin category is not provided in an interface, the message is stored in the New messages category.

New messages

Messages that are received in a subscriber mailbox are stored in the New message category when they meet any of the following criteria:

- The subscriber has not listened to or viewed the contents of the message, also known as the message body. The subscriber might or might not have accessed the envelope or header information of the message.
- The subscriber has accessed the message body and has used the available TUI options to explicitly retain the message as New.
- The subscriber has moved the message from the Saved category back to the New category.
- The subscriber has marked read messages as unread, from graphical user interface (GUI) clients.

The Modular Messaging TUIs present these messages as New messages. Standards-based e-mail clients might present these messages as New, Unseen, and Unread.

Saved messages

Messages that are received in a subscriber mailbox are stored in the Saved message category when they meet either of the following criteria:

- AUDIX and Serenade TUIs for Modular Messaging. The subscriber has accessed the contents of the message. The subscriber might have accessed the whole message or might have partially accessed the message.
- Aria TUI for Modular Messaging. The subscriber has accessed the message and has used the available TUI option to save the message.

The Modular Messaging TUIs present these messages as Saved messages. Standards-based e-mail clients might present these messages as Old, Seen, or Read.

With some clients, such as Modular Messaging Outlook Client, subscribers can mark read messages as unread, thus moving messages from the Saved category to the New category.

When subscribers move messages from the Saved category to the New category, the system activates or deactivates the following features:

- MWI. The system activates MWI for the moved message if the message meets the subscriber-defined MWI rule. Broadcast messages that are moved to the New category do not activate MWI.
- Call Me or Notify Me. The system activates Call Me for the moved message only if the delivery time of the message is after the time that the subscriber last logged in from the TUI.

Deleted messages

The Deleted message category shows messages that a subscriber deletes. These messages are accessible through the Modular Messaging Aria TUI, Modular Messaging Serenade TUI, and the Modular Messaging GUIs. Subscribers cannot access these messages through the Modular Messaging AUDIX TUI.

Draft messages

If the telephone call drops when a subscriber is composing a voice message, the unsent voice message is saved in the Drafts message category.

A TUI will save the unsent voice messages of a subscriber in the Drafts message category only if the administrator has enabled the feature for the subscriber. The administrator can use a class of service (COS) setting to determine whether the subscriber is permitted to use the feature or not.

When the subscriber logs into the mailbox using the TUI and there are unsent messages saved in the Drafts message category, the TUI presents the unsent messages to the subscriber. The subscriber can perform any one of the following actions on the messages:

- Edit the message, address the message, and send the message. When the message is sent, the TUI removes the unfinished copy of the message from the Drafts message category.
- Delete the message. When the message is deleted, the TUI removes the message from the Drafts message category.
- Skip the message. When the message is skipped, the TUI retains it in the Drafts message category. During the next log on, the TUI again presents the message to the subscriber.
- Exit to the main TUI menu, skipping any remaining unsent messages.

If a subscriber edits a voice message saved in the Drafts message category and the telephone call drops again, the TUI replaces the old unsent message with the new edited version of the unsent message.

Message Waiting Indicator status

All the Modular Messaging TUIs behave in a common fashion when activating and deactivating the MWI feature.

Broadcast messages may not activate MWI, depending on which message store is in use. For more information, see Broadcasting messages on page 107.

Message Waiting Indicator for New Messages

When the mailbox of a subscriber has one or more new messages, the system activates MWI, provided that the new messages meet the subscriber-defined MWI rules. When subscribers access a message and use a TUI option to retain the message in the New message category or when subscribers move a message from the Saved category to the New category, the system activates MWI.

Message Waiting Indicator for Saved Messages

Messages in the Saved category do not activate MWI.

Message Waiting Indicator for Deleted Messages

Messages in the Deleted category do not activate MWI.

Call Answer greetings

Subscribers can set up the Modular Messaging TUIs to play personalized greetings to callers.

If a called extension is associated with a Caller Application and the call is redirected to the TUI, the Caller Application is executed instead of the default CCI call handling. In this case, when callers reach a subscriber mailbox, they hear the menus or announcements of the Caller Application instead of the subscriber greeting.

The Modular Messaging TUIs support the following types of greetings:

- Personal greeting

  Subscribers can use this greeting to greet all callers that reach their mailboxes.

- Extended Absence Greeting (EAG)

  Subscribers can use the EAG to inform a caller that they are away from the office and have infrequent or no access to their messages. Callers cannot dial-through an EAG. Once recorded, the EAG will remain available and can be rerecorded or activated at any time. Administrators can choose through Class of Service whether to allow callers to leave messages following the playing of an EAG or not. Administrators can also delegate this decision to the subscriber who may configure the EAG using Subscriber Options, Web Subscriber Options, and TUI settings.

- Enhanced greetings

  Modular Messaging allows subscribers to create several greetings to be used in different situations. Subscribers can designate which optional greeting to use when an extension is busy (Busy calls) or because there is no answer (No Answer calls).

  Subscribers can also determine which greeting is played during office hours and after office hours. The enhanced greetings are also available when the Automated Attendant overrides Call Handling.

Call Handling feature can be configured to choose greetings for internal or external calls. Internal and external call differentiation depend on the Switch Integration (SWIN). With Multiple Greetings, subscribers can configure internal calls to act differently from external calls. For more information on call types and call handling, see the *Avaya Modular Messaging Telephone User Interface* Guide.

When the personal greeting or the optional greeting is active and the caller dials zero, the system transfers the call to the personal operator's mailbox when the greeting is being played. When EAG is active and the caller dials zero, the system does not transfer the call to the personal operator's mailbox until EAG is being played. The system transfers the call to the personal operator's mailbox only after EAG is played.

Audible Hourglass prompt

When the system response to a subscriber-requested operation is delayed for more than four seconds, the system plays an Audible Hourglass prompt. This prompt is an audible indication to subscribers that work is in progress and they should continue to wait.

The Audible Hourglass prompt is the Please Wait prompt or an appropriately localized equivalent, which is repeatedly played to the subscriber at 8-second intervals. Playback of the prompt is cancelled as soon as a response to the subscriber-requested operation is received. When a response is received, the system plays the Audible Hourglass prompt completely and then after a pause plays the subsequent prompt.

If the system does not respond within 30 seconds, the "The system is experiencing difficulties. Please hang up and try again later." prompt or an appropriately localized equivalent prompt is played.

Multilingual support

Administrators can configure the system so that the Modular Messaging TUIs support multiple languages.

Multilingual support for subscriber login

Administrators can identify one language as the default language for the system. The TUIs play all announcements and prompts in this language, unless otherwise instructed.

The prompts that a subscriber hears when logging in to the system are played in the default language of the system, up to the point of logging in. Once the subscriber successfully logs in to the mailbox, all subsequent prompts are played in the language administered for the mailbox.

Multilingual support for Automated Attendant

Administrators can assign up to three languages to the Automated Attendant. TTY can be assigned as one of the languages.

When the Automated Attendant greets callers, callers can select the language they prefer. All subsequent prompts and announcements from the Automated Attendant and Caller

Applications during that call are played in the selected language. Callers calling from TTY devices can select TTY/Telecommunications Device for the Deaf (TDD) as a language.

Multilingual support for Call Answer

Subscribers can configure their mailbox to support either multiple languages or a single language. Subscriber Options and Web Subscriber Options allow subscribers to assign up to three languages to their mailbox. TTY can be assigned as one of the languages. The subscriber can record different greetings for each language, and also for each type of call (such as internal, external, busy, and no answer), up to a total of nine optional greetings. Available call types depend on the switch integration settings of the system.

If only one language is defined for the subscriber mailbox, the primary Call Answer language is used for the duration of the Call Answer session.

If a mailbox is multilingual, callers that are unknown to the system are given the opportunity to select a language. Callers that are known to the system (system subscribers) are automatically presented with the default language of their own mailbox, provided it matches one of the languages assigned to the called mailbox. All subsequent prompts and announcements during that Call Answer session are played in the selected language.

Multilingual support for TUIs

Subscriber Options and Web Subscriber Options allow subscribers to select their preferred TUI language for their mailbox. The TUI language selected for the mailbox is used for logged in messaging sessions and not for Call Answer sessions. TTY can be assigned as the preferred TUI language. All TUI prompts are played in the selected language. If subscribers do not specify a language, the system uses the default language.

Multilingual support for Caller Applications

A Caller Application can interact with callers in different languages.

A Caller Application runs in the default TUI language for the system, unless a caller has previously interacted with the Automated Attendant and has chosen a different language.

When a multilingual Caller Application replaces the system Automated Attendant, only the default TUI language defined for the VMD is played to callers, provided this language exists in the Caller Application. Callers are not provided with an opportunity to choose a language before the Caller Application starts to run. However, Caller Applications can be modified to offer callers a choice of languages by providing a suitable interface. One way to do this is to create a Caller Application that collects the caller’s choice of language and that branches to other Caller Applications according to their choice.

Graphical user interfaces

Depending on the system Privacy Enforcement Level setting, Modular Messaging subscribers can use graphical user interfaces (GUIs), such as Avaya GUI clients or standards-based clients to access their mailboxes. GUI clients are applications that allow subscribers to access their mailboxes from a personal computer. These applications provide subscribers with a visual interface to perform various operations, such as accessing and sending messages, managing

messages, configuring mailboxes, and maintaining mailboxes, rules, greetings, and TUI and GUI preferences.

For more information on the Privacy Enforcement Level setting and its impact on GUI access to mailboxes, see The Privacy Enforcement Level parameter on page 120.

The following table lists the available GUIs and indicates which Modular Messaging versions work with each GUI.

Graphical User Interface (GUI)	Supported by Modular Messaging version	More information
Modular Messaging Microsoft Outlook Client	Modular Messaging—MSS Modular Messaging—Exchange	Modular Messaging Microsoft Outlook Client on page 65
Modular Messaging Microsoft Restricted Outlook Client	Modular Messaging—MSS	Modular Messaging Restricted Outlook Client on page 68
Outlook Web Access (OWA)	Modular Messaging—Exchange	Outlook Web Access (OWA) on page 74
Modular Messaging IBM Lotus Notes Client	Modular Messaging—MSS	Modular Messaging IBM Lotus Notes Client on page 74
		IBM Lotus Notes with IBM Lotus Domino Unified Communications on page 85
		iNotes on page 77
Modular Messaging Web Client	Modular Messaging—MSS	Modular Messaging Web Client and Restricted Web Client on page 82
Standards-based e-mail clients and other third-party e-mail clients	Modular Messaging—MSS Modular Messaging—Exchange Modular Messaging—Domino	Standards-based clients with Modular Messaging—MSS on page 85 and Avaya support policy for third-party clients on page 311
Subscriber Options	Modular Messaging—MSS Modular Messaging—Exchange Modular Messaging—Domino	Subscriber Options on page 77
Web Subscriber Options	Modular Messaging—MSS Modular Messaging—Exchange Modular Messaging—Domino	Web Subscriber Options and Restricted Web Subscriber Options on page 79

Modular Messaging Microsoft Outlook Client

Modular Messaging Outlook Client is an application that integrates with the Microsoft Outlook program and provides subscribers with access to mailboxes.

The application allows subscribers to create new voice messages, reply to any message type with a voice message, and forward any message type with a voice message—all from within the Microsoft Outlook e-mail client application.

Various message types are differentiated by specialized icons. Subscribers can use Modular Messaging Outlook Client to send, review, forward, and reply to messages from within Outlook.

Microsoft Outlook Client for MSS

Modular Messaging Outlook Client provides subscribers with an integrated view of their messages, with voice and fax messages in the Modular Messaging inbox, which is separate from the corporate inbox. The Modular Messaging inbox stores voice, text, and fax messages.

Modular Messaging Outlook Client enables subscribers to create and to access private messages under suitable administration of the privacy settings.

Subscribers can keep copies of messages that the Modular Messaging inbox receives. Subscribers can copy messages from the Modular Messaging inbox to other folders, such as a folder in the corporate inbox or on the desktop. However, subscribers cannot copy messages from other folders or inboxes into the Modular Messaging inbox.

When subscribers use Modular Messaging Outlook Client to retrieve voice messages, they can either locally play the message on the computer or on the telephone. With Modular Messaging—MSS, when subscribers play messages on the telephone, the audio content is streamed from the MSS to the client and then to an MAS for playback over the telephone. Because of this double transfer, Modular Messaging Outlook Client is not recommended to playback a message using the telephone when subscribers are using the client across a wide area link or any other slow network connection.

Microsoft Outlook Client for Exchange

Modular Messaging Outlook Client provides subscribers a unified view of all their voice mail, text, corporate e-mail, and fax messages. Voice messages are stored in the same inbox that receives corporate e-mail messages.

With Modular Messaging—Exchange, when Modular Messaging Outlook Client subscribers play a voice message on the telephone, the message is not transferred to the client. Therefore, the connection rate from the client to the MAS does not affect responsiveness. For example,

if a subscriber uses a dial-up connection to play a voice message and has two telephones available, a message played on the telephone is likely to provide much better responsiveness than local play.

Modular Messaging Outlook Client components

Modular Messaging Outlook Client provides the following tools:

- Modular Messaging Voice Form.
- Modular Messaging Voice Recorder.
- Service Providers (Modular Messaging—MSS).
- Subscriber Options (Voice Mail tab). For more information, see Subscriber Options on page 77.

Voice Form for Outlook Client

The Voice Form allows subscribers to review, record, and send voice messages from Microsoft Outlook. The Voice Form includes a voice control that can be used to create and play voice messages by using either a telephone or local multimedia. The voice control provides familiar audio controls, such as pause, stop, skip ahead, and skip back. When subscribers play multipart voice content, such as voice messages forwarded with voice comments, the voice control presents the message as a single audio stream.

The Voice Form provides the following features:

- Directory access for addressing message recipients and address lists, as described in Addressing from GUI clients on page 115.
- User preferences

  Using the Voice Form, subscribers can set user preferences such as:

  - Automatic playback of voice messages when the Voice Form is opened.
  - Request for notification of voice messages that are delivered and opened (Modular Messaging—Exchange version only)
  - Request for read receipt of all new voice messages sent (Modular Messaging—Exchange version only)
- Message sensitivity and importance

  The Voice Form enables subscribers to set sensitivity and importance on a per-message basis.
- Message comment (Modular Messaging—Exchange only)

  Using the Voice Form, subscribers can attach text comments to a voice message (new or opened). Subscribers can use message comments as search criteria, thus making it easier to locate specific messages.
- Message subject

The Voice Form permits subscribers to add a subject when creating a new message or when replying to or forwarding a message. The message subject makes it easier for a recipient to search for a message, refer to a message when using a GUI client, or scan messages using the TUI. The Voice Form also enables subscribers to edit text subjects of messages they have received.

- Message privacy

  The Voice Form permits subscribers to create private messages. In Modular Messaging—MSS, if the Privacy Enforcement Level (PEL) parameter is not set to Full, the Voice Form also enables subscribers to access private messages. However, the Voice Form does not restrict forwarding or saving private messages or replying to private messages with the original message attached. In Modular Messaging—Exchange, the Voice Form enables subscribers to access private messages depending on the system Privacy Enforcement Level setting.

Voice Recorder for Outlook Client

Subscribers can use the Voice Recorder to record and send voice mail and voice-annotated items without having to start the Microsoft Outlook e-mail application. This tool works independently from the Voice Form.

When subscribers send messages, the Voice Recorder relies on certain capabilities of Microsoft Outlook; hence subscribers must have Microsoft Outlook installed and configured as their default e-mail client.

Service Providers (Modular Messaging—MSS)

With Modular Messaging—MSS, subscribers must configure the Modular Messaging Service Providers for their Microsoft Outlook profiles before they use Modular Messaging Outlook Client.

The Service Providers act as an interface between Microsoft Outlook and the Modular Messaging servers.

Configuring the Service Providers enables the Microsoft Outlook e-mail client to gain access to the Modular Messaging directory as an address book and to send and retrieve messages to and from the Modular Messaging system.

For more information on the Modular Messaging Outlook Client application, see the *Avaya Modular Messaging Microsoft Outlook Client User Guide*, available on the *Modular Messaging documentation Library*.

Installing Modular Messaging Outlook Client components

Two factors that decide whether all or some of the components of the Modular Messaging Outlook Client must be installed are:

- Modular Messaging version (MSS, Microsoft Exchange, or IBM Lotus Domino message store)
- Whether or not Microsoft Outlook is installed

Modular Messaging Restricted Outlook Client, Modular Messaging Outlook Client, and Modular Messaging Lotus Notes Client cannot exist on the same personal computer. If Modular Messaging Outlook Client is installed on the subscriber's personal computer, it is uninstalled when Modular Messaging Restricted Outlook Client is installed. If Modular Messaging Lotus Notes Client is installed on the subscriber's personal computer, Modular Messaging does not allow installation of Modular Messaging Outlook Client.

During installation, the Modular Messaging Outlook Client setup program prompts the user to enter the name or IP address of the appropriate MAS. The setup program then queries the MAS and identifies the message store being used.

During a silent installation of Modular Messaging Outlook Client, the MAS name or IP address is passed as a command line argument.

If Microsoft Outlook is installed, Modular Messaging allows subscribers to install either Modular Messaging Outlook Client with Subscriber Options or only Subscriber Options.

The following table explains various scenarios and the components that are installed.

For information on the supported Microsoft Outlook versions, see the *Avaya Modular Messaging Microsoft Outlook Client User Guide*.

Modular Messaging configuration	Microsoft Outlook installed	Client components installed
Modular Messaging—MSS	Yes	Subscriber Options, Voice Form, Voice Recorder Service providers to be configured
Modular Messaging—MSS	No	Subscriber Options
Modular Messaging—Exchange	Yes	Subscriber Options, Voice Form, Voice Recorder
Modular Messaging—Exchange	No	Subscriber Options

Modular Messaging Restricted Outlook Client

Modular Messaging Restricted Outlook Client is an application that integrates with the Microsoft Outlook program and provides subscribers with access to mailboxes.

The application allows subscribers to create new voice messages, reply to any message type with a voice message, and forward any message type with a voice message—all from within the Microsoft Outlook e-mail client application.

Modular Messaging—Exchange and Modular Messaging—Domino do not support Modular Messaging Restricted Outlook Client.

Modular Messaging Restricted Outlook Client provides subscribers with an integrated view of their messages, with voice and fax messages in the Modular Messaging inbox, which is separate from the corporate inbox.

The Modular Messaging inbox stores voice, text, and fax messages. In the Modular Messaging inbox, various message types are differentiated by specialized icons. Subscribers can use Modular Messaging Restricted Outlook Client to send, review, forward, and reply to messages from within Outlook. However, subscribers can send, forward, and reply to voice messages received only from Modular Messaging subscribers, both local and remote subscribers.

Subscribers can address voice messages only to Modular Messaging remote subscribers whose voice mails are networked to the subscriber's Messaging System.

Modular Messaging Restricted Outlook Client temporarily stores voice messages that subscribers intend to send in the Modular Messaging outbox, which is separate from the corporate outbox. Once the voice messages are successfully sent the messages are deleted from the outbox. If there are voice messages in the Modular Messaging outbox and Outlook is closed, Modular Messaging Restricted Outlook Client permanently deletes the messages.

Modular Messaging Restricted Outlook Client enables subscribers to create and to access private messages under suitable administration of the privacy settings.

Subscribers can keep copies of received messages in the Modular Messaging inbox. Subscribers cannot, however, save copies of voice messages on the computer's desktop or in any e-mail folder.

When subscribers use Modular Messaging Restricted Outlook Client to retrieve voice messages, they can either locally play the message on the computer or on the telephone. When subscribers play messages on the telephone, the audio content is streamed from the MSS to the client and then to an MAS for playback over the telephone. Because of this double transfer, Modular Messaging Restricted Outlook Client is not recommended to playback a message using the telephone when subscribers are using the client across a wide area link or any other slow network connection.

Modular Messaging Restricted Outlook Client components

Modular Messaging Restricted Outlook Client provides the following tools:

- Modular Messaging Voice Form.
- Modular Messaging Voice Recorder.
- Service Providers.
- Subscriber Options (Voice Mail tab). For more information, see Subscriber Options on page 77.

Voice Form for Restricted Outlook Client

The Voice Form allows subscribers to review, record, and send voice messages from Microsoft Outlook. The Voice Form includes a voice control that can be used to create and play voice messages by using either a telephone or local multimedia. The voice control provides familiar audio controls, such as pause, stop, skip ahead, and skip back. When subscribers play

multipart voice content, such as voice messages forwarded with voice comments, the voice control presents the message as a single audio stream.

Subscribers can use the Voice Form to address messages to PDLs created in Modular Messaging Restricted Outlook Client. However, if Modular Messaging Outlook Client exists on a subscriber's system and the subscriber installs Modular Messaging Restricted Outlook Client to replace it, the PDLs created in Modular Messaging Outlook Client are not deleted. The subscriber can address voice messages to these PDLs from Modular Messaging Restricted Outlook Client. For more information on addressing messages to PDLs, see Addressing from GUI clients on page 115.

The Voice Form provides the following features:

- Directory access for addressing message recipients.

  The Voice Form provides access to the MSS directory. The MSS directory includes the Modular Messaging Global Address List, the Modular Messaging PDL, and personal contacts. However, Modular Messaging Restricted Outlook Client allows subscribers to address voice messages only to Modular Messaging subscribers and Modular Messaging PDLs.

- User preferences

  Using the Voice Form, subscribers can set user preferences such as:

  - Automatic playback of voice messages
  - Playing or recording of voice messages through telephone or multimedia

- Message sensitivity and importance

  The Voice Form enables subscribers to set sensitivity and importance on a per-message basis.

- Message privacy

  The Voice Form permits subscribers to create private messages. In Modular Messaging—MSS, if the Privacy Enforcement Level (PEL) parameter is not set to Full, the Voice Form also enables subscribers to access private messages. However, the Voice Form does not restrict forwarding or replying to private messages.

Voice Recorder for Restricted Outlook Client

Subscribers can use the Voice Recorder to record and send voice mail and voice-annotated items without having to start the Microsoft Outlook e-mail application. This tool works independently from the Voice Form.

When subscribers send messages, the Voice Recorder relies on certain capabilities of Microsoft Outlook; hence subscribers must have Microsoft Outlook installed and configured as their default e-mail client.

Service Providers for Restricted Outlook Client

Subscribers must configure the Modular Messaging Service Providers for their Microsoft Outlook profiles before they use Modular Messaging Restricted Outlook Client.

The Service Providers act as an interface between Microsoft Outlook and the Modular Messaging servers.

Configuring the Service Providers enables the Microsoft Outlook e-mail client to gain access to the Modular Messaging directory as an address book and to send and retrieve messages to and from the Modular Messaging system.

For more information on the Modular Messaging Restricted Outlook Client application, see the *Avaya Modular Messaging Microsoft Restricted Outlook Client User Guide*, available on the *Modular Messaging documentation Library*.

Installation of Modular Messaging Restricted Outlook Client components

Two factors that decide whether all or some of the components of the Modular Messaging Restricted Outlook Client must be installed are:

- Modular Messaging version (MSS message store is supported, Microsoft Exchange and IBM Lotus Domino message store are not supported)
- Whether or not Microsoft Outlook is installed

Modular Messaging Restricted Outlook Client, Modular Messaging Outlook Client, and Modular Messaging Lotus Notes Client cannot exist on the same personal computer. If Modular Messaging Outlook Client is installed on the subscriber's personal computer, it is uninstalled when Modular Messaging Restricted Outlook Client is installed. If Modular Messaging Lotus Notes Client is installed on the subscriber's personal computer, Modular Messaging does not allow installation of Modular Messaging Restricted Outlook Client.

If Microsoft Outlook is installed, Modular Messaging allows subscribers to install either Modular Messaging Restricted Outlook Client with Subscriber Options or only Subscriber Options.

The following table explains various scenarios and the components that are installed.

For information on the supported Microsoft Outlook versions, see the *Avaya Modular Messaging Microsoft Restricted Outlook Client User Guide*.

Modular Messaging configuration	Microsoft Outlook installed	Client components installed
Modular Messaging—MSS	Yes	Subscriber Options, Voice Form, Voice Recorder Service providers to be configured
Modular Messaging—MSS	No	Subscriber Options
Modular Messaging—Exchange	Not supported	Not supported

Comparing Modular Messaging Outlook Client and Modular Messaging Restricted Outlook Client

Though Modular Messaging Outlook Client and Modular Messaging Restricted Outlook Client look similar, they differ in the way they handle voice messages. To maintain the integrity of voice messages, Modular Messaging Restricted Outlook Client imposes certain restrictions on the actions that can be performed on voice messages. The following table lists the various actions that can be performed on a voice message and the extent to which the actions are supported in Modular Messaging Outlook Client and Modular Messaging Restricted Outlook Client.

Voice message actions	Modular Messaging Outlook Client	Modular Messaging Restricted Outlook Client
Automatic playback of voice messages	Yes	Yes
Navigate between messages (the next and previous buttons on the Voice Form to navigate without having to close the Voice Form first)	Yes Both for voice messages and e-mail messages from Voice Form	Yes Only for voice messages from Voice Form
Notify when messages are delivered	Yes Only in Modular Messaging—Exchange	No
Notify when messages are opened	Yes Only in Modular Messaging—Exchange	No
Record and play voice message using telephone or multimedia	Yes	Yes
Attach comments to voice messages	Yes Only in Modular Messaging—Exchange	No
Address voice messages to other users	Yes To Modular Messaging subscribers, other e-mail users, or recipients who use Octel Analog Networking	Yes To Modular Messaging subscribers, both local and remote subscribers However, subscribers can address voice messages only to remote subscribers whose voice mails are networked to the subscriber's Messaging System.

Voice message actions	Modular Messaging Outlook Client	Modular Messaging Restricted Outlook Client
Address voice messages to PDLs	Yes	Yes Only to PDLs created in Modular Messaging Restricted Outlook Client.
Mark voice messages as Private, Confidential, or Personal	Yes In Modular Messaging—MSS, if the Privacy Enforcement Level (PEL) parameter is not set to Full, the Voice Form also enables subscribers to access private messages.	Yes In Modular Messaging—MSS, if the Privacy Enforcement Level (PEL) parameter is not set to Full, the Voice Form also enables subscribers to access private messages.
Assign priority levels such as High importance and low importance	Yes	Yes
Send voice messages	Yes	Yes Only to Modular Messaging subscribers
Save voice messages	Yes	No
Listen to voice messages	Yes	Yes
Navigating between message parts in a multipart voice message	Yes	Yes
Modify message subject	Yes	No Subscribers cannot add a subject to voice messages they send
Reply to a voice message with a voice message	Yes	Yes Only for voice messages received from Modular Messaging subscribers
Reply to a voice message with an e-mail message	Yes	No
Reply to an e-mail message with a voice message	Yes	Yes
Include the original in your reply	Yes	No
Forwarding voice messages with a voice introduction	Yes	Yes Only to Modular Messaging subscribers. Can forward voice messages received from

Voice message actions	Modular Messaging Outlook Client	Modular Messaging Restricted Outlook Client
		either Modular Messaging subscribers or non-subscribers
Forwarding voice messages with a text introduction	Yes	No
Deleting voice messages	Yes Stored in the Deleted Items folder	Yes Permanently deleted In Modular Messaging Restricted Outlook Client, the Deleted Items folder does not exist. When a subscriber deletes messages (e-mail, voice, and fax) the messages are permanently deleted.
Enforced separation of e-mail messages and voice messages	No	Yes

Outlook Web Access (OWA)

This Web client provides subscribers with a single interface for access to voice mail and corporate e-mail messages stored in a common inbox on the Microsoft Exchange message store. OWA provides the ability to listen to messages but does not provide recording capabilities for replying with voice or composing new voice messages.

Modular Messaging IBM Lotus Notes Client

Modular Messaging Lotus Notes Client is an application that integrates with the IBM Lotus Notes program and provides subscribers with access to mailboxes. The application allows subscribers to view their voice and fax messages in the Modular Messaging inbox, which is separate from the corporate inbox.

The Modular Messaging inbox stores voice, text, and fax messages. In the Modular Messaging inbox, various message types are differentiated by specialized icons. Modular Messaging Lotus Notes Client allows subscribers to create new voice messages, reply to any message type with a voice message, and forward any message type with a voice message—all from within the IBM Lotus Notes e-mail client application.

Note:

Modular Messaging—Exchange and Modular Messaging—Domino do not support Modular Messaging Lotus Notes Client.

Subscribers can keep copies of messages that the Modular Messaging inbox receives. Subscribers can copy messages from the Modular Messaging inbox to other folders, such as a folder in the corporate inbox or on the desktop. However, subscribers cannot copy messages from other folders or inboxes into the Modular Messaging inbox.

When subscribers use Modular Messaging Lotus Notes Client to retrieve voice messages, they can play the message either locally on the computer on the telephone. When subscribers play messages on the telephone, the audio content is streamed from the MSS to the client and then to an MAS for playback over the telephone. Because of this double transfer, Modular Messaging Lotus Notes Client is not recommended for playing messages remotely by means of the telephone.

Modular Messaging Lotus Notes Client components

Modular Messaging Lotus Notes Client provides the following tools:

- Modular Messaging Voice Form.
- Modular Messaging Voice Recorder.
- Service Providers.
- Subscriber Options (Voice Mail tab). For more information, see Subscriber Options on page 77.

Voice Form for Lotus Notes Client

The Voice Form allows subscribers to review, record, and send voice messages from IBM Lotus Notes. The Voice Form includes a voice control that can be used to create and play voice messages by using either a telephone or local multimedia. The voice control provides familiar audio controls, such as pause, stop, skip ahead, and skip back. When subscribers play multipart voice content, such as voice messages forwarded with voice comments, the voice control presents the message as a single audio stream.

Subscribers can use the Voice Form to address messages to PDLs.

For more information on addressing messages to PDLs, see Addressing from GUI clients on page 115.

The Voice Form provides the following features:

- Directory access for addressing message recipients. The Voice Form provides access to the MSS directory. The MSS directory includes the Modular Messaging Global Address List, the Modular Messaging PDL, and personal contacts. The Voice Form also provides directory access for addressing messages to PDLs.
- User preferences

Using the Voice Form, subscribers can set user preferences for automatic playback of voice messages.

- Message sensitivity and importance

  The Voice Form enables subscribers to set sensitivity and importance on a per-message basis.

- Message subject

  The Voice Form permits subscribers to add a subject when creating a new message or when replying to or forwarding a message. The message subject makes it easier for recipients to refer to messages when using a GUI client or a TUI. The Voice Form also enables subscribers to edit text subjects of messages they have received.

  Subscribers can use message subjects as search criteria, thus making it easier to locate specific messages.

Voice Recorder for Lotus Notes Client

Subscribers can use the Voice Recorder to record voice mail and voice-annotated items without having to start the IBM Lotus Notes e-mail application. This tool works independently from the Voice Form.

When subscribers send messages, the Voice Recorder relies on certain capabilities of IBM Lotus Notes; hence subscribers must have IBM Lotus Notes installed and configured as their default e-mail client.

Service Providers for Lotus Notes Client

Subscribers must configure the Modular Messaging Service Providers for their IBM Lotus Notes profiles before they use Modular Messaging Lotus Notes Client.

The Service Providers act as an interface between IBM Lotus Notes and the Modular Messaging servers.

Configuring the Service Providers enables the IBM Lotus Notes e-mail client to gain access to the Modular Messaging directory as an address book and to send and retrieve messages to and from the Modular Messaging system.

For more information on the Modular Messaging Lotus Notes Client application, see the *Avaya Modular Messaging IBM Lotus Notes Client User Guide*, available on the Modular Messaging documentation CD-ROM.

Installation of Modular Messaging Lotus Notes Client components

Two factors that decide whether all or some of the components of the Modular Messaging Lotus Notes Client must be installed are:

- Modular Messaging version (MSS, Microsoft Exchange, or IBM Lotus Domino message store)
- Whether or not IBM Lotus Notes is installed

Modular Messaging Outlook Client and Modular Messaging Lotus Notes Client cannot exist on the same personal computer. If Modular Messaging Outlook Client is installed on the

subscriber's personal computer, Modular Messaging does not allow installation of Modular Messaging Lotus Notes Client.

During installation, the Modular Messaging Lotus Notes Client setup program prompts the user to enter the name or IP address of the appropriate MAS. The setup program then queries the MAS and identifies the message store being used.

During a silent installation of Modular Messaging Lotus Notes Client, the MAS name or IP address is passed as a command line argument.

If IBM Lotus Notes is installed, Modular Messaging allows subscribers to install either Modular Messaging Lotus Notes with Subscriber Options or only Subscriber Options.

The following table explains various scenarios and the components that are installed. For information on the supported IBM Lotus Notes versions, see the *Avaya Modular Messaging IBM Lotus Notes Client User Guide*.

Modular Messaging configuration	IBM Lotus Notes installed	Client components installed
Modular Messaging—MSS	Yes	Subscriber Options, Voice Form Service providers to be configured
Modular Messaging—MSS	No	Subscriber Options

iNotes

iNotes, also known as IBM Lotus Domino Web Access, is a Web client that subscribers can use to access their mailbox on the IBM Lotus Domino store. iNotes provides subscribers with a single interface for access to voice mail and corporate e-mail messages stored on the IBM Lotus Domino message store. iNotes provides listen and record capabilities to facilitate replying and composing messages with voice.

Subscriber Options

Subscribers can use the Subscriber Options application to modify their mailbox settings from a desktop computer.

In Modular Messaging—MSS, when Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, or Modular Messaging Lotus Notes Client installs the Subscriber Options component, an additional property page is attached to the e-mail options pages. Subscribers can use the **Voice Mail** tab to access Subscriber Options from Microsoft Outlook or IBM Lotus Notes.

Subscriber Options also appears as an option in the **Programs** submenu in Windows. Subscribers who do not use the Microsoft Outlook or the IBM Lotus Notes e-mail client can use Subscriber Options as a standalone application available from the **Programs** submenu.

Subscribers can use Subscriber Options for performing the following tasks:

- Configuring Call Handling

  Screen calls from the Automated Attendant, override Call Handling, and choose greetings for an extension that is busy or unanswered.

- Managing greetings

  Record spoken name, personal greeting, Please Hold prompt, Enhanced greetings, and Extended Absence Greeting (EAG)

- Configuring settings for the TUIs

  Sort messages in the inbox by priority, by the order in which they were received, or by message type; specify fax number for printing faxes, prompt language for mailbox, and rules for new message alerts.

  Note:

  Sorting by message type feature is applicable only to Modular Messaging AUDIX TUI and Modular Messaging Serenade TUI. Subscribers of Modular Messaging Aria TUI do not require to sort their messages by message type since the TUI provides separate queues for each message type.

- Configuring time zones for a mailbox

  Assign a specific time zone and indicator for daylight saving time to a mailbox.

- Configuring Personal Operator

  Assign a mailbox number or extension number as the personal operator and select a schedule for the personal operator.

  Subscribers can configure personal operators for their mailboxes only if the administrator has assigned the required permissions to the subscribers.

- Setting rules for special features:

  - Find Me to schedule the redirection of unanswered calls to one or more telephone numbers.
  - Call Me to schedule calls to subscribers at one or more designated telephone numbers when messages that meet certain criteria arrive in their mailboxes.
  - Notify Me to notify subscribers of new Call Answer messages in their mailboxes and of missed incoming calls.

- MWI to alert subscribers when messages meeting specified criteria arrive in their mailboxes.

- Creating and managing PDLs:
  - Subscribers can create new PDLs and modify or delete existing PDLs. For more information, see Working with PDLs on page 111.

For more information, see *Avaya Modular Messaging Subscriber Options*, available on the Modular Messaging documentation CD-ROM.

Web Subscriber Options

Subscribers can use the Web Subscriber Options application to modify their mailbox settings from a Web browser. Subscribers can modify all or some of their mailbox settings, depending on how the mailbox is configured by the administrator.

The system administrator can apply restrictions to Web Subscriber Options to customize or restrict the user interface, allowing subscriber access to some or all of the tasks available from Web Subscriber Options. Administrators can restrict features through the Voice Mail System Configuration (VMSC) application.

Both Web Subscriber Options and Web Subscriber Options with restrictions ability can be used with the Restricted Outlook Client. However, Web Subscriber Options with restrictions ability allows you to add trusted domains to the voice mail domain (VMD), whereas Web Subscriber Options does not allow this. For more details, refer to the *Web Subscriber Options Dialog Box page* in the *Messaging Application Server (MAS) Administration Guide* available on the *Modular Messaging documentation Library*.

Modular Messaging allows only authenticated subscribers to log in to Web Subscriber Options. Modular Messaging—MSS subscribers can also log in to Web Subscriber Options using a Quick Logon from Modular Messaging Web Client.

If the subscriber's credentials are appropriate for the message store being used, the Web server allows the subscriber to access Web Subscriber Options.

With Web Subscriber Options, subscribers can compose greetings and set up preferences for using the telephone user interface (TUI).

Subscribers can use Web Subscriber Options to perform the following tasks:

- Configuring Call Handling

  Screen calls from the Automated Attendant, override Call Handling, and choose greetings for busy or no answer calls, internal or external calls, calls received during office hours or out of hours.

- Managing greetings

  Record spoken name, personal greeting, Please Hold prompt, Enhanced greetings, and EAG

- Configuring settings for the TUIs

  Sort messages in the inbox by priority, by order in which they were received, or by message type; specify fax number for printing faxes, prompt language for mailbox, and rules for new message alerts.

  Sorting by message type capability is applicable only to Modular Messaging AUDIX TUI and Modular Messaging Serenade TUI. Subscribers of Modular Messaging Aria TUI do not require to sort their messages by message type since the TUI provides separate queues for each message type.

- Configuring multiple time zones for a mailbox

  Assign a specific time zone to a mailbox.

- Configuring Personal Operator

  Assign a mailbox number or extension number as the personal operator and select a schedule for the personal operator.

  Note:

  Subscribers can configure personal operators for their mailboxes only if the administrator has assigned the required permissions to the subscribers.

- Setting rules for special features:

  - Find Me to schedule the redirection of unanswered calls to one or more telephone numbers.
  - Call Me to schedule calls to subscribers at one or more designated telephone numbers when messages that meet certain criteria arrive in their mailboxes.
  - Notify Me to notify subscribers of new Call Answer messages in their mailboxes and of missed incoming calls, if requested by the caller.
  - Message Waiting Indicator to alert subscribers when messages meeting specified criteria arrive in their mailboxes.

- Creating and managing PDLs

  Modular Messaging—MSS subscribers can create new PDLs and modify or delete existing PDLs. In Modular Messaging—MSS, subscribers use Subscriber Options, Web Subscriber Options, or the TUIs to create new PDLs.

  Modular Messaging—Exchange and Modular Messaging—Domino subscribers use their e-mail server or the TUIs to create PDLs. Using Subscriber Options and Web Subscriber Options, Modular Messaging—Exchange and Modular Messaging—Domino subscribers can modify an Exchange or a Domino distribution list. Other than creating PDLs, Modular Messaging—Exchange and Modular Messaging—Domino subscribers can record list names and change the numeric identifier of PDLs. For more information, see Working with PDLs on page 111.

For more information, see the online Help system provided with the Web Subscriber Options application.

Subscriber-controlled parameters from Subscriber Options and Web Subscriber Options

In Modular Messaging, some capabilities can be configured by using the TUIs, the Subscriber Options, or the Web Subscriber Options. The following table lists the capabilities that are configured exclusively from Subscriber Options or Web Subscriber Options.

Capability	Description
Call Me rules	Subscribers can create rules for using Call Me from Subscriber Options or Web Subscriber Options. The rules include the destination telephone numbers. The Call Me rules can be enabled or disabled by using Subscriber Options, Web Subscriber Options, or the TUIs.
Find Me rules	Subscribers can create rules for using Find Me from Subscriber Options or Web Subscriber Options. The rules include the destination telephone numbers. The Find Me rules can be enabled or disabled by using Subscriber Options, Web Subscriber Options, or the TUIs.
Notify Me rules	Subscribers can set rules for using Notify Me-Caller Requested and Notify Me-Automatic using Subscriber Options or Web Subscriber Options. The rules can be enabled or disabled using Subscriber Options or Web Subscriber Options. Notify Me feature can be enabled or disabled using the class of service (COS) and each COS is associated with the subscriber or TUI.
MWI rules	Subscribers can create rules for using MWI from Subscriber Options or Web Subscriber Options. The rules can be enabled or disabled by using Subscriber Options or Web Subscriber Options.
Subscriber mailbox voice prompt language	Subscribers can set the default language in which voice prompts are played to them when they dial in to their mailboxes, using Subscriber Options or Web Subscriber Options.
Subscriber mailbox Multilingual call answering languages	Subscribers can enable the multilingual Call Answer feature using Subscriber Options or Web Subscriber Options. Subscribers can record a separate greeting for each language.

Capability	Description
Subscriber mailbox time zone selection	Subscribers can select a specific time zone for their mailboxes by using Subscriber Options and Web Subscriber Options.
Subscriber TUI message sorting capabilities	Subscribers can set the various message-sorting capabilities of their TUIs by using Subscriber Options and Web Subscriber Options. The messages in a subscriber mailbox can be sorted by priority, by order in which the messages were received, or by message type.
PDLs	Subscribers can create PDLs by using Subscriber Options, Web Subscriber Options, or the TUIs. Subscriber Options or Web Subscriber Options is required for the following enhanced capabilities: edit the identifier, create the display name, include an internet e-mail address in the list, and include a fax number in the list.

Desktop deployment of Avaya GUI Thick Clients

To facilitate desktop deployment of Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, Modular Messaging Lotus Notes Client, and Subscriber Options, organizations can do the following:

- Place the software on a server to make it available to subscribers for download.
- Push software to subscribers through Microsoft Systems Management Server (SMS). SMS allows the distribution of software over a network to client computers with little to no intervention from the computer user.
- Use the Software Installation component of the Active Directory Group Policy Object Editor to centrally manage a push of software to desktops.

Modular Messaging Web Client

Modular Messaging Web Client enables subscribers to use a Web browser for visual access to their Modular Messaging messages. Web Client with restrictions ability allows the system administrator to customize or restrict the user interface, allowing subscriber access to some or all of the tasks available from Modular Messaging Web Client. Administrators can restrict features through the Web Client Administration user interface. For information on the configuration of the Web Client, see the *Web Client Administration Help*.

Modular Messaging Web Client does not support access to Avaya legacy messaging servers, such as Octel or the Intuity AUDIX servers. Modular Messaging allows only authenticated subscribers with an MSS message store to log in to Modular Messaging Web Client.

Subscribers of Modular Messaging—MSS must enter their mailbox numbers and numeric passwords to enter Modular Messaging Web Client. If a subscriber's credentials are appropriate, the Web server allows the subscriber to access Modular Messaging Web Client.

Modular Messaging provides a Quick Logon from Modular Messaging Web Client to Web Subscriber Options. Thus, if a subscriber is authenticated for Modular Messaging Web Client, the subscriber can access Web Subscriber Options without re-entering the log-in credentials. Modular Messaging Web Client provides a link to the Web Subscriber Options. Subscribers can use this link to access Web Subscriber Options.

Modular Messaging Web Client provides a visual interface that subscribers can use to create, send, receive, reply to, forward, and organize their messages from the Modular Messaging mailbox. Subscribers can listen to voice messages and view fax messages and text messages from a computer. With Modular Messaging Web Client, subscribers can play and record voice messages either through their telephone or through the local multimedia of their computers. Subscribers must use an additional software application, either a local player or the Avaya Voice Player, to play or record messages with the local multimedia. Modular Messaging Web Client provides subscribers the option to download the Avaya Voice Player application.

If administrators do not want subscribers to store voice messages on their computers, they can restrict subscribers from downloading the Avaya Voice Player. Administrators can disable the Avaya Voice Player option of Modular Messaging Web Client for the subscribers. If the option is disabled, subscribers can use only the telephone to listen to or record voice messages. From Modular Messaging Web Client, subscribers can also send messages to the PDLs they own. For information on addressing messages to PDLs, see Addressing from GUI clients on page 115.

The Modular Messaging Web Client inbox presents visual indicators, known as message flags, that help subscribers to easily identify broadcast messages, priority messages, private messages, and delivery failures. For information on using Web Client, see the online Help system provided with the Web Client application. For information on the system requirements for Modular Messaging Web Client, see Modular Messaging Web Client requirements on page 343.

Modular Messaging Web Client provides:

- An integrated view of voice, fax, and text messages in the Modular Messaging mailboxes of subscribers.
- Message organizational capabilities, such as:
  - Sorting messages by type, sender, subject, folder, or receipt time
  - Searching for a particular message
  - Moving messages within the inbox from one folder to another. Subscribers can move New messages to the Deleted folder or Saved folder, saved messages to the Deleted folder, and deleted messages to the Saved folder.
- Directory browsing

Provides access to the Modular Messaging voice server directory so that from the directory, subscribers can search for other users and address messages to them.

- Toggle between telephone and local multimedia

  Modular Messaging Web Client allows subscribers to toggle between recording messages by using local multimedia of their computer and using the telephone, regardless of the default settings.

- Choice of language to view the interface

  Provides subscribers with a choice of languages to view the interface. The language choices are listed in the table describing Multilingual support on page 26.

  Note:

  The administrative interfaces of Modular Messaging Web Client are available only in U.S. English.

- Support Secure Sockets Layer (SSL) for secured access

  Modular Messaging Web Client supports SSL Web connections. However, customers must configure SSL on the Web server (as per the configuration supported by IIS) prior to installing the Web Client.

  Whether Web browsers connect by using SSL depends only on the Web server configuration and not on any settings in the Modular Messaging Web Client application.

- Maximum message privacy enforcement

  When subscribers access messages that are marked private, Modular Messaging Web Client provides an appropriate indication to subscribers. Regardless of the system Privacy Enforcement Level setting for the VMD, Modular Messaging Web Client always enforces maximum message privacy—subscribers cannot forward private messages. For more information on the Privacy Enforcement Level settings, see The Privacy Enforcement Level parameter on page 120.

- Text subject creation

  Subscribers using Modular Messaging Web Client can create a text subject when composing a new message. A text subject makes it easier for recipients to refer to the message when using a GUI client or scanning by means of the TUI. Subscribers can create a subject text when composing a message; subscribers cannot change subject texts once messages are sent.

- Edit message subject line

  Modular Messaging Web Client allows subscribers to edit the subject lines of messages. However, a subscriber can edit the subject line only if the administrator has set the feature for the system.

- Address messages to PDL

  Using Modular Messaging Web Client, subscribers can address messages to a PDL.

- Drag and drop messages

  Subscribers using Modular Messaging Web Client can drag and drop messages into a Modular Messaging Web Client folder.

- Set message notifications

  Subscribers can set Modular Messaging Web Client to notify them when they receive new messages.

Standards-based clients with Modular Messaging—MSS

With the appropriate privacy settings, Modular Messaging subscribers can use standards-based e-mail clients to receive, send, and manage messages from a desktop computer.

Subscribers can gain access to and deal with messages by using a variety of clients that support either the IMAP4 or the POP3 e-mail standard. Clients include Microsoft Outlook and Microsoft Outlook Express.

Although most clients support both IMAP4 and POP3, some clients, such as some versions of Microsoft Outlook, support only the older POP3 protocol. When you are using a standards-based client with Modular Messaging, Avaya recommends the use of IMAP4. POP3 clients copy messages from the subscriber's mailbox and act on the local copy without informing the server of status changes, for example, whether a message has been read or deleted.

The local copy is not aware of the message status on the original message store. Thus, if a POP3 user pulls copies of their voice messages into the e-mail client and later use the TUI to delete a message from the message store, the local copy of the message in the e-mail client will remain.

In contrast, IMAP4 clients act on the message stored on the server so message status is synchronized with the actions of other clients, such as the TUI.

IBM Lotus Notes with IBM Lotus Domino Unified Communications

From the IBM Lotus Notes proprietary client on a computer with the Windows operating system, subscribers can use the following IBM Lotus DUC services:

- Integrated voice mailbox

  A specialized IBM Lotus Notes mail file provides a combined inbox for all messages, as well as a voice inbox tailored for voice message display and management.

- Voice Message Form with Player/Recorder

  The Voice Message Form, while maintaining the look and feel familiar to both Lotus Notes and iNotes Web Access clients, includes an integrated player/recorder that subscribers use to create and play voice messages, from either a telephone or a multimedia computer.

The player/recorder provides familiar audio controls, such as pause, stop, skip ahead, and skip back.

- Subscriber Options

  Using Subscriber Options, subscribers can modify their mailbox settings at any time from the Lotus Notes client and Lotus Domino Administrator client. For more information, see Subscriber Options on page 77.

one-X Speech

one-X Speech is a complementary Avaya product providing an English speech user interface that supports all versions of Modular Messaging.

Speech recognition allows callers to speak commands to one-X Speech, and TTS technology allows mobile professionals to access their business computer resources from any telephone. one-X Speech also provides access to voice mail messages, call answering, and follow-me/hold-my-calls filtering.

In addition, with the use of Avaya one-X Speech, subscribers can launch telephone calls, either single-party or multi-party conference calls, all from a single session.

one-X Speech also provides e-mail reading capabilities. Modular Messaging—MSS subscribers do not have access to corporate e-mails from the Modular Messaging TUIs. However, they can use one-X Speech for TTS conversion of corporate e-mail messages.

With all versions of Modular Messaging, one-X Speech can provide, among other things, speech access and voice control of voice and corporate e-mail messages.

one-X Speech enables subscribers to create and to access private messages. For more information, see Message Privacy on page 118.

For more information, see the one-X Speech client product documentation (Site Preparation Guide, Installation Guide, and Wallet Card) available at http://www.avaya.com/support.

One-X Speech is available as a standard feature with Modular Messaging only in select countries. For a list of countries, visit the Avaya Enterprise Portal at https://enterpriseportal.avaya.com/ptlWeb/gs/products/P0519 or contact Avaya Technical Support.

Administrative and management interfaces

Modular Messaging provides administrators with different interfaces or tools for the administration of the MSS, MAS units, Modular Messaging Web Client, and Caller Applications.

In addition, Modular Messaging provides a reporting tool for monitoring voice mail system usage.

For information on the administrative interface for Modular Messaging Web Client, see the online Help system provided with the *Modular Messaging Web Client application*. For information on the Caller Applications Editor, used to create, deploy, and modify Caller Applications, see Caller Applications Editor on page 36.

Message Storage Server administration

The Web-based administrative interface of the MSS provides administration, diagnostics, and reporting capabilities, using a standard Web browser from anywhere in the enterprise. Organization-wide administrative utilities can also be used, as specified in Ease of administration.

In addition to providing this Web-based administrative interface, Modular Messaging supports the 2nd Nature application or Avaya Integrated Management with Avaya Site Administration or Avaya MultiSite Administration for MSS mailbox administration.

Avaya Integrated Management

Modular Messaging can be administered with Avaya Integrated Management. Avaya Site Administration (Release 2.0 or later) or Avaya MultiSite Administration (Release 2.1 or later) can be used to perform subscriber move, add, change, and remove activity. It can also be used to define COS for Modular Messaging in conjunction with an associated user station extension on the Communication Manager Media Server. This tool also provides import and export support of subscriber data for Modular Messaging.

MAS administration

An MAS provides administration tools such as the VMSC application and Visual Voice Editor.

For more information on using these tools, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation Library*.

Reporting capabilities

Modular Messaging provides a Reporting Tool that administrators can use to generate predefined reports for monitoring voice mail system usage, planning capacity, and tracking system security.

Report information is taken from the transaction database and generated for the VMD. Some reports can also generate MAS-specific or subscriber-specific information.

Administrators can export a report to save the report information or work with it by using alternative tools. The export facility supports a number of popular spreadsheet, word processor, and data interchange formats. Administrators can attach an exported report file to a message sent using an e-mail system, or can print a report displayed on the screen.

The MSS collects information about system settings and attributes and information that depicts how the system is used, including data about features, subscribers, communities, data port loads, and remote-messaging traffic. This information is displayed in real-time dynamic report pages and in messaging traffic reports.

Chapter 4: Modular Messaging features

Text-to-speech conversion capability

Modular Messaging provides licensed speech synthesis software so that subscribers can hear the envelope and subject information of messages and text names over the telephone through a computer-generated spoken voice.

Modular Messaging uses e-mail readers for TTS conversion. The TUIs voice the e-mail messages using TTS conversion. TTS is also used for name confirmation when a recorded name is unavailable.

Multilingual text-to-speech

Subscribers of Modular Messaging—Exchange and Modular Messaging—Domino can hear the contents of their corporate e-mail messages over the telephone by virtue of TTS conversion.

Organizations that receive e-mail in more than one language can enable multilingual TTS. Multilingual TTS identifies the language of e-mail messages and reads them in that language. For more information, see Multilingual support on page 26.

Modular Messaging provides ScanSoft RealSpeak Telephony 3.5 as the default TTS engine. All installations of Modular Messaging provide support only to the ScanSoft RealSpeak Telephony 3.5 engine.

Note:

Modular Messaging supports the ScanSoft User Dictionary Editor (UDE) application, to update user dictionaries created using RealSpeak. Generally, the user dictionaries exist in the `%SSFTTTSSDK%\speech\dictionary` directory. For information on the steps involved in updating the user dictionaries, see the online help of the UDE application.

Some considerations related to TTS are:

- The minimum number of TTS sessions per MAS is 12 and the maximum number of ports is equal to one quarter of the number of ports in the MAS if greater than 12.
- Some subscribers might implement extra security in their Microsoft Exchange or IBM Lotus Domino environments and encrypt each e-mail message. The TTS conversion capability is incapable of reading encrypted e-mail messages.

Alarms and notifications

The MAS generates system alarms and error logs that you can gain access to by using a command line interface tool. This command line interface tool is called displog on the MAS. The MSS generates system alarms and error logs that you can gain access to by using the MSS Web Administration forms.

Notifications that alarms generate can be sent to any one of the following recipients:

- Avaya Services
- A customer through an Network Management Station (NMS)
- Avaya Partners

  Note:

  Avaya Partners need access to the Modular Messaging system to receive these notifications.

- Avaya Fault and Performance Manager with use of either Secure Services Gateway (SSG) or Avaya Proxy Agent

Following table lists the serviceability agents that are used to send the alarm notifications to a service organization.

Serviceability agent	Description
Secure Access Link (SAL)	New installations of Modular Messaging Release 5.2 support only the SAL serviceability agent. SAL is an Avaya serviceability solution for support and remote management of a variety of devices and products. SAL provides remote access and alarm reception capabilities. SAL uses the existing Internet connectivity of a customer to facilitate remote support from Avaya. All communication is outbound from the environment of the customer over port 443, and uses encapsulated Hypertext Transfer Protocol Secure (HTTPS). SAL Gateway is a software package that facilitates remote access to support personnel and tools that need to access supported devices. The SAL Gateway is installed on a host

Serviceability agent	Description
	operating system based on release 4.7 of Red Hat Inc. version of Linux® in the customer network and acts as an agent on behalf of several managed elements. The MAS is configured using VMSC to send the alarms to a SAL Gateway server. The SAL Gateway server is configured to forward the alarms to various NMS destinations.
SNMP	The MAS and MSS can also use SNMP to send the alarm notifications to a customer NMS. With Modular Messaging, the MSS provide support for SNMP GET requests. The MAS does not provide support for SNMP GET requests. Neither the MAS nor the MSS provides support for SNMP SET requests. For details about SNMP traps, see SNMP alarm notification on page 96.
SPIRIT	Modular Messaging systems upgraded to Modular Messaging Release 5.2 on multi-server configuration can use the SPIRIT software, which provides support for alarming and connectivity without the use of the Avaya Remote Maintenance Board (RMB). Avaya SPIRIT Agent replaces the RMB and Avaya Serviceability Agent on both the MAS and MSS. The Avaya SPIRIT Agent relays alarms, SNMP traps and software inventory records to Avaya Technical Support and customers' Network Management Systems.
Secure Access and Control (SAC)	With Modular Messaging systems upgraded to Modular Messaging Release 5.2 systems, Avaya also offers SAC and SAC-Premium, which provide serviceability access using VPN. SAC incorporates the SSG component, a Network Interface Unit (NIU), VPN, Alarm Fault Manager (AFM), and, Avaya Secure Services Delivery Platform (SSDP) to provide a secure IP service solution. SAC enables strong authentication and authorization to be enforced at the central access point and a detailed activity log of all system access to be maintained. Built upon the Secure Services Delivery Platform (SSDP) and the Secure Services Gateway, SAC provides centralized security and detailed audit trial of Avaya access to customer equipment located on customer networks by Avaya personnel and Expert Systems. See http://www.avaya.com/support for more information.

MAS alarms and logs

MAS has an application-level maintenance infrastructure that provides automatic error recovery from many software failures. MAS raises alarms for hardware or software failures for

which automatic recovery actions are unsuccessful, and a notification of the alarm condition is sent to a service organization.

Modular Messaging Release 5.2 Service Pack 10 includes a new set of RAID battery and write cache alarms. Some of the MAS servers have a battery backed write cache on their RAID controllers. The cache increases RAID controller throughput performance but requires a battery to keep data in the cache should the server unexpectedly lose power. The battery is designed to preserve the data in the cache for 3 days (72 hours). If the battery degrades to a point where it cannot preserve the data for 3 days then the RAID controller will stop using the cache with a corresponding decrease in I/O throughput. The MAS server generates the RAID battery and write cache alarms when the MAS server detects any of the following problems:

- RAID write cache is not configured: This minor alarm is generated only when the S8800 servers are used. This alarm indicates that the write cache has not been enabled in the RAID controller firmware. Therefore, irrespective of the state of the battery or the health of the write cache, the write cache will not be used.
- RAID write cache is not active: This major alarm is generated when the S8730, S8800, or HP DL 360 G7 servers are used. This alarm indicates that either the RAID battery has failed or some other problem is keeping the write cache from working. If the battery has failed then there will also be a write cache battery failed alarm and you should replace the battery immediately. If there is no write cache battery failure alarm then the write cache has some other failure which must be diagnosed with vendor diagnostics.
- RAID write cache battery has failed: This major alarm is generated when the S8730, S8800, or HP DL 360 G7 servers are used. This alarm indicates that the RAID battery has failed and it cannot hold the data in the write cache. In this case, replace the battery immediately.
- RAID write cache battery is low: This minor alarm is generated only when the S8800 servers are used. This alarm indicates that the battery power is getting low but the battery is still working. However, it will not work very much longer. A new battery should be procured immediately and the battery replaced in the server a soon as a scheduled outage can be arranged.

For more information on the RAID battery degrade alarms, see the *Avaya Modular Messaging, Messaging Application Server Administration* guides.

Using the command line interface tools supplied with each MAS, administrators can view the following logs:

- The event log, which contains events and errors of interest to only technical services and development personnel.

  Note:

  The event log is not the same as the Windows Event Log.

- The administrator log, which contains events and errors of interest to system administrators.

- The active alarms log, which contains information about alarms that are currently active on the system. This log provides a primary tool when problems occur.
- The resolved alarms log, which contains a history of and information about alarms that have been raised and then resolved on the system. This log can be useful in analyzing problems and trends in the system.

For information on configuring serviceability and on displaying event, error, and alarm logs, see the *Avaya Modular Messaging, Messaging Application Server Administration* guides, available on the *Avaya Modular Messaging Documentation Library*.

MSS alarms and logs

MSS has an application-level maintenance infrastructure that provides automatic error recovery from many software failures. MSS raises alarms for hardware or software failures for which automatic recovery actions are unsuccessful, and a notification of the alarm condition is sent to Avaya Services. MSS also monitors each MAS on a regular basis and raises an alarm if an MAS becomes unresponsive for an extended period of time. This extended period of time, known as the time-out value, can be configured and can be set to 0 to disable the time-out.

MSS hardware platform in single server and multi-server configuration includes SAL, a serviceability agent that autonomously raises an alarm if an MSS processor fails or in response to various environmental problems.

Modular Messaging Release 5.2 Service Pack 10 includes a new set of RAID battery and write cache alarms. The MSS server has a battery backed write cache on its RAID controllers. The cache increases RAID controller throughput performance but requires a battery to keep data in the cache should the server unexpectedly lose power. The battery is designed to preserve the data in the cache for 3 days (72 hours). If the battery degrades to a point where it cannot preserve the data for 3 days then the RAID controller will stop using the cache with a corresponding decrease in I/O throughput. The MSS server generates the RAID battery and write cache alarms when the MSS server detects any of the following problems:

- RAID write cache is not configured: This minor alarm is generated only when the S8800 servers are used. This alarm indicates that the write cache has not been enabled in the RAID controller firmware. Therefore, irrespective of the state of the battery or the health of the write cache, the write cache will not be used.
- RAID write cache is not active: This major alarm is generated when the S8730, S8800, or HP DL 360 G7 servers are used. This alarm indicates that either the RAID battery has failed or some other problem is keeping the write cache from working. If the battery has failed then there will also be a write cache battery failed alarm and you should replace the battery immediately. If there is no write cache battery failure alarm then the write cache has some other failure which must be diagnosed with vendor diagnostics.
- RAID write cache battery has failed: This major alarm is generated when the S8730, S8800, or HP DL 360 G7 servers are used. This alarm indicates that the RAID battery

has failed and it cannot hold the data in the write cache. In this case, replace the battery immediately.

- RAID write cache battery is low: This minor alarm is generated only when the S8800 servers are used. This alarm indicates that the battery power is getting low but the battery is still working. However, it will not work very much longer. A new battery should be procured immediately and the battery replaced in the server a soon as a scheduled outage can be arranged.

For more information on the RAID battery and write cache alarms, see *MSS Alarms*, available on the *Modular Messaging documentation Library*.

MSS uses a series of logs that provide a view of activities, errors, and alarms. Reviewing the logs allows a system administrator to reach a quick understanding of overall system status. MSS logs are available from Web-based administration pages.

Logs record events that are useful for preventive maintenance, for diagnosing problems and troubleshooting the server, and for spotting trends or estimating future needs.

Log information is organized as follows:

- Administrator's log, which contains events and errors of interest to system administrators. Administrative events can include problems that directly affect message processing, such as full subscriber mailboxes and undeliverable messages.
- Alarm log, which contains descriptions of all significant problems detected by the system. The alarm log contains active alarms and resolved alarms.
- Maintenance log, which contains descriptions of all reported maintenance events.
- Administration History log, which identifies administrative events that occur on the system. These events include information about any changes to the system, such as logins, command line entries, reports that were run, or changes to software.
- Backup and Restore log. The Backup log informs administrators that a partial unattended backup was successfully completed. When an unattended backup does not successfully occur, the system backs up the System data and as many of the Names and Greetings and message data types as possible. This is called a partial unattended backup. The Restore log contains a list of all the files that were restored and information about any errors that occurred during the restore. If the restore was not successful, the log contains an explanation of why the restore process failed.
- VM Start-up log. When the system reboots, or when the Messaging software or Voice Module restarts, the system regenerates the VM Start-up Log. The VM Start-up Log provides information about the Messaging software for the following situations:
  - During a restart, the log shows the progress of the restart and information on the state of the Messaging software.
  - During a system update from one software release to the next, the log shows the progress of the data update.

  - During normal system operation, the log provides the last start date of the Messaging software. Note that the Messaging software restart date is not necessarily the same as a system reboot.
- Internet Messaging logs. Most of these logs contain information about the status of each e-mail process.
- Enhanced-List Delivery Failure Log. This log provides information on failed ELA deliveries, and contains the following information:
  - Delivery failure date and time
  - Mailbox number of the originator of each failed message
  - Enhanced-List to which the originator sent the message
  - Last Enhanced-List visited in a nested Enhanced-List hierarchy before the message failed
  - Name of the intended recipient of each failed message
  - Mailbox number of the intended recipient of each failed message
  - Detailed reason for each delivery failure
- Installation and Removal logs. These logs contain information about the installation, update, and removal of software packages.

Simple Network Management Protocol with Modular Messaging

Simple Network Management Protocol (SNMP) can be used with Modular Messaging monitoring some parts of the Modular Messaging system and for notification of alarms.

SNMP is used for the managing and monitoring network elements. The two kinds of SNMP software are a manager, which makes configuration requests and receives notifications, and an agent, which acts on behalf of the managed or monitored element to respond to configuration requests and generate notifications. An SNMP manager is often referred to as a Network Management Station (NMS).

In the Modular Messaging context, the MAS and the MSS are the managed systems that interact with NMSs through SNMP.

SNMP can be used with Modular Messaging to perform the following tasks:

- An NMS can perform queries to retrieve information from an MSS. SNMP is read-only in the Modular Messaging system, which means that an NMS can query an MSS for information, but cannot change that information.
- Modular Messaging (the MAS and MSS) can send alarm information to specified NMSs, using notifications or traps. For more information, see SNMP alarm notification on page 96.

The Avaya MSS supports SNMP versions 1, 2c, and 3, whereas the MAS supports SNMP versions 1 and 2c.

SNMP system queries

The Avaya MSS allows SNMP queries from NMSs. When a suitably administered NMS queries an MSS, through SNMP GET requests, the NMS retrieves read-only information defined by Management Information Base - II (MIB-II).

SNMP GET requests are restricted to specifically administered NMSs.

With Modular Messaging, the MAS does not provide support for SNMP GET requests. Neither the MAS nor the MSS provides support for SNMP SET requests.

SNMP alarm notification

Customers can extend their existing SNMP alarm notification functionality to MAS units and to the MSS.

Important:

Avaya does not supply NMS units. Customers or Avaya Partners that choose to use SNMP alarm notification with their MAS units and MSS must ensure that an NMS is installed, set up, and tested prior to technicians arriving onsite for the Modular Messaging installation or upgrade. The MAS and the MSS communicate with the SNMP NMS.

When an MAS or the MSS enters an alarm state, it can notify service personnel of its alarm state by sending SNMP alarm traps to a predefined NMS. In some SNMP versions, traps are also called notifications or informs.

Modular Messaging can send alarm notifications of major alarms, minor alarms, and warnings:

- To send alarm notifications of major alarms or of major and minor alarms, Modular Messaging sends SNMP traps to Avaya services personnel or Avaya Partners. These SNMP traps are defined in the Avaya SNMP MIB-II, and convey the following information in its payload:
  - A notification object, inadssnmpAlarm, as defined in the Avaya SNMP MIB-II.

- Two objects, inadssnmpAlarm Message and inadssnmpAlarmTime, which exist in the payload of inadssnmpAlarm. Both inadssnmpAlarm Message and inadssnmpAlarmTime are defined in the Avaya SNMP MIB-II.

- In addition to sending major and minor alarms through SNMP traps, the MSS can be configured to send traps indicating warnings, major alarms, and minor alarms to one or more additional customer NMSs. These traps are defined in the Avaya OAM MIB. These additional customer NMSs cannot acknowledge receipt of traps.

For more information on MIB-II and OAM MIB, see the *Messaging Application Server (MAS) Administration Guide*.

The following table provides information on the generic traps configured by alarming.

Generic trap	Description
Cold Start (Generic Trap 0)	This indicates that the Messaging Application Server (MAS) containing the SNMP agent has rebooted. All management counters for standardized Management Information Bases (MIBs) are then reset.
Warm Start (Generic Trap 1)	This indicates that the SNMP agent has re-initialized itself. None of the management variables are reset.
Link Down (Generic Trap 2)	This indicates that a network interface has gone down. The trap contents describe which interface went down.
Link Up (Generic Trap 3)	This indicates that a network interface has become available.
Authentication Failure for SNMP Queries (Generic Trap 4)	This indicates that an attempt has been made to query the Modular Messaging system using SNMP with an incorrect community name. If the corporate LAN interface goes down, the MAS cannot send this trap.

Licensing

Avaya controls the use and access of some Modular Messaging features through licenses, which the customer must purchase, including the number of Modular Messaging enabled mailboxes the customer wants to use.

In previous releases of Modular Messaging, licenses were tied to a VMD, and any servers in that VMD could use a licensed feature. Modular Messaging Release 5.2 uses WebLM as its standard licensing mechanism. Modular Messaging features are tied to the WebLM server, and any clients of that server can acquire and use a licensed feature.

All Modular Messaging Release 5.2 systems, whether newly installed or upgraded, require a WebLM hosted license. Modular Messaging uses an enterprise license file which will allow the same license to be shared with multiple Modular Messaging systems within an organization,

if desired. WebLM licenses do not restrict the license to any one message store type (e.g. Domino, Exchange, or Avaya MSS messaging stores) but the number of seat licenses is shared between all the Modular Messaging systems associated with that license.

WebLM Servers

With the Modular Messaging single server configuration, a WebLM server is installed as part of the System Platform installation and will be automatically configured as the WebLM server to be used by Modular Messaging. Customers can subsequently change this configuration if they already have a centralized WebLM server that they would prefer to use instead. For new installations of multi-server configurations, a WebLM can be optionally installed on one of the MAS units at the time of installation or, if a WebLM server is already provisioned, that may be used instead.

When upgrading from releases prior to Modular Messaging Release 5.0, WebLM can be installed from the Modular Messaging Release 5.2 Applications DVD on to one of the existing MAS units after the upgrade is complete. However when upgrading from Modular Messaging Release 5.x, the WebLM software must be downloaded via PLDS and then installed as required.

In larger or more complex environments, customers may have multiple Modular Messaging systems. Each Modular Messaging system can be associated with just one license file and therefore consideration must be given to how the licenses will be distributed. In many cases these decisions should be made before the license is obtained via PLDS. There are many WebLM configurations possible, but these are the main four:

- Each Modular Messaging system has its own dedicated WebLM server. This will result in each Modular Messaging system requiring its own license and the subscriber seats being dedicated to that system. Any changes to these licenses will need to be managed via PLDS.
- If the customer has multiple locations, a single WebLM server can be configured for each location and all Modular Messaging systems in that location can share a single license. This has the advantage that it will reduce the number of licenses that need to be managed and also allow for greater flexibility in movement of subscriber seats between Modular Messaging systems. However, subscriber seats will not be able to be moved between sites without using PLDS to reissue the license for both sites.
- Where a suitable network exists, the customer may choose to have a single, enterprise, WebLM server which all Modular Messaging systems will use. This will require just one license to be issued and the subscriber seat count will be the total for the enterprise with no restrictions on how many subscribers are hosted on each system. The downside of this configuration is that network outages could cause a Modular Messaging system to temporarily lose connectivity to the licensing server. This would cause Modular Messaging to enter License Error mode, with no other effects, as long as the connectivity was restored within 30 days.
- The more complex scenario makes full use of the capabilities of WebLM. The Modular Messaging enterprise license can be installed on a ‘master’ WebLM server and an

allocation of the total subscriber seats made to a number of 'local' WebLM servers. Each local server will manage the licenses for one or more Modular Messaging systems potentially removing the impact of wide area network outages. Customers can manage themselves the distribution of subscriber seats thus removing the complexity of managing individual licenses via PLDS so long as the total number of seats in the enterprise is not exceeded.

For more information, see the *Installing and Configuring Avaya WebLM server* guide, available at http://support.avaya.com.

WebLM licensing

The license file controls the number of subscriber mailboxes that can exist within a Voice Mail Domain. The license is created based upon the Host ID of the WebLM server. The subscriber count can only be changed via PLDS either by purchasing additional seats or by moving seats between licenses. If more than one Modular Messaging system exists in an enterprise then the licensing model should be planned out before obtaining the require license(s) through PLDS.

Modular Messaging license management

One of the MAS units in the VMD is designated as the license manager. This MAS manages the requests for subscriber licenses. The first MAS to be installed (or upgraded to Modular Messaging Release 5.2) will initially be the license manager, but if this MAS becomes unavailable then another MAS will automatically be selected and become the default.

- If the MAS that has the license manager role is shutdown normally, another MAS (if available) will be immediately selected to fulfil the role.
- If the MAS service unexpectedly stops on the license manager and remains out of service then a process running on each live MAS checks whether the license manager MAS has been unavailable for continuous one hour, if yes then one of the live MAS takes over the role of the license manager.

All licenses which are not renewed expire automatically after 10 minutes. The license manager is responsible for renewing all licenses within that time period. Failure to acquire or renew licenses will result in the system entering License Error mode. For more information, see WebLM licensing modes on page 100.

The licensing implementation on the MSS will attempt to contact the license manager whenever a subscriber is being created or edited. If no license manager MAS is available then the administration task will not be allowed. The Modular Messaging—Exchange Subscriber Administration interface directly communicates with an MAS which in turn will contact the license manager. Modular Messaging—Domino Subscriber Administration does not query the license manager MAS. The license manager MAS at regular intervals tries to acquire/renew

licenses for all the subscribers and if it is not able to acquire enough licenses then it puts the system in License Error mode.

For Microsoft Exchange or IBM Lotus Domino message stores, the number of subscriber licenses acquired on start-up will be the number of voice mail enabled subscribers in the VMD. For Avaya MSS storage server, the number of subscriber licenses acquired on start-up will be the total number of subscribers in the VMD.

WebLM licensing modes

Every Modular Messaging system maintains a license mode to enforce the restrictions imposed by the Modular Messaging license, whilst allowing customers some flexibility to overcome temporary problems.

There are three types of licensing modes, namely License Normal, License Error, and License Restricted. All changes to the license mode are recorded in the Windows Event Logs.

License Normal mode

The system is in License Normal mode if all of the following conditions are true:

- The license server is accessible
- A valid license is installed on the WebLM server
- Licenses acquired is greater than or equal to the number of Modular Messaging enabled mailboxes for Exchange and Domino while number of mailboxes for MSS
- A license manager MAS is available

A mailbox license is used whenever a new Modular Messaging subscriber is enabled. The Exchange and MSS subscriber administration applications reject any attempt to enable a subscriber if a subscriber license is not available at that point of time. The Domino subscriber administration application does not prevent administrators from enabling Modular Messaging mailboxes past the licensed limit, so the mailbox license check is done periodically by the license manager MAS. A mailbox license is released when a mailbox is disabled for voice mail, or when an enabled mailbox is deleted. In Modular Messaging—MSS, a mailbox whether enabled or not enabled for voice mail consumes a license.

License Error mode

The system enters License Error mode if all of the following conditions are true:

- The license server is inaccessible
- An invalid license is installed on the WebLM server
- The number of Modular Messaging enabled mailboxes is greater than the total number of acquired licenses and available licenses
- License manager MAS is not available

In License Error mode, the system allows any number of mailboxes to be enabled, for a grace period of 30 days. If this grace period expires then the system enters License Restricted mode.

License Restricted mode

The system enters License Restricted mode if it has been in License Error mode for 30 consecutive days without the license problem being resolved. The Common Caller Interface will lock any mailbox with an expired password if the system is in License Restricted mode.

License Restricted mode enforces following restrictions:

- New subscribers cannot be enabled for voice mail
- Administrators and subscribers cannot change mailbox properties
- The TUIs disable access to personal configuration
- Subscriber Options or Web Subscriber Options cannot be used to configure mailbox settings

Apart from these restrictions, the system operates normally. Subscribers can be deleted or disabled for voice mail, allowing customers to recover if the licensed mailbox count is exceeded. System configuration can be performed as normal.

The system returns to License Normal mode only when all outstanding license problems are resolved.

Audio encoding formats

Modular Messaging supports the following audio encoding formats:

- Global System for Mobile Communications (GSM) 6.10
- G.711 (A-law and µ-law)

Audio compression manager codecs for GSM 6.10 and G.711 are available on most Windows desktops. Voice messages recorded by using Modular Messaging and sent to non–Modular Messaging users can be played back by using Microsoft Sound Recorder or Media Player on a multimedia computer without any additional software.

The audio encoding format for recording messages is administered on a Voice Mail Domain basis. For information about configuring audio encoding properties, see the *MAS Administration Guide*.

Some considerations related to audio encoding formats are:

- An MAS can play and record the GSM 6.10, G.711 A-law, and G.711 µ-law audio encoding formats. The single format specified by the VMD setting refers to the format used to record voice messages, recorded names, and greetings by the TUI and GUI clients. The G.711 format is used to record system and Caller Application prompts.
- A message store may contain some messages encoded with GSM 6.10 and some with G.711. This could happen if the encoding is changed, or if networked messages use a different encoder than the one used in the MAS of its VMD. For example, an MSS may

receive G.711-encoded messages from the MAS and GSM 6.10-encoded messages from remote subscribers.

Note:

Administrators must revisit the mailbox sizes set for the COSs if the encoding formats of a Modular Messaging system are changed, especially when going from GSM 6.10 to G.711 since G.711 requires more storage space.

GSM 6.10

This audio encoding format has a coding rate of approximately 13 kilobits per second (kbps) or 1.6 Kilobytes per second (KBps). A message that is 1 minute long would require approximately 95.2 KB of storage space when encoded using the GSM 6.10 format. One hour of GSM 6.10 requires 5.6 MB of storage space. GSM 6.10-encoded messages occupy approximately 20% of the storage space used by G.711.

The GSM 6.10 format produces cell phone quality speech. GSM 6.10 is the default encoding format in Modular Messaging.

GSM 6.10 does not support Teletypewriter (TTY).

G.711

This audio encoding format has a coding rate of approximately 64 kbps or 8 KBps. A message that is 1 minute long would require approximately 468.8 KB of storage space when encoded using the G.711 format. One hour of G.711 requires 27.5 MB of storage space. G.711-encoded messages occupy approximately five times as much storage space as GSM 6.10.

G.711 is an international standard telephony encoding format on a 64-kbps channel. G.711 uses the Pulse Code Modulation (PCM) encoding scheme. This is an 8-bit format that is used primarily for telephone quality speech. G.711 has two variants: A-law and μ-law. Typically, A-law is used in Europe, and μ-law is used in the United States. In Modular Messaging Release 5.2, the SIP integration supports both A-law and μ-law.

G.711 encoding produces high-quality recording, which is essential for TTY. Customer systems that use TTY with Baudot tones must use G.711 audio encoding.

G.711 encoding produces higher quality sound. If customers that use GSM 6.10 encoding find that sound quality is inferior, they may consider changing to G.711 encoding for improved sound quality.

Recommendations for selecting audio encoding formats

The voice connectivity between a Modular Messaging system and a switch is dependent on the SWIN used. The following table lists the audio encoding format recommended for the various SWINs.

SWIN	Audio Encoding Format
Session Initiation Protocol (SIP)	Modular Messaging negotiates encoding with the switch.
H.323	G.711
T1/E1 QSIG	G.711
Digital Set Emulation (DSE)	Uses the digital encoding method of the switch.

GSM is the default encoding format for Modular Messaging. Some considerations related to GSM and G.711 selection:

- G.711 provides the highest quality voice, especially when multiple instances of encoding and decoding are used in the customer's voice network. Voice quality is critical for customers.
- G.711 requires more storage space than GSM. However, encoded message size should not be an issue for customers with LAN connectivity for message playback or for message networking. With G.711 encoding, the MSS-Standard Availability and MSS-High Availability systems provide 1,500 and 3,000 hours of storage, which is adequate for most customers.
- G.711 encoding is required for Modular Messaging systems that require support for TTY devices.

  For more information about using TTY devices with Modular Messaging, see *Messaging with a Teletypewriter (TTY)*, available on the *Modular Messaging documentation Library*.

To use G.711 as the audio encoding format for a system, administrators must set G.711 as the encoding format in the VMSC.

Binary size and MIME transfer size

Modular Messaging—MSS stores voice messages in their native binary GSM 6.10 or G.711 format, but uses the base64 encoding scheme to encode audio data when transferring binary messages using Multipurpose Internet Mail Extensions (MIME). A binary message that is base64 encoded occupies about 37% more space than the original binary message. For example, a message that originally occupies 300 KB will occupy about 411 KB after base64 encoding.

When Modular Messaging—MSS subscribers use a standards-based e-mail client to listen to a message, the size of the message displayed by the e-mail client is the MIME transfer size of the message, after base64 encoding. This size includes a 37% increase in size as compared to the original size of the message, regardless of the encoding format used (GSM 6.10 or G.711).

Impacts of message size on message transfer by GUI clients

When subscribers use a GUI client to retrieve a voice message, the entire message may be downloaded to the client.

The size of an encoded message, either GSM 6.10 or G.711 format, and the MIME transfer size of a message affect the time GUI clients take to retrieve and play these messages locally. However, in a corporate setting, message retrieval takes place on a high-speed LAN, with a speed of 10 MBps or more. Hence, the size difference between the two encoding formats does not noticeably affect message download time.

Communities and sending restrictions

Modular Messaging—MSS has a feature called Sending Restrictions. With appropriate administration, this feature prevents the delivery of messages from certain originators to specific groups of mailboxes residing within the Modular Messaging system. Thus, administrators can prevent unwanted enhanced-list usage, unauthorized message creation, and unwanted messaging, such as delivery from line employees to senior executives, while also isolating mailboxes that should not receive inbound traffic (such as the ELA shadow mailbox).

Use of the Sending Restrictions feature begins with the planning necessary to organize the messaging network's mailboxes into communities. Modular Messaging provides up to 15 communities. You can also think of the communities as classes of restriction. Although these assignments can be changed, Modular Messaging, by default, uses communities 10 and 11 for enhanced-list mailboxes and the ELA shadow mailbox, respectively.

The communities must be defined equivalently everywhere within the messaging network as messaging systems include each mailbox's community assignment when exchanging directory updates. For networked messaging systems that do not possess facilities to assign communities to its subscribers, Modular Messaging has an administration field, configurable on a per-networked system basis, to allocate a community number to all the remote system's mailboxes. An administrator can uniformly assign a community number to all Internet originators who send e-mail to the Modular Messaging system's mailboxes.

Once the communities are defined, the administrator should identify unwanted message transmission paths and configure each Modular Messaging system with the same sending restrictions matrix. Message transmission between any two communities may be freely open,

restricted in one direction or the other, or restricted in both directions. Modular Messaging systems arrive preconfigured to restrict all traffic into the community in which the ELA shadow mailbox resides.

Community numbers are given to Modular Messaging local subscribers on a per-subscriber basis. They are independent of COS assignments. Administrators may need to change the community assignments for some subscribers or networked systems that have already been administered to achieve the desired results. Administrators should assign appropriate community numbers to subscribers or networked machines that are added in the future. Modular Messaging allows definition of a default community number. The default community is assigned to a new local subscriber unless the administrator selects a different value during the subscriber addition.

The Modular Messaging server enforces community-based sending restrictions at delivery time. Feedback is not given when addressing a message to a destination that the system does not allow the originator to reach. However, for each unreachable destination, the originator will receive a delivery failure notice stating that messaging to the intended recipient was not permitted. This behavior produces uniformity between the TUIs and the graphical clients.

Sending restrictions do not affect directory lookup services available to subscribers. When subscribers address or perform lookups based on name or number, results will include entries to which sending may be restricted. Community-based sending restrictions may not be suitable to partition a Modular Messaging system for multitenant applications, as entries for other tenants will appear in a given tenant's addressing and lookup results.

A common configuration for community-based sending restrictions is to allow only selected individuals to use very large enhanced lists or broadcast lists. To do so, the administrator assigns the privileged persons into their own community and then modifies the restrictions matrix to prevent all other communities from sending into the community housing the list mailboxes.

System lists

This topic provides information on the system lists that Modular Messaging supports.

Modular Messaging—MSS Enhanced-List Application

ELA is a messaging tool that greatly expands the capability of the Modular Messaging—MSS system to deliver messages to a large number of recipients. ELA associates one mailbox to a list of members, so that when subscribers want to send a message to the whole list, they can send a message to the list mailbox instead.

When a new message is delivered into the list mailbox, known as the shadow mailbox, the ELA software distributes the message to the members of the list. ELA members can be local

or remote subscribers or arbitrary e-mail addresses, thus providing extreme flexibility. For example, administrators can set up an ELA list for a suggestion box that messages addressed to this list are distributed to the Modular Messaging mailboxes of a set of subscribers and to one or more e-mail addresses, for archiving or any other purpose.

Ordinarily, recipients receive the message as if it were sent by the message originator. Recipients can reply to the person who originally sent the message and to all recipients of the original message. However, administrators can configure lists to block recipients from replying to ELA senders or recipient lists. In this case, the shadow mailbox must belong to a community that cannot receive messages, but can send messages to all other communities. For more information on sending restrictions and communities, see Communities and sending restrictions on page 104.

An ELA mailbox is like any other mailbox, allowing such operations as recording a name and a greeting for the list and allowing Call Answer messages to be distributed through ELA. As any other mailbox does, an ELA mailbox has a mailbox number, a numeric address, and a Modular Messaging e-mail address.

Administrators of Modular Messaging—MSS can also administer a remote mailbox with the e-mail address of a list, thus making Microsoft Exchange and IBM Lotus Domino lists available through Modular Messaging—MSS configurations.

A Modular Messaging—MSS system supports a maximum of 1,000 ELA lists; each ELA list can have a maximum of 1,500 members. ELA lists can be nested to create larger lists.

Modular Messaging—Exchange global distribution lists and Modular Messaging—Domino mailing list groups

Microsoft Exchange and IBM Lotus Domino systems support system lists, known as global distribution lists and mailing list groups, respectively.

A global distribution list is a group of e-mail addresses that are grouped under a single e-mail address. A distribution list provides an easy way to send messages to a group of people. A message sent to a distribution list goes to all recipients of the list.

Microsoft Exchange supports global distribution lists that are visible in the Global Address List and are available to everyone who uses that network.

When an account is hidden from the global address list (GAL), systems that have peer Exchange servers set as Exchange 2010 cannot send messages to the accounts. Before a message is sent to a user, a lookup is performed in the GAL from the account that the user has logged on. In the case of external callers, the External caller account is used. Either way, if the peer Exchange server is 2010, this look up fails when the account is hidden, however, it works when the peer Exchange server is an Exchange 2003 server.

IBM Lotus Domino supports mailing list groups that are visible in the IBM Lotus Notes Address Book and are available to everyone on that Domino Domain.

The global distribution list and mailing list groups can be addressed from the Modular Messaging Outlook Clients. Numeric Addresses of subscribers from global distribution list and mailing list groups can also be addressed from the TUIs.

Broadcasting messages

Modular Messaging—MSS

With Modular Messaging—MSS, an administrator can designate any ELA to be a local broadcast list. When a message is received into an appropriately configured enhanced-list mailbox, the message is sent to all local subscribers and to all list members. The ELA list members receive the email message twice, one as a normal message and another as a broadcast message.

Modular Messaging—MSS administrators can also set up system-wide or enterprise-wide broadcast lists. For example, administrators can create a broadcast list on each Modular Messaging system and then create a broadcast list on one of the Modular Messaging systems that has, as its members, the broadcast lists on all the systems.

A broadcast message resides physically on an MSS in one location. If a broadcast message is sent to networked systems, the message will reside once on each MSS. Each subscriber's mailbox then has a link to the physical location of the message and the message attributes. Each subscriber's mailbox has a different message ID for the broadcast message.

The MSS uses the broadcast mailbox and Community ID settings to control sending privileges of users who address messages to ELA broadcast mailing lists. For more information on communities and sending privileges, see Communities and sending restrictions on page 104.

When a broadcast message is sent it is not immediately delivered to a subscriber's mailbox. The link to the broadcast message appears in a subscriber's mailbox the first time the mailbox is logged into after the message is sent. Mailbox Monitor logs in to the mailbox regularly if Call Me, Notify Me or MWI is used. This results in the broadcast message appearing in the subscriber's mailbox even though the subscriber has not yet logged in through the TUI or a GUI.

The MSS broadcast mailbox can only store 16 active messages. The broadcast lists are set up system-wide and the Broadcast Message Active Time setting is set to 10 days, by default. It is possible to send more than 16 broadcast messages if the Broadcast Message Active Time setting is changed to less than 10 days. When the time set in the Broadcast Message Active Time setting is expired, the broadcast message will not be delivered to any subscriber whose mailbox has not been logged into. However, the broadcast message will be retained for any subscriber whose mailbox has been logged into. The broadcast message is still accessible because it is already in the subscriber's mailboxes. The broadcast message will be retained in the message store until the audit notes that no subscriber mailboxes refer to it, then the message will be deleted.

Note:

With AUDIX TUIs, the broadcast mailboxes are administered in such a way that the system deletes the message from the broadcast mailbox when it expires. Then the broadcast message can no longer be accessed.

Although a new broadcast message does not activate MWI, it does activate Call Me and Notify Me, provided that the broadcast message meets subscriber-specified criteria. If customers require MWI activation, system administrators can create an ELA with entries for each local subscriber. Messages sent to an ELA activate MWI. Call Me rules within Subscriber Options and Web Subscriber Options can be defined to exclude broadcast messages from the set of message types that trigger an outcall.

The Modular Messaging TUIs announce broadcast messages. The TUIs present new broadcast messages before other messages and provide a summary count of broadcast messages after subscribers log in. AUDIX TUI and Serenade TUI subscribers hear all broadcast messages of all message types (voice, fax, and text) before gaining access to other messages. Aria TUI subscribers hear all voice broadcast messages before accessing other voice messages but have to select the text message option to be able to listen to broadcast text messages. If broadcast messages are sent as text, Aria TUI users will not hear the messages unless they access text messages.

Modular Messaging Web Client, Modular Messaging Restricted Outlook Client, and Modular Messaging Outlook Client provide visual indications for identifying broadcast messages.

Standards-based clients do not provide any special visual indicators for broadcast messages. Recipients can recognize broadcast messages from the address of the broadcast ELA, unless the broadcast message has been sent through Blind Carbon Copy (BCC).

When a broadcast message is removed from the broadcast mailbox it will not be delivered to any subscriber whose mailbox has not been logged into. However, it will be retained for any subscriber whose mailbox has been logged into. When Call Me, Notify Me, and MWI are used Mailbox Monitor logs in to mailboxes regularly. Therefore, the broadcast message appears in the subscriber's mailboxes even though they have not logged in.

Modular Messaging—Exchange and Modular Messaging—Domino

Modular Messaging—Exchange will automatically create a broadcast list, Broadcast Distribution List (BDL). Previous releases of Modular Messaging—Exchange allow administrators to create a BDL. When a new message is sent to the list, the BDL distributes the message to the members of the distribution list.

Recipients of the broadcast message receive the message as if it were sent by the message originator. Recipients can reply to the person who originally sent the message. However, administrators can configure the distribution lists to block recipients from replying to broadcast messages.

Subscribers of Modular Messaging—Exchange can use the Active Directory settings to control sending privileges of users who address messages to the broadcast distribution list. The actual addressing format used to send a broadcast message can be any addressing format that the relevant TUI supports.

A new broadcast message will activate Call Me, Notify Me, and the MWI provided that the message meets subscriber-specified criteria. Call Me rules within Subscriber Options and Web

Subscriber Options can be defined to exclude broadcast messages from the set of message types that trigger an outcall.

Personal Distribution Lists

A Personal Distribution List (PDL) is a labeled collection of addresses that a subscriber may create and save for later use. Messages that are addressed to the list are sent to all of the addresses (list members) within the list. Subscribers who frequently send messages to the same group of people can create PDLs for the groups. For example, if a subscriber frequently sends messages to 10 members of the Sales team, the subscriber can create a PDL labeled “Sales” that has the addresses of the 10 members of the Sales team. When the subscriber sends a message to the PDL “Sales,” the message is sent to all 10 members of the Sales team.

Unlike system lists, such as an ELA or a broadcast distribution list, a PDL is created and managed by a subscriber rather than a system administrator. Unlike an ELA or a broadcast distribution list, a PDL is personal, meaning that only the owner of the list can view and use the list. A PDL is not available for other subscribers.

Modular Messaging supports up to 500 PDLs per subscriber, subject to system capacity, although no hard limit has been established for the product. A PDL can contain up to 999 members (list entries), subject to system capacity, although no hard limit has been established for the product.

Note:

Lists are not Modular Messaging enabled subscribers and do not count toward any purchasable limits.

PDL members

The entries in a PDL are known as PDL members. A PDL can contain one or more of the following entries as list members:

- Addresses of local or remote subscribers
- Fax machine telephone number
- ELA lists on local or remote systems
- Enterprise lists on a Message Networking server
- Other PDLs owned by the same subscriber
- Any arbitrary e-mail address

A PDL may not contain the broadcast mailbox, the internal fax delivery mailbox, or a Modular Messaging—MSS ELA shadow mailbox.

Subscribers can also create a PDL with no addresses and then add addresses later. The format for adding addresses to a PDL depends on the client or interface that subscribers use.

In Modular Messaging—MSS, subscribers can create new PDLs from the Modular Messaging TUIs, from Subscriber Options, and from Web Subscriber Options. Subscribers can modify or delete existing PDLs from the Modular Messaging TUIs, from Subscriber Options, and from Web Subscriber Options.

In Modular Messaging—Exchange and Modular Messaging—Domino, subscribers can create new PDLs only from the Modular Messaging TUIs. Subscribers can use Subscriber Options or Web Subscriber Options to allow a distribution list or group to be accessed as a PDL from the TUIs. Subscribers can modify or delete existing PDLs from the Modular Messaging TUIs, from Subscriber Options, and from Web Subscriber Options.

For more information, see Creating PDLs from TUIs on page 112 and Creating PDLs from Subscriber Options or Web Subscriber Options on page 112.

PDL labels and identifiers

A PDL has one or more of the following labels or identifiers:

- Name
- Identifier
- List number (List ID)
- Recorded list name

Name

A name, also known as the PDL display name, is a unicode text name that subscribers can assign a PDL. A PDL name can contain a maximum of 255 characters.

Subscribers can use the PDL name when addressing messages from the Modular Messaging TUIs. When managing PDLs from Subscriber Options or Web Subscriber Options, subscribers can use the PDL name to quickly navigate through the PDLs they own.

A PDL name can contain alphanumeric and restricted characters. A PDL name need not be unique.

When creating PDLs from Subscriber Options and Web Subscriber Options, subscribers must assign PDL names. When creating PDLs from the Modular Messaging TUIs, subscribers cannot assign PDLs a name. However, subscribers can use Subscriber Options or Web Subscriber Options to modify the PDL and assign it a name.

Identifier

An identifier is an ASCII name that is assigned to PDLs. When subscribers enter a name for their PDLs, the system automatically generates an identifiers for the PDLs. A system-generated identifier is the PDL name without any spaces or restricted characters. For example, the identifier of a PDL named Sales Team (3) would be SalesTeam3.

Subscribers can also edit the system-generated identifier, if required. An identifier can contain only ASCII characters (0 to 9, a to z, A to Z, _ and -) and must be unique across all the PDLs a subscriber owns. If subscribers do not provide an identifier, the system automatically generates an identifier.

The Identifier is used in the PDL e-mail address syntax *#[Identifier]@hostdomain.com*, when subscribers address messages to a PDL from a GUI client.

List number (List ID)

A list number, also known as the list ID, is a numeric list identifier that subscribers must assign to PDLs they own. A list number must be unique among all PDLs that the subscriber owns.

A list number can contain 1 to 32 digits and can start with 0. In Modular Messaging—MSS, the list number is used in the PDL e-mail address syntax #[*List number]@hostdomain.com*, when subscribers address messages to a PDL from a GUI client.

Subscribers can also use the list number to address messages to a PDL from the Modular Messaging TUIs. All PDLs that exist must have a list number.

Recorded list name

A recorded list name is an optional identifier that subscribers can record when creating lists from the Modular Messaging TUIs, from Web Subscriber Options, or from Subscriber Options. This will allow the TUI to play the recorded name of the list as confirmation when the list is selected.

Working with PDLs

Subscribers can create and manage, which includes modifying or deleting, PDLs from the following interfaces or clients:

- The Modular Messaging TUIs:
  - Aria TUI for Modular Messaging
  - AUDIX TUI for Modular Messaging

- Serenade TUI for Modular Messaging
- Subscriber Options
- Web Subscriber Options

PDLs that subscribers create by using one client or interface are usable from any other client or interface. For example, PDLs that subscribers create by using the Aria TUI for Modular Messaging are usable from the AUDIX TUI for Modular Messaging, from the Serenade TUI for Modular Messaging, and from the GUI clients.

Creating PDLs from TUIs

From the Modular Messaging TUIs, a subscriber can create new PDLs with one or more of the following members:

- Local subscribers. Local subscribers can be added by mailbox number, Numeric Address, or name.
- Remote subscribers. Remote subscribers can be added by Numeric Address, network address, or name.
- Fax device telephone numbers

  The Modular Messaging AUDIX TUI and Modular Messaging Serenade TUI support adding a fax device telephone number to a PDL. However, Modular Messaging Aria TUI does not.
- ELA lists
- List numbers (List IDs) of other PDLs that the same subscriber owns

Note:

Subscribers can create a PDL with no members and add entries later.

When subscribers create a PDL from the TUIs, the PDL has no text name. Subscribers can provide a name later from Subscriber Options or Web Subscriber Options, after the PDL is created. When subscribers create a PDL from the TUIs, they can also provide a recorded name.

Creating PDLs from Subscriber Options or Web Subscriber Options

From the Subscriber Options or the Web Subscriber Options applications, a subscriber can create new PDLs. When creating a PDL from Subscriber Options or Web Subscriber Options, subscribers assign the PDL a text name and a list number. Subscribers can also edit the system-generated identifier and provide an optional recorded name.

For Modular Messaging—MSS, PDLs may be created with one or more of the following members:

- The mailbox numbers or Numeric Addresses of subscribers from Global Contacts.
- The extension numbers of local subscribers from Global Contacts.
- The names of subscribers from Global Contacts. When subscribers enter the name or partial name of subscribers from Global Contacts, Subscriber Options or Web Subscriber Options presents a list of matches, if any. Subscriber Options and Web Subscriber Options present up to nine matches for the specified name.
- Fax device telephone numbers in the format *fax=nnnn@host.domain*, where *host.domain* is the address of the subscriber's MSS.
- Arbitrary e-mail addresses.
- Text names of other PDLs that the same subscriber owns.

Note:

From the Subscriber Options and Web Subscriber Options for the Restricted Outlook Client, a subscriber cannot add a non-subscriber to a PDL.

In Modular Messaging—Exchange, subscribers can create distribution lists using Microsoft Outlook. In Modular Messaging—Domino, subscribers can create groups using Lotus Notes.

Subscribers can use Subscriber Options or Web Subscriber Options to allow a distribution list or group to be accessed as a PDL from the TUIs. Any Modular Messaging TUI can be used to add members to a PDL; this cannot be done using Subscriber Options or Web Subscriber Options.

Managing PDLs from the TUIs

Managing a PDL from the Modular Messaging TUIs includes:

- Adding and removing list members by specifying their mailbox numbers, Numeric Addresses, or network addresses
- Modifying the list number of the PDL
- Adding or modifying the recorded name of the PDL
- Deleting a PDL

To manage a PDL, subscribers can select the PDL by specifying its list number or its name. If the PDL name contains only non-ASCII characters, the only way to select a PDL is by its list number.

Managing PDLs from Subscriber Options or Web Subscriber Options

Managing a PDL from Subscriber Options or Web Subscriber Options includes:

- Modifying the list number or identifier of the PDL
- Adding or modifying the recorded name of the PDL
- Deleting a PDL
- Adding and removing list members by specifying their mailbox numbers, Numeric Addresses, extension numbers, or e-mail addresses

To manage a PDL, subscribers can select the PDL by specifying its list number or its unicode name. The PDL name enables subscribers to quickly navigate through the PDLs they own. From Subscriber Options, subscribers can sort PDLs by name or by list number.

An administrator can invoke Subscriber Options or Web Subscriber Options on behalf of a subscriber, enabling the administrator to access lists that the subscriber owns.

Addressing messages to PDLs

Subscribers can address messages to PDLs from any of the following interfaces, applications, or clients:

- The Modular Messaging TUIs:
  - Aria TUI for Modular Messaging
  - AUDIX TUI for Modular Messaging
  - Serenade TUI for Modular Messaging
- Modular Messaging Outlook Client
- Modular Messaging Restricted Outlook Client
- Modular Messaging Lotus Notes Client
- Modular Messaging Web Client
- one-X Speech client
- A standards-based e-mail client

If subscribers address a message to a PDL that contains a deleted subscriber or a deleted PDL, the system generates a delivery failure notification message. The message is delivered to all other valid recipients. The system also informs the message originator of the last known name and e-mail address of the deleted subscriber or PDL. The TUIs voice the e-mail address by using TTS conversion. For more information, see PDLs and deleted subscribers on page 117.

Addressing from the Modular Messaging TUIs

The Modular Messaging TUIs enable subscribers to include a PDL in the addressee list when addressing messages.

To address messages to a PDL from the Modular Messaging Aria TUI or the Modular Messaging Serenade TUI, subscribers can address to the list number or to the name, if one exists.

With these TUIs, PDLs belonging to a subscriber are mixed in with addresses of other subscribers. When subscribers address a message to the list number of a PDL, the system matches the number against all PDLs belonging to the subscriber, as well as mailbox numbers, Numeric Addresses, and network addresses of other subscribers. When subscribers address a message by name, the system matches the name against the names of PDLs belonging to the subscribers, as well as display names of subscribers.

The system prompts the subscribers to select the targeted recipient, which in this case is a PDL.

Subscribers of Modular Messaging AUDIX TUI can address to a PDL either by name, if one exists, or by list number. The TUI provides subscribers an opportunity to select the PDL from a list of matches. The Modular Messaging AUDIX TUI provides subscribers with a unique key press when addressing messages to PDLs. This key press identifies the PDL address type, thus keeping PDL addresses separate from addresses of other subscribers.

Addressing from GUI clients

Subscribers can address messages to a PDL from any of the following GUI clients (applicable only to Modular Messaging—MSS):

- Microsoft Outlook, with Modular Messaging Outlook Client and Modular Messaging Restricted Outlook Client
- IBM Lotus Notes, with Modular Messaging Lotus Notes Client
- Modular Messaging Web Client
- Standards-based e-mail client

From all these GUI clients, subscribers can address messages either to the list number or to the PDL identifier.

When subscribers address messages to a PDL from Modular Messaging Outlook Client or Modular Messaging Restricted Outlook Client the Voice Form component provides directory assistance. Subscribers can select a PDL recipient from the MSS directory and conveniently send a message to the list. All PDLs that a subscriber owns are grouped under Modular Messaging PDLs, in the MSS directory.

Modular Messaging Web Client facilitates subscribers to look up PDL addresses. Subscribers thus do not need to know the address of a PDL. In Modular Messaging Web Client, subscribers

also have an option of addressing a message to selected members of a PDL. Subscribers can select individual members by expanding the PDL.

Avaya GUI clients support the following PDL addressing formats:

- *#nnnn*, where *nnnn* is the list number of the PDL. Modular Messaging Outlook Client and Modular Messaging Restricted Outlook Client resolve this address to a PDL from the list of PDLs belonging to the subscriber. Modular Messaging Web Client expands this address to *mailboxnumber#nnnn@host*.
- *#asciichars*, where *asciichars* is the identifier of the PDL. Modular Messaging Outlook Client and Modular Messaging Restricted Outlook Client resolve this address to a PDL from the list of PDLs belonging to the subscriber. Modular Messaging Web Client expands this address to *mailboxnumber#asciichars@host*.

Avaya GUI clients also support addressing formats as an Internet Messaging Access Protocol 4 (IMAP4) standards-based e-mail client. These addressing formats are:

- *mailboxnumber#nnnn@host*, where *mailboxnumber* is the local mailbox number of the subscriber and *nnnn* is the list number of the PDL.
- *handle#nnnn@host*, where *handle* is the handle (part to the left of the @ symbol) of the subscriber's e-mail address and *nnnn* is the list number of the PDL.
- *mailboxnumber#asciichars@host*, where *mailboxnumber* is the local mailbox number of the subscriber and *asciichars* is the identifier of the PDL.
- *handle#asciichars@host*, where *handle* is the handle (part to the left hand side of @) of the subscriber's e-mail address and *asciichars* is the identifier of the PDL.

Note:

When using the list identifier, the match against the PDLs belonging to the subscriber is not case sensitive.

Addressing from one-X Speech client

When addressing messages to a PDL from the one-X Speech client, subscribers can, through speech, request a PDL list number. The list number can have a maximum length of four digits. Alternatively, subscribers can add the e-mail address of the PDL to their personal contacts.

Other PDL addressing concepts

Other concepts related to PDL addressing are:

Circular PDLs

A circular PDL directly or indirectly includes itself. A message addressed to a circular PDL is delivered to the union of all individual members, other than PDLs on each of the PDLs. Each recipient receives the message only once.

Consider the example of a subscriber who owns two PDLs—PDL1 and PDL2. PDL1 has subscriber A, subscriber B, and PDL2 as its members and PDL2 has subscriber B, subscriber C, and PDL1 as its members. A message addressed to either PDL1 or PDL2 is delivered to subscriber A, subscriber B, and subscriber C, and all three subscribers receive the message only once.

A circular PDL has unlimited levels of nesting.

PDLs and deleted subscribers

If a subscriber addresses a message to a PDL that has deleted subscribers or deleted PDLs among its members, the system delivers a delivery status notification (DSN) to the subscriber. This DSN informs the subscriber of a problem with list expansion. The message is delivered to all other valid recipients.

The DSN informs the subscriber of the list that has deleted members and also includes the last known text name and e-mail address of the deleted members. The TUIs voice the e-mail address using TTS conversion.

Regardless of the number of deleted subscribers in the targeted PDL, the subscribers receive only one DSN that informs them of a problem in the targeted PDL. However, a subscriber receives as many DSNs as the number of PDLs with deleted subscribers. For example, if a subscriber sends a message to a PDL that has other PDLs—PDL A and PDL B, each containing deleted subscribers—the originating subscriber receives 2 DSNs: a DSN informing of problems with PDL A and another DSN informing of problems with PDL B.

PDL address not visible to recipients

When subscribers send a message to a PDL from the Modular Messaging TUIs, Microsoft Outlook with Modular Messaging Outlook Client and Modular Messaging Restricted Outlook Client, or Modular Messaging Web Client, recipients cannot see the address of the PDL.

The message that the recipient receives shows only the addresses of individual subscribers within the PDL and not the address of the PDL itself. Even when a PDL contains other PDLs, recipients see only the addresses of individual subscribers.

If a PDL is copied on a message using BCC, provided that BCC is available to the sending client, the recipient sees neither the PDL itself nor any of the PDL members.

Message Privacy

Modular Messaging uses a two-pronged approach to achieve message privacy:

- Flexible support for message privacy

  This includes the ability to create, send, and access private messages from the Modular Messaging TUIs and from Avaya GUI clients. It also includes the restrictions that these clients and interfaces impose on the recipients of private messages. The support that Avaya GUI clients provide is subject to the enforced privacy parameters.

- Enforcement of message privacy

  This includes privacy parameters that administrators can configure using the VMSC application on a MAS and on the Avaya MSS.

System administrators can set the levels of privacy support and privacy enforcement. These administered levels also determine the behavior of user interfaces and clients, with respect to privacy.

Modular Messaging does not restrict recipients of private messages from playing the messages on a speakerphone or recording the message with a tape recorder. Likewise, Modular Messaging does not restrict recipients of private fax messages or private messages with attachments from printing and then circulating the fax or attachments. Modular Messaging cannot restrict the operation of programs that subscribers may use to view private message attachments.

Creating private messages

When creating new messages, subscribers can mark messages as private from the following interfaces, clients, or applications:

- Modular Messaging TUIs:
  - Aria TUI for Modular Messaging
  - AUDIX TUI for Modular Messaging
  - Serenade TUI for Modular Messaging
- Modular Messaging Web Client
- one-X Speech
- Microsoft Outlook with Modular Messaging Outlook Client and Modular Messaging Restricted Outlook Client

- IBM Lotus Notes with Modular Messaging Lotus Notes Client
- Standards-based e-mail clients

Standards-based e-mail clients support creating private messages only if the client uses the standard RFC822 privacy or sensitivity message header. Modular Messaging treats private, confidential, or personal messages originating from a standards-based e-mail client as private messages.

Callers can create private messages when using the Avaya Common Caller Interface (CCI) to leave Call Answer messages, provided that administrators have configured the system to allow private Call Answer messages. For more information, see Creating private Call Answer messages on page 120.

While creating private messages, consider the following:

- Marking a message as private indicates the sender's intent that the message be treated in a confidential manner and makes it difficult for the recipient to easily forward the message. However, there is no guarantee that the recipient will not rerecord the voice content of a message or play the message through a speakerphone.
- Messages with attached faxes or files can be marked as private, but there are no restrictions on viewing, printing, or distributing files that are attached to such messages.

Gaining access to private messages

Modular Messaging supports subscribers access to private messages as follows:

- When subscribers gain access to a private message from any of the Modular Messaging TUIs, the TUI announces that the message is private before playing the message. Depending on the PEL setting, the TUIs may restrict subscribers from forwarding private messages or from replying to private messages with the original message attached. For more information, see The Privacy Enforcement Level parameter on page 120.
- When subscribers gain access to a private message from the Modular Messaging Web Client application, the application provides a visual indicator for private messages. Regardless of the administered PEL setting, Modular Messaging Web Client restricts subscribers from forwarding private messages or replying to the sender of a private message with the original message attached.

  Note:

  When subscribers play a voice message locally on the computer, they have the option to save the voice file on the computer. In addition, Windows Media Player also caches the voice file on the computer. To enforce maximum privacy, administrators can configure Modular Messaging Web Client to support only dual-connect mode. This prevents voice messages from being played locally on the computer, downloading voice messages, and caching voice messaging on the computer.
- When subscribers gain access to a private message from the one-X Speech client, the client announces that the message is private. The one-X Speech client restricts

subscribers from forwarding private messages or from replying to private messages with the original message attached.

- In Modular Messaging—MSS, subscribers can use Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, and IMAP4 standard-based e-mail clients to gain access to mailboxes only if:
  - The PEL parameters are not set to Full.
  - The Restrict Client Access COS is set to No.

Note:

These clients do not enforce privacy restrictions. If subscribers want voice mail privacy operation, administrators can prevent specific subscribers or all subscribers from using these clients by using the Restrict Client Access COS and the PEL setting, respectively.

When subscribers access private messages from Modular Messaging Outlook Client or from Modular Messaging Restricted Outlook Client, the application provides a visual indicator for the messages. However, the application does not enforce privacy so subscribers are allowed to forward the message or reply to the message with the original attached. Subscribers can also save the message using the Save As feature.

Standard IMAP4 clients may provide a visual indicator for private messages, provided that the client recognizes the standard RFC822 privacy or sensitivity message header. Typically, these clients may not enforce privacy; that is, they may not restrict subscribers from replying to private messages with the original message attached, forwarding, or saving messages.

Creating private Call Answer messages

The VMSC application on the MAS provides an administrative setting that determines whether a caller can leave private Call Answer messages. If this setting (Allow Private Call Answer Messages) is enabled, callers that reach the Modular Messaging Common Caller Interface (CCI) can mark Call Answer messages as private.

This administrative setting is independent of the PEL parameters. For more information, see The Privacy Enforcement Level parameter on page 120.

If this setting is disabled, callers will not be able to leave private messages. However, subscribers will still be able to create new private messages when composing messages from the TUI, GUIs, or one-X Speech.

The Privacy Enforcement Level parameter

Administrators can control the level of privacy the system enforces by administering the PEL parameter. The PEL privacy parameter setting determines which clients or interfaces have access to Modular Messaging mailboxes. Depending on the PEL parameter setting, clients

and interfaces may or may not restrict subscriber attempts to forward private messages or reply to private messages with the original message attached.

PEL is a system-wide parameter with the values Full, Partial, and Notification Only, where Full is the default value. The value of this privacy parameter determines the level of privacy the system enforces.

Modular Messaging—Exchange supports only Partial and Notification Only values for the PEL parameter. Modular Messaging—Domino supports only Partial for the PEL parameter.

The PEL parameter does not affect the Allow Private Call Answer Messages parameter.

Full privacy enforcement

This is the default setting for new Modular Messaging—MSS installations.

Modular Messaging—Exchange and Modular Messaging—Domino do not support Full privacy enforcement.

If the value of the PEL system parameter is set to Full, the Modular Messaging system enforces privacy to the fullest extent possible.

With this setting, subscribers can access their mailboxes by using only the following interfaces or clients:

- Modular Messaging TUIs
- Modular Messaging Web Client
- one-X Speech

When the PEL parameter is set to Full, these interfaces and clients also enforce privacy to the maximum extent possible; subscribers cannot forward private messages or reply to private messages with the original message attached.

In addition, with this setting, the system prevents subscribers from sending private messages to arbitrary e-mail addresses.

When Modular Messaging subscribers send private messages to users of remote messaging systems connected to a Message Networking server, the following actions occur:

- Private messages sent to Intuity AUDIX, Octel 250/350, and Octel 200/300 are delivered as private.
- The Message Networking server provides an option to either allow or block sending private messages to an Audio Messaging Interchange Specification (AMIS) end node. If this option is set to block private messages from being sent to an AMIS end node, private messages are rejected. If this option is set to allow private messages to be sent to an AMIS end node, the message is sent to the AMIS recipient with an earcon indicating

Private appended to the start of the message. AMIS remote subscribers cannot send private messages.

- Voice Profile for Internet Mail (VPIM) support of privacy is optional. Private messages sent through a Message Networking server to a VPIM end node are sent as private. However, the ability of the receiving node to identify the message as private and offer any restrictions is a function of the capabilities of that end node. If a VPIM subscriber sends a private message and it is delivered to Message Networking marked as private, the Modular Messaging recipient receives it marked as private, subject to the Modular Messaging privacy restrictions.

When the PEL parameter is set to Full, subscribers cannot access their mailboxes using either standards-based clients, Modular Messaging Restricted Outlook Client, or Modular Messaging Outlook Client. The Full privacy enforcement setting overrides the Restrict Client Access COS setting.

Partial privacy enforcement

If the value of the PEL system parameter is set to Partial, subscribers can access their mailboxes by using the following interfaces or clients:

- Modular Messaging TUIs
- Modular Messaging Web Client
- one-X Speech
- Modular Messaging Outlook Client
- Modular Messaging Restricted Outlook Client
- Modular Messaging Lotus Notes Client
- Standards-based clients

Note:

In Modular Messaging—MSS, mailbox access through Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, and standards-based clients is determined by the Restrict Client Access COS setting.

With this setting, the TUIs, Modular Messaging Web Client, and one-X Speech enforce privacy; subscribers cannot forward private messages or reply to private messages with the original message attached. However standards-based clients and Modular Messaging Outlook Client may not restrict subscriber attempts to forward private messages or reply to private messages with the original message attached.

Notification Only privacy enforcement

If the value of the PEL system parameter is set to Notification Only, subscribers can access their mailboxes by using the following interfaces or clients:

- Modular Messaging TUIs
- Modular Messaging Web Client
- one-X Speech
- Modular Messaging Outlook Client
- Modular Messaging Restricted Outlook Client
- Modular Messaging Lotus Notes Client
- Standards-based clients

With this setting, although the TUIs allow subscribers to mark messages as private, they do not enforce privacy of messages. The TUIs announce messages as being private but do not enforce restrictions on forwarding of private messages and on replying to a private message with the original message attached.

Modular Messaging Web Client and the one-X Speech client always enforce privacy, regardless of the PEL setting; subscribers cannot forward private messages or reply to private messages with the original message attached.

TUI privacy announcement

The announcements that the Modular Messaging TUIs play when subscribers access private messages depend on the PEL setting:

- If the PEL setting is Full or Partial, the TUIs play an announcement indicating that the message is private. Subscribers cannot dial through this announcement.
- If the PEL setting is Notification Only, the TUIs play a non-dial-through privacy announcement, followed by a dial-through announcement indicating that the sender has requested that the message be treated as private.

Restricting client access to mailboxes

Modular Messaging—MSS provides administrative settings to control subscriber access to mailboxes from clients that use IMAP4 or Post Office Protocol 3 (POP3) standards.

Restrict client access to mailbox feature is supported only in Modular Messaging—MSS. Modular Messaging—Exchange does not support the *Restrict client access to mailbox* feature or the *Full privacy enforcement parameter*.

Enabling or disabling POP3 and IMAP4 services

The Avaya Message Storage Server (MSS) provides administrators the facility to enable or disable IMAP4 and POP3 services.

When the IMAP4 service is disabled, subscribers cannot use any IMAP4 clients to access the Modular Messaging system. This includes Modular Messaging Web Client, one-X Speech, the Modular Messaging Outlook Client application, the Modular Messaging Restricted Outlook Client application, or any IMAP4 standard-based e-mail clients.

When the POP3 service is disabled, subscribers cannot use POP3 standard-based e-mail clients to access their Modular Messaging mailboxes.

When the IMAP4 and POP3 services are enabled, IMAP4 and POP3 standards-based clients can access Modular Messaging, subject to the Restrict Client Access COS and the PEL setting. For more information, see The Privacy Enforcement Level parameter on page 120.

Client Access restriction using COS

Administrators can use a class of service (COS) privacy parameter to enable or restrict client access to Modular Messaging mailboxes. This COS, known as the “Restrict Client Access” COS determines whether subscribers using that COS can use an IMAP4 or POP3 standards-based client to access their Modular Messaging mailboxes.

This Restrict Client Access COS has values of Yes and No.

Subscribers can access their mailboxes from standards-based e-mail clients, from Modular Messaging Restricted Outlook Client, and from Modular Messaging Outlook Client only when the Restrict Client Access COS parameter is set to No.

The Restrict Client Access COS does not affect the behavior of the Modular Messaging telephone user interfaces (TUIs) and Modular Messaging Web Client; these clients will continue to have access to the Modular Messaging mailboxes, even when the COS is set to Yes.

For new installations of Modular Messaging, the COS value is set to Yes by default. For upgrades from existing systems, the COS value is set to No by default.

Note:

The Restrict Client Access to Mailbox COS is not relevant when the Privacy Enforcement Levels (PEL) parameter is set to Full. When the PEL parameter is set to Full, the system operates as if all COS have the Restrict Client Access setting of Yes.

Standard RFC822 Privacy Header

Modular Messaging supports the standard RFC822 sensitivity header for privacy. This allows subscribers using standards-based clients to mark outgoing messages as private. Depending on the capabilities of the client, incoming messages may also be identified as ‘private’. Typically, these clients do not prominently display the privacy indicator. These clients may not enforce any privacy restrictions with respect to forwarding private messages.

Summary of the privacy parameters

The following table summarizes the roles and interdependencies of the different parameters that enforce and support message privacy in Modular Messaging—MSS systems:

Interdependencies of the privacy parameters

PEL	Feature ability with private messages	TUI	Web Client	one-X Speech	Modular Messaging Outlook Client[1]	Modular Messaging Restricted Outlook Client[1]	Modular Messaging Lotus Notes Client[1]	IMAP4 clients[1]	POP3 clients[1]
Full	Forward	No	No	No	When the PEL setting is full, clients cannot access the mailbox[1]. Modular Messaging—Exchange does not support Full PEL setting or the Restrict client access to mailbox feature				
	Reply/Reply All	Yes	Yes	Yes					
	Reply/Reply All with Original	No	No	No					
	Copy Message	NA	No[2]	NA					
	Copy Message Contents	NA	No[2]	NA					
Partial	Forward	No	No	No	Yes	Yes	No	The Partial PEL setting is available. However, the feature ability is dependent on the client settings.	
	Reply/Reply All	Yes	Yes	Yes	Yes	Yes	Yes		
	Reply/Reply All with Original	No	No	No	Yes	Yes[3]	Yes		
	Copy Message	NA	No[2]	NA	Yes	Yes[3]	No		
	Copy Message Contents	NA	No[2]	NA	Yes	Yes[3]	No		
Notification Only	Forward	Yes	No	No	Yes	Yes		The Notification Only PEL setting is available. However, the feature ability is dependent on the client settings.	
	Reply/Reply All	Yes	Yes	Yes	Yes	Yes	Yes		
	Reply/Reply All with Original	Yes	No	No	Yes	Yes[3]	Yes		
	Copy Message	NA	No[2]	NA	Yes	Yes[3]			
	Copy Message Contents	NA	No[2]	NA	Yes	Yes[3]			

1 If PEL is Full, or if Restrict Client Access is Yes, then the client cannot access the mailbox. The message privacy enforcements listed in the column apply only if PEL is not Full and Restrict Client Access is No.

2 The Modular Messaging Web Client interface does not provide an option to save or copy the private message or the content of the private message. However, subscribers can press CTRL+C to copy the message or its content to another file.

3 Applicable only to e-mail messages.

The following table summarizes the roles and interdependencies of the different parameters that enforce and support message privacy in Modular Messaging—Exchange and Modular Messaging—Domino systems:

Interdependencies of the privacy parameters

PEL	Feature ability with private messages	TUI	Web Client	one-X Speech	Modular Messaging Outlook Client	Modular Messaging Lotus Notes Client	IMAP4 clients	POP3 clients
Partial	Forward	No	No	No	Yes	No	The Partial PEL setting is available. However, the feature ability is dependent on the client settings.	
	Reply/Reply All	Yes	Yes	Yes	Yes	Yes		
	Reply/Reply All with Original	No	No	No	Yes	Yes		
	Copy Message	NA	No[1]	NA	Yes	No		
	Copy Message Contents	NA	No[1]	NA	Yes	No		
Notification Only	Forward	Yes	No	No	Yes		The Notification Only PEL setting is available. However, the feature ability is dependent on the client settings.	
	Reply/Reply All	Yes	Yes	Yes	Yes	Yes		
	Reply/Reply All with Original	Yes	No	No	Yes	Yes		
	Copy Message	NA	No[1]	NA	Yes			
	Copy Message Contents	NA	No[1]	NA	Yes			

1 The Modular Messaging Web Client interface does not provide an option to save or copy the private message or the content of the private message. However, subscribers can press CTRL+C to copy the message or its content to another file.

Multiple time zones feature

Modular Messaging supports the multiple time zones feature that enables administrators to select and assign time zones to a group of subscribers within a single system or VMD. This feature is beneficial in centralized switching and messaging configurations, where subscribers

may reside in different time zones than that of the Modular Messaging system, for example, in branch offices.

Time zones can be set at the system (Windows), COS, and subscriber levels. Time zones can also be set at the Site level when MultiSite is enabled. The default setting for time zone for each of these levels are system default. However, the administrators can modify this to apply a different time zone at any level that they choose.

The Modular Messaging system uses determines the effective time zone by evaluating the time zone set for each level in the following order: Mailbox, COS, Site (applicable only for a MultiSite-enabled Modular Messaging system), and Windows/system; if not set then system uses the system time zone as the default for date and time presentation to all subscribers using:

- Modular Messaging TUIs
- Subscriber Options
- Web Subscriber Options

For example, for subscribers located far away from the message store, administrators can set up and assign a COS that uses a time zone specific to the location of the subscribers.

The system time zone is the default time zone for every COS. Administrators can administer the COS time zone on the MSS, for Modular Messaging—MSS systems, and in VMSC, for Modular Messaging—Exchange and Modular Messaging—Domino systems.

The multiple time zones feature also allows subscribers to assign a different time zone to their mailboxes.

Other than groups of subscribers in decentralized locations, the multiple time zones feature also allows the following subscribers to assign the time zone of their current location to the mailbox:

- Virtual office subscribers
- Subscribers who are traveling

Subscribers can use Subscriber Options or Web Subscriber Options to assign a specific time zone to a mailbox.

Internal to Modular Messaging, all time values, such as message timestamps and schedule times, are stored in Coordinated Universal Time (UTC). The time zone attribute is used to convert the internal UTC into the specific time zone presented to each subscriber. This applies to all subscriber visible events, including but not limited to:

- Receipt time for messages
- Future delivery time for messages
- Schedules for Call Me, Notify Me, and Find Me

Changing a subscriber's time zone attribute changes only the presentation of time values to the subscriber, not the internal UTC of the corresponding event.

Modular Messaging TUIs use the time zone to adjust times for announcing the message receipt time or for scheduling future message delivery. Similarly, Modular Messaging Web Clients use

the time zone attributes from Modular Messaging rather than those of the subscriber's computer.

Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, and standards-based clients will adjust the presentation of time based on attributes defined for the subscriber's computer.

Modular Messaging also provides time zone adjustments for fax cover sheets and fax delivery status notifications.

Although Caller Application schedules are not adjusted by the time zone settings, they are adjusted for daylight saving time. The schedules use the Windows time zone of the MAS running the Caller Application.

Automatic Deletion Notification feature

Modular Messaging—MSS Release 5.2 Service Pack 9 supports the Automatic Deletion Notification feature for the Aria TUI. Administrators can configure the MSS COS settings to allow subscribers to be notified of messages that are earmarked for automatic deletion after a defined period. Subscribers are notified of such messages and are given the option to restore the messages to a new age, so that the system aging algorithm does not automatically delete the messages.

Administrators can configure the following options:

- Forever: MSS does not automatically delete the messages.
- Delete After: MSS deletes the messages after the configured number of days have elapsed, so that these messages cannot stay behind even if a subscriber does not log on to the mailbox. You can configure a maximum of 999 days.
- Warn After: MSS marks the messages as Pending Deletion using a flag when the messages reach the relevant Warn After period. The Warn After period must be smaller than the Delete After period.

If a subscriber class of service has Warn After days configured and the mailbox contains some messages that fall under the Warn After criteria, the Modular Messaging Aria TUI alerts the subscriber to the presence of such messages. When the subscriber logs on to the TUI, the TUI alerts the subscriber with a prompt: nn messages will be deleted soon automatically.

Using the TUI, subscribers can:

- Review the messages flagged as Pending Deletion.
- Reset the timer to preserve the messages if the subscriber class of service is appropriately configured.
- Delete the messages when the subscriber exists the TUI.

Backup capabilities on MSS

Modular Messaging allows administrators to back up critical MAS and MSS data. If a system failure occurs, administrators can use the backed up data to restore data to the servers. In the Modular Messaging systems with multi-server configuration, administrators can back up data either to a backup media in the local DVD-RAM drive installed in the MSS or to a remote storage location on the LAN through FTP and SFTP. Modular Messaging single server configuration does not support DVD-RAM based backup. However, administrators can back up data to a remote storage location on the LAN through FTP and SFTP.

Note:

If a system failure occurs, the system does not restore the local administration accounts on the MSS that the AAA server authenticates. The administrator must re-add the local administration accounts while restoring the data on the MSS.

Note:

The backing up and restoring of the MAS and the message store data is the responsibility of the customer.

Modular Messaging provides two kinds of backup, attended and unattended.

Attended backups

In attended backups, MAS and MSS data are backed up manually to a DVD or to a remote storage location. Administrators can perform attended backups to do the following:

- Back up large amounts of data.
- Create backups before shutting down for a repair or upgrade.
- Create backups after changing subscriber profiles.
- Create backups after recording additional subscriber names.

For example, administrators can back up voice messages and other voice data by using an attended backup. Modular Messaging also allows administrators to back up only selected data types of the servers. The following three data types can be backed up during an attended backup:

- System data, such as enabled features, installed software, networking connectivity and communication information, ELAs and PDLs, options enabled for subscribers, and Spoken Name recording
- Spoken Name
- Greetings and messages

Unattended backups

Modular Messaging systems can also back up system-critical information automatically on a regular basis. These automatic system backups are called unattended backups. Unattended backups can save the following MSS data:

- Detailed system data on shared memory
- Speech file system pointers
- Alarm management information
- List of enabled features
- List of installed software
- Networking connectivity and communication information
- Message headers
- ELAs and PDLs
- Administrators profiles
- New Message status
- Hard disk configuration
- Spoken Name, if there is space
- Messages and greetings, if there is space

Note:

Depending on the subscriber's system, some of the MSS data may not be backed up.

The unattended backup contains all information required to bring a system back to an operational state after a service-affecting event. By default, unattended backups are scheduled to automatically start at 3:00 a.m., local time, every day. Modular Messaging allows administrators to modify the scheduled start time, on the MSS.

Backup logs

The Modular Messaging system generates backup logs for the attended and unattended backups. The backup logs contain the following information:

- Start and end time
- Type of backup
- Amount of backup data
- Backup progress information
- Information regarding all abnormal situations, if any

Administrators can view the backup logs to verify whether a backup was successful or not.

Web-based interface for backup

Modular Messaging also provides a Web-based user interface to back up and restore data. Using the Web-based interface, administrators can do the following:

- Set up a configuration of an unattended backup, including the backup type.
- Perform an attended backup.
- Select data to be restored from all backups done for that system.
- Perform a restore.

For more information on backup and restore of MAS data, see *Avaya Modular Messaging Release 5.2 Messaging Application Server Administration Guide for Avaya Modular Messaging with the Avaya MAS and MSS*.

Backing up and restoring data from a DVD

Modular Messaging—MSS multi-server configuration provides a DVD-RAM medium to back up data. If a system failure occurs, the data stored on the DVD-RAM can be used to restore the system back to an operation state.

Note:

Modular Messaging single server configuration does not support DVD-RAM based backup.

Administrators can perform an attended full-system backup of MAS and MSS data on the DVD-RAM. During a full backup, multiple DVD-RAM media can be used for backing up the data.

Administrators can also configure the Modular Messaging system to perform unattended backup of critical data to the DVD-RAM. Administrators can view the backup logs to verify whether the unattended backup was successful or not. If an unattended backup is unsuccessful, the Modular Messaging system raises alarms to notify the administrator. An unattended backup to a DVD-RAM will be unsuccessful if the following occurs:

- Required backup media is not in the DVD-RAM drive.
- Media is placed upside down in the drive.

During an unattended backup, if there is not enough space for the backup, the backup is considered to be partially successful. Partially successful backups do not raise alarms. However, the system labels the backup as partially successful in the backup logs.

Modular Messaging system supports 4.7GB, single sided rewritable DVD RAM media only. With the S3500 server, Modular Messaging supports Type 1 (single sided, non-removable cartridge) and Type 2 (single sided, removable cartridge) DVD-RAM cartridges. With S8800, S8730, or HP DL360 G7 server, Modular Messaging supports Type 3 (single sided, no cartridge) DVD-RAM discs. When a backup is created on S3500 server and then read on S8730, S8800, or HP DL360 G7 server, then a Type 2 or Type 4 (using only a single side)

cartridge must be used. The disc must be removed from the cartridge before using with the S8800, S8730, or HP DL360 G7 server.

During an unattended backup, if more than one DVD-RAM is required for backing up data or offsite storage of data is required, it is recommended to back up data on the LAN.

If a system failure occurs, administrators can restore the backed-up MAS and MSS data from the DVD-RAM manually. MSS data can also be restored when any one of the following events occurs:

- Alarm repair action prompts to perform a restore.
- The MSS stops operating and will not boot.

Modular Messaging allows subscribers either to restore the complete backed up data or to restore only selected data types.

Backing up and restoring data from a LAN

Administrators can back up MAS and MSS data on a remote storage location on the LAN through FTP or SFTP. LAN backups facilitate disaster-recovery planning and provide the ability to make a complete backup for large systems with many subscribers and their messages. If a system failure occurs, the backup data stored on the remote storage location of the LAN is used to restore the system to an operation state.

Backup considerations

Backing up the MAS and MSS data to a remote storage location requires a customer-provided FTP or SFTP server on the customer LAN. Administrators can back up data to the LAN, using either the FTP or the SFTP data transfer protocol. By default, SFTP will be the data transfer protocol for Modular Messaging—MSS LAN backups.

Avaya has tested LAN backup using FTP to Windows 2003 server, and LAN backup using SFTP to a Redhat server. FTP backup can also be performed on a Windows 2008 R2 based FTP Server. For more information, consult the documentation and online help of the customer-provided server, and see the *Modular Messaging Documentation Library topic "Administering remote storage server for FTP/SFTP backups."*

During a LAN backup of data, the Modular Messaging system creates a new file for the backup on the remote storage server. The backup file name consists of the system name, the backup type, and the date and time when the backup is performed.

If a subscriber opts to use the FTP to transfer the files being backed up to the specified remote location, the subscriber must enter a password for authentication.

The SFTP server also allows only authenticated administrators to perform LAN backups through the SFTP. Modular Messaging uses a public cryptographic key for authentication

between the MSS and the remote SFTP server. The public cryptographic key authentication is more secure than password authentication.

Administrators can perform an attended or unattended backup of MAS and MSS data on the LAN. Modular Messaging also allows administrators to specify the scheduled start time and expected completion time for unattended LAN backups.

If an unattended backup is unsuccessful, the Modular Messaging system raises alarms to notify the administrator. An unattended backup to a LAN will be unsuccessful if the following occurs:

- The connection to the remote storage server was unsuccessful.
- Not enough space is available for the backup.

The Modular Messaging system also raises an alarm when a LAN backup process takes longer than the expected completion time specified by the administrator.

Time and bandwidth considerations

During a full backup of a message store, LANs with low bandwidth take a longer time to back up data. LAN backup time is dependent on the throughput of the corporate LAN and the remote storage server used.

Storage space calculation

The following formula estimates how much space one night's LAN backup requires, based on the number of subscribers, their average number of messages and greetings (measured in minutes), and the system's audio encoding format.

Space used each night = 100MB + 0.05MB*(L+R) + (0.1MB*M*L*F)

where:

- MB represents a unit of megabytes.
- L is the number of local subscribers existing on the system that night.
- R is the number of remote subscribers existing on the system that night.
- M is the average number of minutes of messages per mailbox.
- F equals 1 if the system uses GSM encoding, and F equals 5 if the system uses G.711 encoding.

For example: a G.711 system with 2,000 local subscribers with 5 minutes of messages/greetings and 50,000 remote subscribers would occupy approximately = 100MB + 0.05MB*(2000+50000) + (0.1MB*5*2000*5) = 100 MB + 2600 MB + 5000 MB = 7.7 GB.

Restore considerations

If a system failure occurs, administrators can restore the backed up MAS and MSS data from the LAN manually. Modular Messaging allows subscribers either to restore the complete

backed up data or to restore only selected data types, such as system data, Spoken Name, and greetings and messages.

A disaster recovery procedure for a system backed up using LAN includes the following steps:

- Reloading the system
- Configuring the network
- Configuring the system to use the LAN backup or restore storage server
- Restoring the system state

Backing up Modular Messaging for Exchange and Domino

Customers are reponsible for performing backups of the MAS data. These backups should save the following MAS data:

- Data needed by the operating system, such as system state information, operating system registry, and Active Directory information base
- Messages that are not yet submitted for delivery
- MAS Caller Applications
- Hosts file (if applicable)
- Customized prompts file

MultiSite feature

The MultiSite feature enables you to use a single Modular Messaging system to serve subscribers at multiple locations. With MultiSite, Message Application Servers (MASs) in a single Voice Mail Domain (VMD) communicate with multiple switches with different dial plans, in different locations. MultiSite allows you to centralize the message stores and Message Application Servers (MASs).

In a MultiSite-enabled environment, the MASs are co-located with the message store and the directory servers in a data center, but the subscribers can be anywhere. The MASs communicate through the WAN with distributed SIP Gateways that are installed near the PBXs at the various sites to service the subscribers. All MASs in the voice mail domain can handle requests from subscribers associated with any site and from any configured switch.

The MultiSite feature offers effective and seamless communications across enterprise network. Subscribers can use a unified messaging system that uses a consistent addressing scheme.

For more information on the MultiSite feature, see the *Modular Messaging MultiSite Guide*, available on the Avaya Support Web site at http://www.avaya.com/support.

Subscriber data migrations and system upgrades

Subscriber data migrations

Modular Messaging supports the migration of the following systems to Modular Messaging:

From	To	Default subscriber TUI
Aria 2.0, Aria 3.0, and Aria 3.1	Modular Messaging Release 5.2	Modular Messaging Aria TUI
Intuity AUDIX R5.0, R5.1, R4.4, Intuity AUDIX HiCap, and Intuity AUDIX LX		Modular Messaging AUDIX TUI
Serenade 3.0 and later		Modular Messaging Serenade TUI

Note:

Migrations from Legacy Octel/Intuity will be made available with no changes to product by third parties (Avaya services (that is the Pro-Vision migration offer), Mutare, and Unimax).

Subscriber data migrations are a value-added service that Avaya Global Services and trained Channel Partners provide to Modular Messaging—MSS. Avaya recommends customers to contact the appropriate organization to facilitate this service.

For migration of networking subscriber information to a new or existing Message Networking Server, see the document *Network management for subscriber migrations to Modular Messaging*, available at http://www.avaya.com/support.

For subscriber data migrations, the following are included:

- Any applicable system data. Most system values are set as part of the installation and not using migration.
- Any applicable COS data.
- Any applicable subscriber mailbox data.
- Any system distribution lists on Aria systems. These system distribution lists are migrated to Modular Messaging ELA lists.

Note:

System distribution lists on Aria systems that include remote subscribers are not migrated.

For subscriber data migrations, the following are not included:

- Messages
- Greetings
- Names
- Customer-modified system prompts and announcements
- Automated Attendant mailboxes and applications
- PDLs

System upgrades to Modular Messaging Release 5.2

Modular Messaging supports upgrading the following systems:

From	To
Modular Messaging Release 3.0 and Release 3.1 on S3500 Servers	Modular Messaging Release 5.2 on S3500 Servers
Modular Messaging Release 4.0 on S3500 Servers	Modular Messaging Release 5.2 on S3500 Servers
Modular Messaging Release 5.0 on S3500 Servers	Modular Messaging Release 5.2 on S3500 Servers
Modular Messaging Release 5.0 on S8730 Servers	Modular Messaging Release 5.2 on S8730 Servers
Modular Messaging Release 5.0 on CPE	Modular Messaging Release 5.2 on CPE
Modular Messaging Release 5.1 on S3500 Servers	Modular Messaging Release 5.2 on S3500 Servers
Modular Messaging Release 5.1 on S8730 Servers	Modular Messaging Release 5.2 on S8730 Servers
Modular Messaging Release 5.1 on CPE	Modular Messaging Release 5.2 on CPE

Note:

Customer-provided equipment can have either an AMD or an Intel processor. The specification of the hardware must be at least equal to that of an equivalent Avaya-provided server. For example for new installations of Modular Messaging, CPE will be equal to or greater than the Avaya S8800 in terms of memory, disk, and CPU power. For upgrades from existing systems, depending on the hardware used before performing the upgrade, CPE will be equal to or greater than the Avaya S8800, S8730, S3500, or HP DL360 G7 server in terms of memory, disk, and CPU power.

You cannot upgrade the previous releases of the Modular Messaging system to the Modular Messaging single server configuration. However, you can upgrade the systems to the Modular Messaging Release 5.2 multi-server configuration.

With Modular Messaging single server configuration, installs, upgrades and updates can be done remotely; thus removes the need for onsite implementations. With Modular Messaging system with multi-server configuration, you can use the Modular Messaging 5.2 Upgrade

application to upgrade the Modular Messaging Release 5.0 and Release 5.1 systems to a Release 5.2 system for MSS. You can use the Modular Messaging 5.2 Upgrade application to upgrade the Modular Messaging Release 5.1 systems to a Release 5.2 system for Exchange and Domino storage server. If required, you can perform this upgrade process without the help of the Avaya Services team.

You cannot use the Modular Messaging 5.2 Upgrade application to upgrade the Modular Messaging Release 4.0 or earlier to Release 5.2.

For complete instructions on upgrading to Modular Messaging Release 5.2 system, see *Avaya Modular Messaging for Avaya MSS Release 5.2 Installation and Upgrades Guide*.

System migrations to Modular Messaging Release 5.2

Modular Messaging supports migrating the following systems to Modular Messaging Release 5.2 on S8800 or HP DL360 G7 servers:

- Modular Messaging Release 3.0 and Release 3.1 on S3500 Servers
- Modular Messaging Release 3.0 and Release 3.1 on S3400 Servers
- Modular Messaging Release 4.0 on S3500 Servers
- Modular Messaging Release 4.0 on S3400 Servers
- Modular Messaging Release 5.0 on S3500 Servers
- Modular Messaging Release 5.0 on S8730 Servers
- Modular Messaging Release 5.0 on CPE
- Modular Messaging Release 5.1 on S3500 Servers
- Modular Messaging Release 5.1 on S8730 Servers
- Modular Messaging Release 5.1 on CPE

Note:

Migration from Modular Messaging multi-server configuration to Modular Messaging single server configuration is not supported. CPE is not supported on single server configuration.

Considerations related to upgrading of Modular Messaging systems

Some considerations related to upgrading of Modular Messaging systems are:

- Upgrades from Modular Messaging Release 3.0, Release 3.1, and Release 4.0 are done by service personnel, not by the customer. Upgrades from Modular Messaging Release 5.0 and Release 5.1 can be done by the customer without the engagement of service personnel.
- For customer-provided servers, subscribers may have to upgrade the Windows operating system version to meet the requirements listed in Customer environment on page 311.
- When a Modular Messaging system is upgraded to a new release, the current Outlook Thick Client, Restricted Outlook Client, Lotus Notes Thick Client, Subscriber Options on the client desktops are supported for a transitional period of time. However, the Outlook Thick Client, Restricted Outlook Client, Lotus Notes Thick Client, Subscriber Options on the client desktops must be upgraded to obtain long-term support. New client features in the new release of Modular Messaging will not be supported with the older clients during the transitional period of time. Newer Outlook Thick Client, Restricted Outlook Client,

Subscriber Options releases are not supported with older Modular Messaging server releases.

- The Web Client and Web Subscriber Options must be upgraded when the Modular Messaging system is upgraded. An older release of Web Client and Web Subscriber Options is not supported with a newer version of Modular Messaging. A newer release of Web Client and Web Subscriber Options is not supported with an older version of Modular Messaging.
- Support for some versions of Microsoft Exchange, IBM Lotus Domino, and Microsoft Outlook is only available after installing the appropriate Service Pack for Modular Messaging. See the release notes of the latest Service Pack for Modular Messaging for more details, available at http://www.avaya.com/support.

Chapter 5: Offline Messaging

Messaging with a message store in offline mode

When a message store is in the offline mode, Modular Messaging supports offline messaging in the following scenarios:

- Offline Call Answer
- Offline access to Call Answer messages

Offline Call Answer

If the message store server is not reachable, Modular Messaging continues to provide basic call answering functions to callers. Callers can continue to leave voice messages or fax messages for subscribers. With Modular Messaging—Microsoft Exchange and Modular Messaging—IBM Lotus Domino, if the message store is offline, the Messaging Application Server (MAS) continues to transfer fax calls to the third-party fax server. If the third-party fax server is offline, the MAS will hang up the call when the fax server does not answer.

From the caller's point of view, operation is close to normal. The significant difference is that subscribers' greetings are not available and are replaced by a prerecorded phrase "Please leave a message for..." followed by the recorded name of the subscriber.

Under these circumstances, some features such as Call Me, Notify Me - Automatic and Caller-requested Notify Me messages, Message Waiting Indicator (MWI), and certain Caller Applications are not available or may be delayed until the message is actually delivered.

When operating in an offline mode, the MAS queues any new Call Answer messages in a local store until the message store server is online. The MAS also queues Caller-requested Notify Me messages for delivery.

Once the MAS reestablishes connection with the message store server, Modular Messaging delivers accumulated Call Answer messages, Notify Me - Automatic messages, and Caller-requested Notify Me messages to the message store server. Call Me and MWI are activated for queued messages after the delivery of the accumulated messages.

With Modular Messaging—Microsoft Exchange, the behavior varies depending on which message store servers are unavailable. Modular Messaging uses a configured Exchange server (or one of a list of configured failover servers) to handle most requests, but subscriber

mailboxes can be hosted on other Exchange servers. The three scenarios and the outcomes related to Exchange server availability include the following:

- If the primary Exchange server (or one of its configured failover servers) and the Exchange server that hosts the subscriber's mailbox are both available, then calls are answered normally.
- If the primary Exchange server (or one of its configured failover servers) is available, but the Exchange server that hosts the subscriber's mailbox is not available, then the system will greet the caller with “Please leave a message for...” rather than the subscriber's greeting. The messaging transport within Exchange queues each message for delivery for up to 72 hours (by default), attempting delivery before returning it with a non-delivery receipt.
- If the primary Exchange Server if offline and no failover server is available then regardless of the state of the Exchange server that hosts the subscriber's mailbox, Modular Messaging will answer calls in offline mode, as described above.

For Modular Messaging—Microsoft Exchange systems that use Exchange 2007 servers or Exchange 2010 servers, at least one Exchange 2007 server or Exchange 2010 server acting as the Hub must be available for messages to be delivered to the recipient. If no Hub server is available in the Active Directory site, messages are submitted from Modular Messaging but queued within Exchange. Modular Messaging does not necessarily switch to the offline mode (or failover) and the queued message is not delivered.

With Exchange Server 2010, Modular Messaging does not talk directly to the mail store, instead it talks to the Client Access Server. Modular Messaging will be unaware of the availability of a subscribers mailbox. It is recommended to use a Database Availability Group (DAG) to maintain availability of the subscriber mailbox data.

Offline access to Call Answer messages

Using the Modular Messaging Offline Access (OLA) feature, subscribers can access new Call Answer messages even when the message store is in the offline mode. If a message store server is not reachable, the MAS continues to queue new Call Answer messages in a local store until the message store server comes up or is online.

The OLA feature can be enabled only when both the MAS and the message store are online. Consequently, this administration must be implemented before rather than after a message store is not reachable.

Subscribers can use the Common Offline Access telephone user interface (TUI) to access their Call Answer messages, regardless of the TUI assigned to them. This TUI is limited, providing options only to retrieve and listen to new Call Answer messages. Subscribers will not have complete control of their mailbox. Subscribers cannot use this TUI to access messages from other sources such as from local or networked subscribers, broadcast, Enhanced-List Application (ELA), Enterprise Lists, Delivery Status Notifications, and so on, or to change

message state, delete, forward, or reply to messages. The system informs subscribers that the TUI offers limited services.

With Modular Messaging—Microsoft Exchange, messages are transferred from the MAS local store to the Exchange Message Transfer Agent (MTA) as long as the primary Exchange server (or one of its failover servers) is available. The Exchange server that hosts the subscriber's mailbox does not have to be available to Modular Messaging. The Exchange MTA queues each message for delivery for up to 72 hours (by default), attempting delivery before returning it with a non-delivery receipt.

Subscribers also have offline TUI access to recently received fax messages. Although fax messages cannot be printed during offline access, header information is available, including the page count and ANI information from the sender's fax machine. In addition, subscribers can review any attached voice message.

In a multi-MAS voice mail domain, each MAS migrates copies of Call Answer messages in its local store to a common repository known as the Offline Call Answer Store.

The Offline Call Answer Store acts as a repository for Call Answer messages taken for all subscribers in the voice mail domain, in the last x number of hours. The value of x is 24 by default, but can be changed to any value from 1 to 99, subject to disk capacity. When access to the message store is lost, the MAS copies all the messages from the Offline Store to the local cache.

Queued messages remain in the Offline Call Answer Store until they roll off the MAS. Thus, when subscribers use the TUI to access Call Answer messages in offline conditions, they may hear messages that they had deleted earlier, when the message store was online.

When subscribers use the Common Offline Access TUI, the system copies the Call Answer messages stored in the Offline Call Answer Store to the local store for playback access.

If the MAS is not able to reach the Offline Call Answer Store, subscribers will not be able to log in to their mailboxes. When one MAS is offline and another is online then Offline Access is disabled for all the MAS servers.

During offline access, as the MAS does not have access to the time zone setting of the subscriber, the timestamp on the message may be unpredictable.

Offline Call Answer and TUI Access to Offline Call Answer Messages are capabilities intended to provide partial service in rare instances of failures and not to compensate for an unreliable infrastructure.

Peer Failover

When you install Modular Messaging—Exchange initially, you configure MAS to have a single Microsoft Exchange server handling message processing for subscribers. This Exchange server is known as the primary peer server. The primary peer server of the first MAS installed in the Voice Mail Domain (VMD) hosts the VMD object itself and is also known as the VMD

Host. Each MAS in the system configuration has an assigned primary peer server, although all MAS units may share the same primary peer server. Each MAS must be able to communicate efficiently with the VMD Host.

System administrators can identify and configure additional peer servers within the voice mail domain that can handle messaging on behalf of subscribers if the primary peer server fails. Thus, if the primary peer server for an MAS fails, the MAS can search for another peer server to allow messaging to continue. Each MAS in the system is assigned its own list of non-primary peer servers for backup. Servers that are candidates to become the peer server if the primary peer server becomes unavailable are known as failover peer servers.

In Modular Messaging—Exchange system, when an MAS detects that the current peer Exchange server (primary peer) is not accessible, the MAS attempts to establish communication with another Exchange serve to act as the peer. You can enable this feature called Peer Failover using the Voice Mail System Configuration application

When the primary peer server is online again, the MAS waits for a stipulated period of time. In the stipulated period, if the MAS is idle (not receiving or originating calls) and the primary peer server continues to be online, the MAS attempts to return service to the primary peer server. This feature is known as Fail Back.

When a Microsoft Exchange e-mail server is offline, Call Answer and subscriber access to Call Answer messages take place as described in Offline Call Answer on page 141 and Offline access to Call Answer messages on page 142.

With Exchange Server 2010, Modular Messaging does not talk directly to the mail store, instead it talks to the Client Access Server. Modular Messaging will only be aware of the availability of the CAS Server or CAS array. If there is more than one CAS server in a CAS array, then the resilience provided by the CAS array replaces the primary need for Peer Failover. Where multiple CAS arrays exist, extra redundancy is available by configuring the second array as Peer Failover. If there are multiple CAS servers and no array, then it is recommended to use Peer Failover to provide redundancy.

For information on configuring the system to continue messaging when the Microsoft Exchange server goes offline, see the *Avaya Modular Messaging Release 5.2 Messaging Application Server Administration Guide for Avaya Modular Messaging with Microsoft Exchange or IBM Lotus Domino*.

Domino Clustering

When an IBM Lotus Domino message store is offline, Call Answer and subscriber access to Call Answer messages take place as described in Offline Call Answer on page 141 and Offline access to Call Answer messages on page 142.

However, creation and sending of new messages and other aspects of messaging are not available when an IBM Lotus Domino message store is offline. When an MAS fails repeated attempts to access an IBM Lotus Domino message store because it is offline, the Modular Messaging TUI terminates the session.

Customers can achieve a high level of redundancy by homing subscribers to Domino clusters.

A Domino cluster comprises two or more Domino servers that mirror each other's data. If one of the servers in the cluster fails, Domino clients (including the messaging subsystem used by the TUI) are seamlessly switched to another server in the cluster. This allows the Domino message store to run at a higher level of overall availability, since nodes in the cluster can be taken down without significantly affecting clients. In practice, this is all transparent to the TUI.

In Modular Messaging—Domino environment, mailboxes and directories are stored in IBM Lotus Domino databases. Within a Domino cluster, replicas of mailboxes and directory databases are continuously synchronized. If a primary database is not available, the MAS units fail over to a replica within the cluster.

Messaging with e-mail clients in offline mode

Modular Messaging—MSS (with Modular Messaging Outlook Client and Modular Messaging Lotus Notes Client), Modular Messaging—Exchange, and Modular Messaging—Domino all support offline messaging sessions.

With offline messaging, subscribers can have messages from their message store synchronized with a local file on their computer so they have access to those messages when they are not connected to the network or message store. Subscribers can listen to, reply, forward, and compose new voice messages from their multimedia computer. New messages remain in the outbox until the next time subscribers are connected to the message store.

With Modular Messaging—Exchange and Modular Messaging—Domino, all messages (new and opened) are included in the offline message file. Modular Messaging Outlook Client and Modular Messaging Lotus Notes Client for Modular Messaging—MSS cache copies of messages on the local computer after a message is opened. The MSS directory is available only when connected to the MSS. Offline subscribers can address messages by entering the full address, copying from messages in their inbox or folders, or selecting from personal contacts where subscribers have recorded the MSS address of recipients.

Messages copied to a local or network folder (personal or public) are available for replay in offline mode.

Chapter 6: Addressing and networking

Addressing

Each Modular Messaging mailbox is assigned the following addresses that can be used to address messages from the Modular Messaging telephone user interface (TUI) and from a desktop computer:

- Primary mailbox address
- Local mailbox number
- Numeric Address

For information on addressing messages to Personal Distribution Lists (PDLs), see Addressing messages to PDLs on page 114. For addressing from one-X Speech, see the *one-X Speech documentation* at http://www.avaya.com/support.

Primary mailbox address

Modular Messaging uses the mailbox number and a standard e-mail address as the primary address for subscriber mailboxes.

In most voice mail systems, the primary mailbox address is the mailbox number. Modular Messaging also associates an e-mail address with each mailbox:

- In a Modular Messaging—Avaya Message Storage Server (MSS) system, the e-mail address is of the form *firstname.lastname@msshost.company.com*, where *msshost.company.com* is the Domain Name System (DNS) name of the MSS and can be replaced with an e-mail host alias name. For more information, see Other networking considerations for Modular Messaging—MSS on page 148.

  Note:

  This e-mail address cannot be the same as the subscriber's corporate e-mail address, as this is the address of the subscriber's MSS mailbox and not of the subscriber's corporate e-mail mailbox.
- In Modular Messaging—Microsoft Exchange and Modular Messaging—IBM Lotus Domino systems, the e-mail address is the subscriber's corporate e-mail address. Typically, this address is of the form *firstname.lastname@company.com*.

The different interfaces of Modular Messaging, such as the TUI and the graphical user interfaces (GUIs), support different forms of addressing. All these addressing forms are

effectively aliases of either the mailbox number or the e-mail address. Internally, Modular Messaging always delivers messages to an e-mail address and always identifies the sender with an e-mail address.

When Modular Messaging sends messages, such as those sent through SMTP/MIME networking or those sent by the Notify Me feature, the sender's name and the e-mail address of the sender's Modular Messaging mailbox appear in the from field of the message. With Modular Messaging—Exchange and Modular Messaging—Domino, this name and address are the sender's corporate e-mail identity. With Modular Messaging—MSS, these are the name and e-mail address for the sender's Modular Messaging mailbox and, although the name might be the same as the sender's name for corporate e-mail, the address must be different. Although Outlook typically displays only names, the address is used when sending replies.

When sending messages to networked systems, and when sending notification e-mail messages, Modular Messaging uses the customer's e-mail infrastructure. With Modular Messaging—Exchange and Modular Messaging—Domino, these messages are sent as e-mails from the subscriber's e-mail mailbox. With Modular Messaging—MSS, these messages are sent as standard e-mail SMTP messages from the Modular Messaging system by using the customer's TCP/IP network, but not necessarily using the customer's e-mail servers.

Other networking considerations for Modular Messaging—MSS

When using Modular Messaging—MSS systems, there are some additional networking considerations that include:

- The e-mail address for a Modular Messaging subscriber mailbox by default includes the (internal) DNS name of the MSS server. This name can be replaced with an e-mail domain alias. For example, a default e-mail address of *john.smith@mss.internaldomain.company.com* can be replaced by *john.smith@voicemail.company.com*, where *voicemail.company.com* is an e-mail domain alias. Two or more Modular Messaging—MSS systems cannot currently be configured to share the same e-mail domain alias.
- Two Modular Messaging—MSS systems or a Modular Messaging—MSS and a Message Networking server network using SMTP and LDAP connections over the customer’s TCP/IP network. The domain names for the e-mail addresses for the remote subscribers must either be resolvable by DNS or be administered in the hosts file of each system.
- Messages sent external to Modular Messaging—MSS, such as those sent through SMTP/MIME networking or those sent by the Notify Me feature, may be dynamically routed by:
  - Standard SMTP e-mail DNS mail exchanger (MX) lookup, with preference to local hosts file entries
  - Configuring a single outgoing e-mail gateway
- When messages are sent outside the customer's network, for example, Notify Me messages sent to e-mail-accessible paging systems, consideration should be given to:
  - Exposing the internal DNS host name of the MSS server

- Whether the customer's inbound e-mail gateways allow incoming e-mail (from the Internet) to be delivered into the subscriber's Modular Messaging mailbox

Avaya neither recommends nor discourages allowing Internet e-mail delivery into Modular Messaging mailboxes. However if Internet e-mail can be delivered into a Modular Messaging —MSS system, Avaya recommends that any such e-mail be filtered through the customer's normal spam and virus-checking mechanisms before delivery.

Local mailbox numbers

Subscribers can use local mailbox numbers to address any Modular Messaging subscriber within a voice mail domain. Traditional voice mail systems typically use this form of addressing. From the computer user interface, Modular Messaging—MSS subscribers can address messages to local mailbox numbers in the format *nnnn@domain.com*, where *nnnn* is the mailbox number and *domain.com* is the e-mail domain name used for the e-mail addresses of Modular Messaging mailboxes.

In a MultiSite-enabled Modular Messaging system, whenever a mailbox number is required, subscribers can always enter a full mailbox number, since it uniquely identifies the subscriber across the VMD. Subscribers can also enter short mailbox numbers. Although the short mailbox number is unlikely to be unique in the enterprise, Modular Messaging gives precedence to short mailbox numbers that are in the same site as the one that is currently being used.

In a MultiSite-enabled Modular Messaging system, a local site is one whose associated PBX is handling the current call. Subscribers generally need to use only their own short mailbox number. The only time that they may have to use their full mailbox number is when they travel to a different location and want to log in to the local Modular Messaging system; in that case, they are likely to have to use their full mailbox number, because their short mailbox number is unlikely to be sufficiently unique. Another option in such cases is to enter a partial mailbox number. A partial mailbox number is the rightmost portion of a full mailbox number.

Sometimes a mailbox number does not have to be unique, for example when addressing a message. Since priority is given to mailboxes that are in a local site, the subscriber might be able to get to the desired mailbox by using very short partial mailbox numbers when addressing other subscribers in their own site.

Mailbox numbers must have at least 2 digits, and can have up to 10 digits, or 50 digits if MultiSite is enabled.

Only local subscribers, that is subscribers within a voice mail domain, can use local mailbox numbers for addressing.

Numeric Address

A Numeric Address, also known as a variable length address, enables subscribers to address messages to any local or remote recipient in an organization.

For Modular Messaging—Exchange and Modular Messaging—Domino, the recipient can be any object in the global directory with a Numeric Address. For Modular Messaging—MSS, the recipient can be any local or remote subscriber in the directory. Remote subscribers that do not have an administered Numeric Address are assigned Numeric Addresses equal to their network addresses. For details, see Network address on page 152.

Each Modular Messaging subscriber must be assigned a Numeric Address that is unique in all VMDs. The Numeric Address allows a subscriber to send a message to any recipient from the TUI without having to know the geographic location of the recipient. The directory makes all Numeric Addresses available to all locations within the organization.

U.S. Organizations might choose to use 10-digit telephone numbers (with the area code) for Numeric Addresses. Other possible schemes include:

- A geographic location code associated with a local mailbox number
- Mailbox numbers
- Employee numbers
- Short Numeric Addresses, for example, 55 for a Help Desk, or 1 for the office of the CEO

A Numeric Address can have a variable length of 1 to 32 digits. All local and remote subscribers can use Numeric Addressing.

With Modular Messaging—MSS and Modular Messaging—Exchange systems, Numeric Addresses can be the same length as mailbox numbers.

Additional forms of addressing from the TUI

In addition to supporting local mailbox numbers and Numeric Addresses, Modular Messaging supports two custom forms of addressing messages from the Modular Messaging TUIs. These forms are needed because the TUIs do not provide a facility to enter alphabetic characters easily. The two forms of addressing are Dial-by-Name and Network address.

When subscribers address messages from the TUIs, the system confirms the correct entry of each recipient's address by playing the name of each recipient. If the subscriber has a recorded name, the recorded name is played. For example, if there are multiple subscribers with the name Jim Smith, subscribers hear Jim Smith speaking his own name. If no recorded name is available, the system uses text-to-speech (TTS) to play the name of the recipient. Modular Messaging—MSS systems support 250,000 remote networked subscribers, each of which can have a spoken name.

Dial-by-Name

Dial-by-Name is a method of addressing messages by spelling the name of the recipient using the keys on the telephone keypad.

There are two ways to access Dial-by-Name:

- A subscriber, while in their mailbox, can address a message, using Dial-by-Name, to another local subscriber or to a remote subscriber on another networked system.
- A caller arriving at the Automated Attendant or via a Caller Application is presented with a menu option to Dial-by-Name. The caller can use the Dial-by-Name to access any local subscriber on the local system. For Modular Messaging—Exchange systems, if more then one VMD exists then results are only returned from the VMD that is associated with the MAS handling the call.

With Dial-by-Name, if a remote subscriber's spoken name is not available, the TUI speaks the display name of the subscriber using TTS technology. Consider this when setting up a format for display names.

When the MultiSite feature is enabled, all subscribers served from the same Modular Messaging system are considered local subscribers, regardless of their home PBX. Remote subscribers are those subscribers on separate voice mail domains that are part of the voice mail network.

Administrators can configure the properties of the Dial-by-Name mode of addressing so that when they match names, Dial-by-Name uses either the name or the e-mail address of the recipient. Administrators can configure the properties in the Voice Mail System Configuration tool on the Messaging Application Server (MAS).

Avaya recommends matching by e-mail addresses only if the names of recipients are not easily mapped to a telephone keypad. This mode of addressing (matching by e-mail address) is useful when the name of the recipient includes characters (such as Chinese) that are not part of the Latin character set.

Dial-by-Name for Modular Messaging—MSS

Modular Messaging—MSS forces the administration of a US-ASCII name for all subscribers in addition to the display name, which may contain non-ASCII characters. Dial-by-Name, when configured to match the names of recipients, uses this US-ASCII name.

Dial-by-Name for Modular Messaging—Exchange and Modular Messaging—Domino

With Modular Messaging—Exchange and Modular Messaging—Domino, subscribers have only one name. This name may contain non-ASCII characters. European-accented characters are mapped to the unaccented character for Dial-by-Name by using the name of the recipient. Alternatively, Dial-by-Name can be configured to use the e-mail address of the recipient.

All local and remote subscribers can be addressed using Dial-by-Name addressing.

When callers use Dial-by-Name to address messages or to reach an extension or mailbox, callers must enter enough characters to allow the system to reduce the possible matches to be nine or fewer. The system then prompts the caller to select the desired entry. For example,

the system plays prompts such as “For John A Smith, press 1. For John B Smith, press 2”. If there are more than nine matches, the system will prompt the caller to enter more characters.

For information on configuring Dial-by-Name, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation* CD-ROM.

Network address

Modular Messaging—MSS subscribers can directly communicate with other Modular Messaging—MSS subscribers or with non-Modular Messaging subscribers through a Message Networking server.

Modular Messaging—MSS subscribers can address messages by using the following address forms in addition to the remote subscriber's Numeric Address:

- Prefix + Remote Number Range set up when administering a remote Modular Messaging—MSS system on a local Modular Messaging—MSS system
  - When multiple Modular Messaging—MSS systems use a Message Networking server as a gateway for LDAP updates, the Remote Number Range is the network address. This network address is the number assigned on the Message Networking server.
  - When a Modular Messaging—MSS system is directly administered as a remote machine on a local Modular Messaging—MSS system, the Remote Number Range is the mailbox number range of the remote system. The mailbox number range is the length of the mailbox numbers on the remote Modular Messaging—MSS system.
- Prefix + Message Networking Network Address when addressing to other systems through a Message Networking server

Message Networking Network Address

The Message Networking server assigns each Modular Messaging subscriber a unique network address that is specific to a voice mail system. A network address is typically a machine prefix followed by the subscriber mailbox number. The machine prefix is common to all subscribers of a particular voice mail system.

A Message Networking server is not assigned a prefix by either the Modular Messaging system or the remote system.

Consider the following example (the table) of a subscriber on a Modular Messaging—MSS system communicating with a networked subscriber, through a Message Networking server.

System	Mailbox number	Network address	E-mail/SMTP address
Modular Messaging—MSS	70000	732-817-0000	name@sys.company.com
Traditional system connected to the Message Networking server	1234	408-555-1234	4085551234@mn.avaya.com

To address a message to a remote subscriber reached through the Message Networking server:

1. The Modular Messaging subscriber uses mailbox number 70000 to log in to the TUI.
2. The subscriber addresses a message to the network address of the recipient on the Message Networking server (408-555-1234).
3. Modular Messaging sends the message to *4085551234@mn.avaya.com* using SMTP.
4. The Message Networking server converts the e-mail address (*4085551234@mn.avaya.com*), which contains the network address (408-555-1234) to the mailbox number (1234). The Message Networking server then sends the message to the remote traditional system, through a protocol that the traditional system supports.

To address a message to a Modular Messaging subscriber:

1. The networked subscriber uses mailbox number 1234 to log in to the subscriber mailbox.
2. The subscriber addresses a message to the Modular Messaging recipient, using the network address (732-817-0000) of the recipient.
3. The remote traditional system sends the message to the Message Networking server.
4. The Message Networking server converts the network address (732-817-0000) to the e-mail address of the Modular Messaging subscriber (*name@sys.company.com*). The Message Networking server then sends the message through SMTP to the Modular Messaging system.

Modular Messaging subscribers can use the Message Networking e-mail address when addressing from a GUI client. For example, to address a message to a networked subscriber whose network address is 408-555-1234, Modular Messaging subscribers can use *4085551234@mn.avaya.com*. The Message Networking e-mail addresses of remote users are in the LDAP directory, so GUI client users can use this directory to resolve names to these e-mail addresses.

Implementing networking without using prefixes

An organization with multiple Modular Messaging—MSS systems can implement networking between the systems, without assigning any prefixes.

In this case, the network addresses of the remote subscribers are the same as their local mailbox numbers. Such an implementation is appropriate for an organization with more subscribers at one location than a single Modular Messaging—MSS system supports.

With multiple Modular Messaging—MSS systems, some features that are specific to voice mail domains do not work between the systems or require special administration. For example, features such as call sender of voice mail messages and transfers do not work between the systems. Administrators need to perform some special administration tasks on the Modular Messaging system for these features to work.

When two networked Modular Messaging—MSS systems are located in different cities, their respective prefixes might be a city-specific switch access code. For example, both sites may be using 4-digit dialing within the system, but they could use the switch access code as a prefix when dialing employees at the other site. The network address does not have to match the (assigned) Numeric Address, so in this case the remote users might be addressable in multiple ways.

When Modular Messaging—MSS subscribers use a network address to address messages, Modular Messaging translates the address to an e-mail address, and the message is sent using e-mail protocols.

Additional forms of addressing from the computer user interface

Depending on the GUI client subscribers use to send messages, Modular Messaging supports the following address formats.

Modular Messaging with e-mail servers

When addressing messages from a personal computer user interface, Modular Messaging—Exchange and Modular Messaging—Domino subscribers can use the respective global directories. An address is unique within the directory. An address entered at any location is automatically available at all locations within the organization. E-mail servers support an enterprise-wide directory, which uses unique identifiers valid from anywhere in the enterprise.

When Modular Messaging—Exchange subscribers use the Client Add-in for the Microsoft Outlook application to send messages, they can use the Global Address List for directory assistance.

When Modular Messaging—Domino subscribers integrate Domino Unified Communications (DUC) software from IBM to run with their IBM Lotus Notes Client, they can use the IBM Lotus Notes Address Book for directory assistance.

Additionally, subscribers can address messages using the local mailbox number and Numeric Address of the recipient.

The Global Address List and IBM Lotus Notes Address Book are also available to subscribers using supported standards-based e-mail clients.

Address format for Modular Messaging—MSS

When using Modular Messaging Web Client, subscribers can address messages to recipients using their names, e-mail addresses, or mailbox numbers. The Web Client provides access to the MSS directory and the e-mail directory. From the directory, subscribers can search for other users and address messages to them. The Web Client supports only the Modular Messaging —MSS version.

When Modular Messaging—MSS subscribers use Client Add-in for Microsoft Outlook or a standards-based e-mail client, they can address messages using the LDAP Address Book that the MSS provides. Subscribers can also address messages by name, primary mailbox address, or Message Networking server e-mail address. For information on the Message Networking address, see Network address on page 152.

Subscribers using Modular Messaging Outlook Client can also address messages to local mailbox numbers and Numeric Addresses of recipients.

Subscribers using any standards-based e-mail client will not be able to use address forms such as local mailbox number and Numeric Address unless the LDAP query string can be modified.

With Modular Messaging—MSS, if a separate e-mail directory exists for corporate e-mails, subscribers must be careful when using directory assistance. Addresses of local subscribers appear in the Modular Messaging directory. If subscribers address a voice message to contacts in the corporate directory by mistake, recipients receive an e-mail message with a .WAV attachment in their corporate e-mail mailboxes.

When Modular Messaging—MSS subscribers use a standards-based e-mail client to reply to a message, they should ensure that the reply is sent from the sender's Modular Messaging address directly to the MSS rather than from the subscriber's corporate e-mail address. Depending on the client used, this operation may be controlled based on from where the message was retrieved or may require a manual selection when sending the message.

Call Answer responses within networked messaging systems

When local or remote subscribers call a Modular Messaging subscriber who is not available, they can leave a message, called as Call Answer message. Modular Messaging—MSS

subscribers can respond to these Call Answer messages. Local subscriber have their mailboxes in the same Modular Messaging—MSS system as that of the Modular Messaging —MSS subscriber.

A remote subscriber is a subscriber whose mailbox exists in any one of the following systems:

- Modular Messaging—MSS connected directly to the called subscriber's Modular Messaging—MSS system
- Any of the following messaging systems that are connected using a Message Networking server to the called subscriber's Modular Messaging—MSS system:
  - Intuity AUDIX
  - Octel Aria
  - Octel Serenade
  - Modular Messaging—MSS
- Messaging systems networked with Voice Profile for Internet Mail (VPIM)

Responses to Call Answer messages

With Modular Messaging—MSS subscribers can respond to local or remote subscribers. Subscribers can do the following:

- Send a reply message to the Call Answer message.
- Call the subscriber who has left the Call Answer message.
- Generate an e-mail as a response to the Call Answer message if the Notify Me rule is enabled for the subscriber.
- Call the subscriber who left the Call Answer message on a specified phone number if the Call Me rule is enabled for the subscriber.

Administering Modular Messaging systems for Call Answer responses

In a MultiSite-enabled Modular Messaging system, the Call-Answer Message Response Improvements (CAMRI) Feature is not required and hence is disabled. MultiSite translation rules provide functionality similar to the CAMRI feature. For more information on MultiSite translation rules, see the *Modular Messaging MultiSite Guide*.

When a local subscriber leaves a Call Answer message, the messaging system tries to match the calling party number (CPN) to a Private Branch Exchange (PBX) extension of the local subscriber. If the system is successful in matching the CPN to a PBX extension, the system

retrieves the name and SMTP address of the called subscriber. This information allows the subscriber who received the Call Answer message to do the following:

- Identify the subscriber who left the message.
- Send a reply message.
- Return a call.

When a remote subscriber leaves a Call Answer message, the messaging system tries to match the CPN with the PBX extension of the remote subscriber. However, as the CPN cannot be directly matched to a remote PBX extension, some additional information other than the PBX extension must be shared between the networked messaging systems.

Modular Messaging allows administrators to create mapping tables that convert the PBX extensions or the network addresses of remote subscribers to telephone numbers. These telephone numbers are then shared between the messaging systems. The messaging systems use the telephone numbers to identify the callers over the network. For example, when a subscriber receives a call from a remote subscriber, the system uses the telephone number to retrieve information regarding the caller.

Administrators can also create dialing rules that specify how outbound calls to the Call Answer messages can be made. The dialing rules specify the dialing string that needs to be prefixed to the telephone number while returning a call to a remote subscriber.

The Call Answer response capabilities are not supported in the following situations:

- If secondary extensions are shared between networked systems
- If the inbound and outbound telephone numbers contain different number of digits
- If multiple telephone numbers, such as internal caller ID and external caller ID, are required to identify a caller
- If the subscriber uses Inband switch integrations (SWINs)
- If a caller has left a Call Answer message through the Call Sender option of the TUIs

Creating mapping tables

When messaging systems are networked through a Message Networking server, administrators must create mappings to create telephone numbers for the remote subscribers.

If messaging systems are networked through a point-to-point network and the subscribers of the systems can directly dial each other, mappings are not required. Administrators must create only dialing rules in the MAS.

Administrators create mappings in the Modular Messaging—MSS systems and the Messaging Network servers.

The mapping tables have two fields, *Map From* and *Map To*. The *Map From* field contains the starting digits, the left most digit, in a remote subscriber's PBX extension or network address. The *Map To* field contains the digits that the starting digits must be replaced with to create the canonical phone number.

The following table provides a sample mapping table.

Map From	Map To
4	719598
47	7195976
31	7195997

For example, if the PBX extension of a remote subscriber is 46175, the starting digit, 4, is replaced with the *Map To* field value, 719598. The telephone number of the subscriber is 7195986175.

If a subscriber's extension matches more than one mapping, the mapping that matches the longest series of digits is applied. For example, if the PBX extension of a subscriber is 47385, the telephone number of the subscriber is 7195976385.

Administrators can create mappings only with a single set of subscriber information. For example, if a mapping is created by using the PBX extensions of subscribers, all other mappings are also created using the extensions and not using the network address.

Creating dialing rules

System administrators must also create dialing rules, which indicate how the telephone numbers, created by using the mapping tables, can be used to return a call to a remote subscriber. A dialing rule contains the following information:

- Number of digits in the telephone number
- Starting digits of the telephone numbers
- Dialing plan that must be used for dialing the telephone number

The following table provides sample dialing rules.

Number of digits	Starting digits	Dialing plan
5	—	Use trunk access code.
10	303538	Use trunk and long-distance access code.

Administrators can set any of the following codes or a combination of the codes as a dialing plan for a dialing rule:

- Trunk access code: Used to dial any number outside the local dialing plan
- Long-distance code: Used to dial a number outside the local area codes
- International access code: Used to dial an international number

Each dialing rule is applied only to telephone numbers that have the specified number of digits and start with the specified starting digits. If a rule applies to a telephone number, the specified dialing plan is used when any subscriber tries to call the number. For example, as in the above table, the system will use the trunk access code before dialing any 5 digit number.

Administrators can create dialing rules in the MAS. In a Modular Messaging system with more than one MAS, dialing rules need to be set in only one MAS. The dialing rules are automatically shared between the MASs.

For more information about dialing rules, see the *Modular Messaging, Messaging Application Server administration* guides, available on the *Avaya Modular Messaging Documentation Library*.

Multiple mailboxes and alias extensions

Modular Messaging enables administrators to configure schemes that support the following:

- Multiple extensions per mailbox
- Multiple mailboxes per extension

Multiple extensions per mailbox

Modular Messaging systems enable a mailbox to have more than one extension number.

A mailbox can have one primary extension number and one or more secondary extension numbers. A secondary extension number is an alternate number that callers can dial to interact with a subscriber.

A secondary extension number can provide a subscriber with a separate number for direct reception of fax messages and can enable callers to use a Caller Application. A secondary extension can also be used if each line appearance on the telephone set has a different telephone number. Secondary extensions can be used by individuals who have multiple offices with separate extensions or by small teams where members have their own extensions but need to share a mailbox.

Secondary extensions can be viewed as alternate numbers for callers to reach a subscriber's mailbox. Thus, all primary extension preferences, such as the preferred TUI language, and rules, such as the Find Me rules, are also applicable to the secondary extension.

Secondary extensions do not have an impact on the Message Waiting Indicator (MWI) server. The MWI server will control only the lamp state for the primary extension.

Call Answer support

By default, the Call Answer behavior for the secondary extension numbers is the same as it is for the primary extension. Thus, callers would get to hear the same greetings and prompts, regardless of which extension they dial. The Automated Attendant transfers calls to the primary

extension. However, Caller Applications can be used to customize the Call Answer behavior for each extension. For more information, see Caller Application support on page 160.

When a subscriber with multiple extensions sends a voice message to another subscriber, and if the recipient wants to call the sender, the call is made to the primary extension of the sender.

Caller Application support

With Modular Messaging, each secondary extension number may be associated with a different front-door Caller Application.

If a Caller Application is associated with a called extension and the call is then redirected to the TUI, the Caller Application is executed instead of any default call handling.

If no Caller Application is associated with an extension, TUI uses the default call handling for the mailbox.

Multiple mailboxes per extension

Using Caller Applications, subscribers can achieve coverage for multiple mailboxes from a single number. A single-level Caller Application can transfer the caller to up to nine mailboxes.

Call Answer callers hear “To leave a message for subscriber A, press 1. To leave a message for subscriber B, press 2” and so on. They then hear an announcement from the relevant subscriber's mailbox and can leave a message.

To complete the configuration, administrators must create an association that ties the deployed Caller Application to a specified extension. This is the extension that is dialed to reach multiple mailboxes.

Even when multiple mailboxes are set up for an extension, subscribers are still capable of having their own extension numbers.

In Modular Messaging—MSS, an Enhanced-List Application (ELA) can be configured so that calls can be made to the extension number of the ELA list, and the message is delivered to all ELA list members.

Networking

The term networking describes how subscribers of a Modular Messaging system can exchange messages with subscribers of other Modular Messaging systems, or, in some cases, with users of other voice mail systems.

Modular Messaging interoperates with other Modular Messaging systems in the following manner:

- Modular Messaging—MSS. Provides native support to SMTP/MIME networking. Using this, subscribers can exchange messages with:
  - Subscribers of other Modular Messaging—MSS systems
  - Subscribers of systems connected to an Avaya Message Networking server. The Message Networking server performs the conversion between SMTP/MIME and both proprietary voice mail networking protocols (such as Octel Analog, AUDIX TCP/IP, Aria TCP/IP, and Serenade TCP/IP) and standard protocols (such as AMIS and VPIM).

  Note:

  Networking between a Modular Messaging—MSS system and a Message Networking server is a chargeable option. For simplified administration, directory management, and performance, Avaya recommends subscribers to consider using a Message Networking server among multiple Modular Messaging—MSS systems. For more information, see Modular Messaging—MSS and the Message Networking server on page 162.

- Using native networking, Modular Messaging—Exchange subscribers can exchange messages with subscribers of other Modular Messaging—Exchange systems, and Modular Messaging—Domino subscribers can exchange messages with subscribers of other Modular Messaging—Domino systems.
- Using Octel Analog Networking (OAN), Modular Messaging—Exchange systems can also send messages and receive messages to and from subscribers of the following systems:
  - Octel 250/350 that use OAN
  - Octel 200/300 that use OAN
  - Avaya Message Networking server with OAN

  OAN is not supported on the following systems:
  - Modular Messaging—MSS
  - Modular Messaging—Domino
  - Modular Messaging—Exchange for H.323 integrations
  - Modular Messaging—Exchange system for SIP integrations
  - Modular Messaging—Exchange 2007 systems
  - Modular Messaging—Exchange 2010 systems

Note:

OAN is not supported for Exchange 2007 and Exchange 2010. However, OAN can be used in mixed Exchange environments as long as the VMD host is Exchange 2003.

- Modular Messaging—Exchange systems also interoperate with systems connected to an Avaya Message Networking server. However, networking between heterogeneous systems requires careful consideration. Avaya recommends customers and planners to review Considerations with Message Networking server and Microsoft Exchange on page 391 and should consult the engineering paper Message Networking Implementation Notes. This engineering paper is available on request.

Modular Messaging—MSS and the Message Networking server

Planning for the Mailbox ID length, Numeric Address length, and Network Address length is important, when designing a network that involves Modular Messaging—MSS and Message Networking.

For more information on networking a Modular Messaging system as a remote machine on a Message Networking system, see the *Modular Messaging MultiSite Guide*, available on the Avaya Support Web site at http://www.avaya.com/support.

When a Modular Messaging—MSS system uses a Message Networking server for communicating with other voice mail systems, certain features are affected.

No partial updates when addressing from the TUI

Modular Messaging—MSS does not support partial updates when addressing to remote subscribers from the TUI. When Modular Messaging subscribers address messages to remote subscribers, from the TUI, recipients must be pre-administered on the Modular Messaging—MSS as remote subscribers. All remote subscribers in the network must be added through an automatic networking directory update or manually pre-administered on the Modular Messaging—MSS system to be able to receive messages addressed from the Modular Messaging TUI.

Reply-all

Messages coming through a Message Networking server do not contain a complete list of recipients because the Message Networking server cannot be sure that it received a complete list of recipients from the originating node. When using reply-all to messages coming through a Message Networking server, the reply-all feature sends the reply only to the originator of the message.

Message Networking server among multiple Modular Messaging—MSS systems

Modular Messaging—MSS systems can establish direct connectivity with each other by using SMTP/MIME networking. However, for simplified administration, directory management, and performance, Avaya recommends the use of a Message Networking server among multiple Modular Messaging—MSS systems.

Message Networking server for administration

Modular Messaging requires each remote machine to be administered on the Modular Messaging system.

With the implementation of a Message Networking server, remote machines are administered on the Message Networking server. Each Modular Messaging system needs to administer only the Message Networking server system, rather than each remote machine, thus simplifying administration.

Message Networking server for performance

Large directory updates between Modular Messaging systems can significantly impact system performance.

A Message Networking server eliminates the possibility of multiple directory updates occurring at the same time, thus improving the performance of directory updates.

When the number of subscribers per Modular Messaging system are more than 5,000, Avaya recommends customers to consider using the high-availability configuration of the MSS (MSS-H). MSS-H improves performance of directory updates by providing higher throughput than the standard-availability MSS configuration (MSS-S).

The following table defines when a Message Networking server is recommended and when it is optional in an environment that contains multiple Modular Messaging—MSS systems.

Average number of subscribers per Modular Messaging—MSS system	3 to 5 Modular Messaging—MSS systems	6 to 10 Modular Messaging—MSS systems	More than 10 Modular Messaging—MSS systems
Less than 200	Optional	Optional	Recommended for administration
200 to 2,000	Optional	Optional	Recommended for administration and performance
2,000 to 5,000	Optional	Recommended for performance	Recommended for administration and performance

Average number of subscribers per Modular Messaging—MSS system	3 to 5 Modular Messaging—MSS systems	6 to 10 Modular Messaging—MSS systems	More than 10 Modular Messaging —MSS systems
5,000 to 10,000	Recommended for performance	Recommended for performance	Strongly recommended for administration and performance
More than 10,000	Strongly recommended for performance	Strongly recommended for performance	Strongly recommended for administration and performance

Chapter 7: Modular Messaging and fax servers

Modular Messaging native fax server

Modular Messaging provides a fax-capable messaging solution that includes native fax resources to provide fax capability.

Modular Messaging uses a native fax server to support the following fax features:

- Subscribers can create, send, receive, review, and print fax messages.
- Subscribers can forward a fax message with an e-mail message.
- Callers can leave fax-only messages or voice-and-fax messages for subscribers.
- Subscribers can create fax messages with any application capable of printing, such as MS Word or Powerpoint, and then “print” to the Modular Messaging Shared Fax Driver.
- Subscribers can create and manually address messages to a fax number.
- Subscribers can use the TUI to print text messages to a fax machine.

Fax Sender Service for Messaging Application Server

You can select either a Messaging Application Server (MAS) or a supplementary server to use the Modular Messaging Fax Sender Server service to process outgoing faxes for the voice mail domain.

The Modular Messaging Fax Service Provider is installed and registered automatically during the Modular Messaging installation on this server, and a Local Fax Printer is created. You can make this printer available as a shared network fax printer. The Windows Fax service is usually already installed with the Windows operating system on the MAS, and is available from Microsoft if needed.

Fax Sender Service can be installed on every MAS in a voice mail domain. However, only one MAS can be designated as the active fax sender for the voice mail domain. Fax Sender Service installed on this MAS requests and utilizes fax resources available on any of the MAS units in the voice mail domain to receive or transmit fax messages. For more information on configuring Modular Messaging Fax Sender Service for a voice mail domain, see “Configuring MM Fax

Service" in chapter "Configuring the voice mail system" in the *Installation and Upgrades guide* for the relevant message store.

When instructed to send a fax, the Fax Sender Server service converts the text message to Tag Image File Format (TIFF)/F Profile for Facsimile Dialogic format, adds a cover page (if required), includes any TIFF/F file that the subscriber may have attached, places an outgoing call to the fax device, sends the fax, and sends a message to the subscriber indicating whether the fax was successfully transmitted.

If the fax is not delivered in spite of the maximum number of retries, the fax is deemed undeliverable, the message is deleted from the queue, and a non-delivery-report is sent to the subscriber who sent the message.

Modular Messaging enables administrators to configure fax properties, including defining company identification that appears on the outgoing fax cover pages.

The following table lists the maximum number of fax resources available based upon the integration type. Where a physical port board is used, fax resources are shared among all voice ports on that port board.

Port board	Number of fax resources
SIP	All channels support FAX.
H.323	H.323 integration does not support FAX.
T1 QSIG	4 per port board
E1 QSIG	4 per port board
8-port DSE	2 per port board
12-port Analog	4 per port board
4-port Analog	4 per port board

Note:

Fax Sender Service only supports the G.711 μ-law. Fax Sender Service does not support the G.711 A-law and digital fax machines.

Outgoing faxes

Subscribers can send fax messages using the following methods:

- Subscribers can create and print fax messages using the Microsoft Outlook client or through any Windows application with print capabilities using the Modular Messaging fax printer configured on their system. Subscribers of Modular Messaging—MSS must include the Fax Authorization Code (FAC) in the print request to use the Modular

Messaging fax printer to send faxes. Subscribers of Modular Messaging—Exchange version can use their Windows credentials for authentication.

- Subscribers whose mailboxes reside on a Modular Messaging system that uses the Message Storage Server (MSS) can create a fax using Modular Messaging Outlook Thick Client and Modular Messaging Restricted Outlook Client. They can print multilingual text messages to a fax device by addressing the text messages to *MM:fax=nnnn@host.domain*, where *nnnn* is the number of the destination fax machine or the recipient. This does not require the Windows 2003 fax server or any print/fax driver to be installed on the client.
- Subscribers can print to a fax device from the TUI.

When using the client fax printing capability, there is a limit of 4 simultaneous outbound fax sessions per VMD since there are only 4 instances of the Modular Messaging Fax Service Provider created for the Windows Fax Service. In addition to these sessions the Fax Sender Service can also use any available fax resources on any of the MASs within the VMD to send outgoing faxes submitted from the TUI or via the fax mailbox. Each MAS can be handling incoming fax sessions up to the simultaneous fax call limit for the MAS.

For instructions, see the *Quick Start Guide for Modular Messaging Microsoft ® Outlook Client* and the *Quick Start Guide for Modular Messaging Microsoft ® Restricted Outlook Client*.

An administrator can control the outgoing fax messages of subscribers using the class of service (COS) settings.

Incoming faxes

You can receive incoming faxes in different ways, depending on how Direct Inward Dialing (DID) is set up on your system:

- On systems with DID, callers can program their machine to send the fax. They can then call into a subscriber's mailbox and press Start on the fax device.
- On systems without DID, callers can call the Automated Attendant from the fax machine, select the extension of the subscriber, either by using Dial-by-Name or by entering the extension of the subscriber, and press Start on the fax device.

The Message Application Server (MAS) provides fax reception capabilities through the voice ports. When an MAS receives a call, the fax data is acquired and stored in the message. See Fax Sender Service for Messaging Application Server on page 166 for more information on the maximum fax resources on a port board. If all fax resources are already in use, the receipt of a fax fails even though the call has been answered. In this case the sending fax machine will retry after some time.

An administrator can control the incoming fax messages of subscribers using the class of service (COS) settings. Class of service settings do not prevent the system from receiving fax calls, it prevents the call proceeding to the point where the fax is received by the subscriber. The sending fax machine will most likely attempt to resend the fax call until a retry limit is

reached. For more information, see the *Installation and Upgrades guide* for the relevant message store.

Viewing a fax message

Faxes in the Modular Messaging mailbox appear as e-mail messages with .tif attachments. You can view these files in any Windows image viewer such as Imaging for Windows or other TIFF viewers.

Click on the .tif attachment, and select whether you want to open it or save it to your computer.

Providing interoperability with third-party fax servers

Modular Messaging—Exchange and Modular Messaging—Domino interoperates either with a native fax server or a customer-provided, third-party fax server to provide fax capabilities. Modular Messaging—MSS does not support third-party fax servers.

The customer provides the hardware and software required for the third-party fax server. For information on the fax server hardware and software recommended for a particular switch integration type, see the configuration (SWIN) notes available at http://www.avaya.com/support. These configuration notes also provide information on where the fax server can be installed.

Third-party fax features

Modular Messaging, in conjunction with a compatible, customer-provided, third-party fax server, offers the following fax features:

- A subscriber mailbox can receive and store fax messages using the 3rd party fax server.
- Subscribers can forward fax messages and e-mail messages to fax devices for printing.
- Subscribers can forward a copy of their inbox listing to a fax device through the TUI.
- Subscribers can forward a fax message with an e-mail message.
- Callers can leave fax-only messages for subscribers.
- Subscribers can print e-mail messages that have attachments (for example, a document in Microsoft Word or Microsoft Excel format) to a fax device. The fax server converts such attachments to fax format. The types of attachments that can be printed to a fax device depend on the capabilities of the fax server.

Incoming faxes with Messaging Application Server

Receipt of incoming faxes can take place in several ways, depending on how the system is set up with Direct Inward Dialing (DID):

- On systems with DID, callers can program their machine to send the fax. They can then call into a subscriber's mailbox and press Start on the fax device.
- On systems without DID, callers can call the Automated Attendant from the fax machine, select the extension of the subscriber, either by using Dial-by-Name or by entering the extension of the subscriber, and press Start on the fax device.

When an MAS receives a call and detects the fax tone, it transfers the call to the third-party fax server. After a fixed time delay (5-second default), Modular Messaging sends fax routing information as DTMF codes to the fax server. Based on the fax routing information, the fax server then delivers the fax message to the mailbox of the recipient.

Note:

The fax server must support Dual-Tone Multifrequency (DTMF) routing.

Requirements for third-party fax server interoperability with Modular Messaging

The third-party fax server must reside on a separate server. The fax hardware is connected to a fax hunt group on the switch.

The following are the requirements for third-party fax server interoperability with Modular Messaging:

- The fax server must be integrated with the mail system as an e-mail connector or an e-mail gateway for fax.
- The fax server must use addressing that is specific to Modular Messaging:
  - With Microsoft Exchange, use a fax addressing type specific to Modular Messaging. For example, *RIGHTFAX:xxxxxxxxxx*, where *RIGHTFAX* is the actual address type for the fax server and *xxxxxxxxxx* is the user supplied telephone number.
  - With IBM Lotus Domino, use a specified foreign domain name for the right-hand part of an address. For example, *nnnnn@FAX*, where *FAX* is the foreign domain name.

    This addressing is necessary to deliver messages to the fax server for transmission and to create one-off or ad-hoc addresses.
- The fax server must support DTMF detection and collection.

- The fax server must match the DTMF fax routing number supplied by Modular Messaging with the fax routing address of a subscriber.
- The fax server must create faxes as e-mail messages with TIFF/F attachments and send them to the intended recipient.
- Depending on the messaging environment, the fax messages placed in the inbox of a subscriber should be identified by one of the following:
  - A unique message class (*IPM.NOTE.FAX*, by default), so that the messages can be detected as faxes by Modular Messaging—Exchange version.
  - A unique message type (FAX), so that the messages can be detected as faxes by Modular Messaging—Domino version.

Note:

If a fax server does not support the configured message class or message type, Modular Messaging does not classify messages as faxes. Instead, depending on the fax server, the message is classified as a normal e-mail message with TIFF/F attachments.

Enabling fax for subscribers

Subscribers with fax-enabled mailboxes can use the TUI to gain access to fax messages in their mailbox. From the TUI, fax-enabled subscribers can route fax or e-mail messages (with or without attachments) to any fax device for printing. Subscribers can also listen to the number of fax messages, review fax messages in a separate queue, print contents of the mailbox, and forward fax messages with voice annotations.

Modular Messaging—Exchange version

Subscribers are fax-enabled when a system administrator adds a fax routing address (FAXROUTE:) as an e-mail address type for the subscriber. The contents of the fax are passed to the fax server with the inbound call.

When a subscriber requests the printing of a fax or e-mail message, Modular Messaging requests that Microsoft Exchange forward a copy of the message to the default fax destination or to a one-off address of the form *FAX:nnnnnnn*, where *FAX* is the address type for the fax server and *nnnnnnn* is the telephone number of the fax device.

Modular Messaging—Domino version

Subscribers are fax-enabled when a system administrator adds a fax routing address as an e-mail address type for the subscriber. The contents of the fax are passed to the fax server with the inbound call.

When a subscriber requests the printing of a fax or e-mail message, Modular Messaging requests that IBM Lotus Domino forward a copy of the message to the default fax destination or to a one-off address of the form *nnnnnnn@FAX*, where *FAX* is the address type for the fax server and *nnnnnnn* is the telephone number of the fax device.

Routing inbound fax calls to the third-party fax server

Like voice calls, fax calls placed to the extension of a subscriber are redirected to the MAS when these calls encounter a ring-no-answer or busy condition. Whenever the MAS receives a call and detects that it is a fax, it places the call on hold and initiates a call transfer to the fax server hunt group.

After a fixed time delay (5-second default), Modular Messaging sends fax routing information as DTMF codes to the fax server and then transfers the fax call. The fax routing information that Modular Messaging sends is determined by retrieving the fax routing address for the subscriber, based on the called extension number or entered mailbox number.

After the fax server receives the fax, it completes the following steps:

1. Determines the address of a subscriber by finding the subscriber with a matching fax routing address
2. Creates an e-mail message with a TIFF/F attachment (TIFF group 3 fax format)
3. Does one of the following:
   - In Microsoft Exchange, sets the message class to IPM.NOTE.FAX
   - In IBM Lotus Domino, sets the message type to FAX
4. Sends the message to the subscriber mailbox

If the subscriber has Call Me, MWI, and Notify Me enabled for fax messages, Modular Messaging makes an outcall to the subscriber and provides a notification of the new fax message.

Chapter 8: Telephony concepts

Voice ports

Messaging Application Server (MAS) units provide a critical link between the telephone call switching equipment and the message store. MAS units communicate with the switch by means of several telephone endpoints known as voice ports. Voice ports receive inbound calls and place outbound calls in the same way as any other extension on the switch.

Modular Messaging supports a range of voice cards, offering various port densities. The number of available card slots for voice cards may differ depending on the hardware used. However, because of CPU and other resource constraints, Modular Messaging may not be able to utilize all the slots for the various card types. For more information on supported configurations, see MAS port capacities for Modular Messaging on page 222.

H.323 and SIP transmit voice as IP data, thus separate port cards are not needed. All further references to voice ports are equivalent to voice channels for H.323 and SIP.

Voice ports or channels can be configured into port groups that are associated with Modular Messaging components, for example:

- Telephone user interface (TUI)
- Desktop client
- Call Me Server
- Message Waiting Indicator (MWI)
- Fax

Voice cards provide telephony signaling to the Modular Messaging software. The way in which this signaling is implemented depends on the telephony protocol. For example, with inband analog telephony, the signaling is implemented in the voice path. With other types of telephony protocol, for example, Q.Signaling (QSIG), a separate signaling channel is used.

Switch integration and telephony protocols

Switch integration is the means by which the switch and the Modular Messaging system exchange control information relevant to calls, MWI status, and so on. This control information

may be passed inband, along with the voice data, or out-of-band, separate from the voice data.

Switch integration is achieved when a call is presented to a voice port and information about the call is supplied to the MAS software. This information includes the nature of the call (for example, a direct call or a call deflected on busy detection), called party information (for example, the number of the busy extension for a deflected call), and the calling party number, if known. Switch integration includes MWI status information, where MWI activity pertains to messages, not calls. An MWI request can be sent as the result of a message arriving from some remote system, without any telephone calls on the local system.

New installations of Modular Messaging Release 5.2 support only SIP integration although other forms of integration are available via a gateway device. Modular Messaging systems upgraded to Release 5.2 support the following telephony protocols and switch integrations for connecting the MAS to the switch:

- IP integration
  - SIP
  - H.323
- QSIG D Channel
  - T1 QSIG: T1 digital trunks with QSIG signaling
  - E1 QSIG: E1 digital trunks with QSIG signaling
- Digital Set Emulation
- Analog telephony interface
  - RS-232 serial integration
  - Inband Dual-Tone Multifrequency (DTMF) integration

For more information on voice card options and the port boards that Modular Messaging supports, see the *Installation and Upgrades guide* for the relevant message store.

For switch integration (SWIN) documentation, see the configuration notes available from an Modular Messaging support representative or from the Avaya Support Center at http://www.avaya.com/support. Audiocodes switch integration (SWIN) documentation is available at http://www.audiocodes.com/support. Configuration notes provide integration information for several types of switch and fax devices. Configuration notes provide information on the common features of SWINs, the procedures for configuring switch integration, and the considerations for each type of integration. Configuration notes are updated frequently to reflect best practices and current knowledge. Customers must verify that they are referring to the latest version of a configuration note.

Session Initiation Protocol

Modular Messaging supports SIP as a SWIN type. SIP is an important technology for establishing real-time audio and multimedia calls in a converged IP network environment.

When MultiSite is being used, only SIP integration is supported. AudioCodes and Dialogic Gateways are used to convert remote switch T1 QSIG, E1 QSIG, Analog, and DSE calls into SIP calls that are in turn routed to the Modular Messaging system.

With SIP, the switch and the MAS are connected to the local area network (LAN). All exchange of information, such as call information, signaling information, and voice data, happens by means of voice channels through the LAN.

In Modular Messaging multi-server configuration, each MAS supports a maximum of 48 voice channels when running on an S3500 server and 96 voice channels when running on an S8800 server, an S8730 server, a HP DL360 G7 server, or a customer-provided server. Modular Messaging single server configuration supports a maximum of 48 voice channels.

Modular Messaging provides SIP with Communication Manager Release 3.1 and later.

SIP connectivity between the MAS and Communication Manager is typically accomplished by means of an Avaya Aura® SIP Enablement Services proxy or Avaya Aura® Session Manager. The Modular Messaging system is connected to the switch, using the SES proxy or Avaya Session Manager, through SIP trunks. The SIP trunks are administered as part of a trunk group on the switch.

Note:

Integration of multiple Communication Manager nodes, to an SES Home or Avaya Session Manager integrating with Modular Messaging, requires special consideration in the design of MWI delivery, network regions and codec set usage. Consult your ATAC or Sales Engineer representative for these types of complex integration.

Modular Messaging release 5.2 single server configuration or a single MAS configuration with any message store , supports SIP Integrations to Communication Manager 5.2.1 or 6.0 without the need for a Session Enablement Server or Session Manager. Consult your ATAC or Sales Engineer representative for these types of complex integration.

The SIP integration transmits signaling information and MWI information by using SIP packets. Signaling information is encrypted before transmission. However, media information for SIP connectivity is not encrypted.

H.323

Note:

New installations of Modular Messaging Release 5.2 do not support the H.323 integration. However, Modular Messaging systems upgraded to Release 5.2 support the H.323 integration.

H.323 is a call signaling protocol that relies on packet-based networks, such as an IP network, for transmission of voice.

Modular Messaging provides H.323 with Communication Manager (Release 1.1 or later) and Avaya DEFINITY (Release 10 or later).

With H.323, the switch and the MAS are connected to the LAN. All exchange of information, such as call information, signaling information, and voice data, happens by means of voice channels through the LAN.

Regardless of the hardware in use, each MAS supports a maximum of 30 voice channels.

H.323 connectivity between the MAS and Communication Manager is accomplished by means of H.323 trunk groups configured as tie trunks supporting QSIG features. QSIG is a standards-based, private networking protocol, based on Q.931 standards (ISDN). Signaling information and MWI information are transmitted using QSIG messages embedded in an H.323 packet.

Note:

H.323 currently does not support fax capabilities and Teletyptewriter (TTY). Fax Sender Service only supports the G.711 μ-law and does not support the G.711 A-law and digital fax machines.

QSIG D Channel

Note:

New installations of Modular Messaging Release 5.2 do not support the QSIG integration. However, Modular Messaging systems upgraded to Release 5.2 support the QSIG integration.

ISDN protocols, such as QSIG, carry signaling information in the D channel for calls in which voice data is carried in separate but associated bearer channels. This method of using the D channel and the bearer channels is known as Common Channel Signaling (CCS). The data in this channel can be used for integration.

Common Channel Signaling uses one or more channels to transmit signaling information for the remaining channels in the trunk. Non-signaling channels are known as bearer channels,

and signaling channels are known as data channels. Therefore, for T1 there are 23 bearer channels and 1 data channel known as 23B+D. For E1, there are 30 bearer channels and 2 data channel known as 30B+2D. Various signaling protocols can be conveyed in the D channel.

With QSIG, Modular Messaging uses QSIG supplementary services (ISO compatible) to convey integration information and to support MWI and transfers.

For QSIG integration, Modular Messaging supports 23-port T1 port boards and 30-port E1 port boards.

With T1 QSIG integration, each MAS supports a maximum of 46 voice channels when running on S3500 server and 69 voice channels when running on S8730 server. With E1 QSIG integration, each MAS supports a maximum of 60 voice channels when running on S3500 server and 90 voice channels when running on S8730 server.

The Avaya switches that Modular Messaging supports with T1 and E1 QSIG integration are Communication Manager (Release 1.1 or later) and Avaya DEFINITY (Release 10 or later). Modular Messaging also supports Cisco Call Manager, and Siemens switches with T1 integration.

T1 digital trunks

A T1 connection is a digital transmission link with a capacity of 1.544 megabytes per second (MBps). T1 trunks carry 24 concurrent telephone connections multiplexed into time slots. Each time slot carries sound digitized at 64 kilobytes per second (KBps), which can be used to convey voice or signaling information.

T1 is a standard for digital transmission in North America, widely used by telecommunications service providers to connect to remote locations and to connect switches to public networks. T1 digital trunks can connect MAS units to the switch. With T1 digital trunks, you can use the simplified wiring in which one wire is used for 24 time slots. In such a case, there will be 23 bearer voice channels and 1 signaling data channel.

Customers that use T1 between their switch and service provider have the option of using E1 between the switch and the MAS to obtain higher port density per card. Usually though, customers choose to use T1 to match the interface used for external and internal communication and establish a consistent model for switch provisioning.

E1 digital trunks

Outside North America, the standard for primary rate connections is an E1 digital trunk, which is a digital transmission link with a capacity of 2.048 MBps. This link is divided into 32 time slots: 30 bearer channels (voice), 1 signaling channel (data), and 1 framing channel. Each time slot carries 64 KBps of data.

Digital Set Emulation

Note:

New installations of Modular Messaging Release 5.2 do not support the Digital Set Emulation (DSE) integration. However, Modular Messaging systems upgraded to Release 5.2 support the DSE integration.

Digital Set Emulation is a digital protocol developed by switch manufacturers to connect digital telephones to their switches. Using DSE, Modular Messaging can emulate digital telephone sets. These telephone sets can provide all the features that a voice mail system requires to integrate with a switch. For example, they can support the receipt of calling and called party identity and can have MWIs and programmable keys.

Each MAS supports a maximum of 16 voice channels when running on S3500 server and 24 voice channels when running on S8730 server.

Many switch vendors use proprietary digital protocols to connect their own hand sets to the switch. These protocols provide call control and integration information. The DSE integrations that are supported in Modular Messaging are listed in the Configuration Notes Master Index for Modular Messaging on the Avaya Support Web site at http://www.avaya.com/support.

In general, Avaya recommends DSE integration for Modular Messaging systems only if the system contains 500 or fewer mailboxes.

AudioCodes Gateway

The AudioCodes Mediant 1000 Gateway allows the Modular Messaging system to work with switches that are not supported by the Avaya Aura®SIP Enablement Services (SES) and Avaya Session Manager, mainly those from third-party vendors. The AudioCodes Gateway supports analog/SMDI, T1 QSIG, E1 QSIG, and SIP integrations to the switch but it does not support Digital Set Emulation (DSE). The AudioCodes Gateway is supported whether MultiSite is enabled or not.

For more information on installation and configuration of AudioCodes Mediant 1000 Gateway, see the *Avaya Modular Messaging for Avaya MSS Release 5.2 Installation and Upgrades* guide, available at http://support.avaya.com. Additional documentation for AudioCodes Gateways is available at http://www.audiocodes.com/support.

Dialogic DSE SIP Gateways

Modular Messaging Release 5.1 and later supports the Dialogic DMG 1000 DSE SIP Gateway. The switch connects to the DMG 1000 Gateway using DSE. The DMG 1000 Gateway in turn uses SIP over an IP network to communicate with the Modular Messaging MASs.

Avaya recommends DSE integration with Avaya or Siemens PBXs for new Modular Messaging systems only if the system contains 500 or fewer mailboxes.

The Dialogic DSE SIP Gateway is supported whether MultiSite is enabled or not. It is also supported with Dialogic supported PBXs, which includes Avaya and non-Avaya PBXs.

Note:

The customer is responsible for installing and configuring the Dialogic DMG 1000 DSE SIP Gateway.

Analog telephony interface

With analog signaling, sound is represented by varying current rather than digital signals. Telephony signaling, such as on-hook or off-hook, is conveyed by completing and disconnecting the circuit. The MAS dials outbound calls by using DTMF tones. All other call progress states, such as dialtone, ring-back, and busy, are conveyed through standard tones.

To initiate a three-way call, Modular Messaging issues a flash-hook (also known as a switch hook flash). On receipt of the flash-hook, the switch usually gives a second dialtone, allowing Modular Messaging to place an enquiry call. The MAS can then dial another number and transfer the call (by hanging up). Depending on the switch type, the switch reconnects Modular Messaging to the caller if the inquiry call clears or fails.

Analog with DTMF call-progress signaling

Using standard tones, such as ring-back and busy, to convey call progress can be imprecise and slow. For example, when an MAS dials an outbound call and detects when the call is answered, it must go to off-hook, wait for a dialtone, and then dial the number. At this point, it detects one of the following standard tones: ring-back, busy, speech, or silence. Some time is required to detect the standard tone, particularly if detection is inferred by the absence of other tones. However, when using DTMF tones, the MAS can quickly and accurately detect call progress.

Inband DTMF integration

With inband integration, the switch sends DTMF tone strings to the MAS port when the call is first placed to the port. These DTMF tone strings are sent within the voice channel and not on a separate data channel, thus the name inband integration. MAS units are configured to recognize the format of these tone strings and interpret the information.

RS-232 serial integration

With RS-232 serial integration, a separate RS-232 serial communications interface is used to send control information between the switch and the MAS. Modular Messaging supports several RS-232 serial integration protocols to send data to the MAS. The most widely used protocol is the standard Simplified Message Desk Interface (SMDI) protocol. In other cases, the RS-232 interface is proprietary to a particular switch.

Note:

Some switches can support only a single serial interface for one hunt group. MAS units, when used in a multi-server voice mail domain, can operate with a single serial interface. This is known as remote integration.

Note:

When multiple MAS units operate with a single RS-232 serial interface, the MWI service must be configured only to use the MAS having the RS-232 physical connection.

Switch integration features

Configuration notes provide integration information for several types of switches. These configuration notes also provide information on the integration features that a particular switch integration supports.

Integration features include:

- System Forward to Personal Greeting: The switch controls the call transfer conditions when the following conditions occur:
  - All Calls: All calls are transferred directly to the voice messaging system, regardless of the status of the subscriber extension. This feature can be configured on the switch.
  - Ring/No Answer: The subscriber extension rings, but no one answers the call. The switch transfers the call to the voice messaging system after a certain number of rings. The number of rings is four by default but can be configured on the switch.
  - Busy: The subscriber extension is busy. The switch transfers the call to the voice messaging system on detecting the busy signal.
  - Busy/No Answer: Certain switches have multiple appearances of the same telephone number on a single telephone set. Each appearance of the number can function as a separate line, meaning that each appearance can carry a separate conversation. With such switches, Busy/No Answer features mean that the switch transfers the call to the voice messaging system on detecting a busy signal. The

telephone rings on the second or third line appearance, but, because the switch detected a busy signal during the first line appearance, the call is treated as busy.

- Station Forward to Personal Greeting: The subscriber controls the call transfer conditions when the following conditions occur:

  - All Calls
  - Ring/No Answer
  - Busy
  - Busy/No Answer

  These features work in a manner similar to the way the switch controls the forwarding conditions, except that these features can be configured by subscribers on their telephone sets.

- Automated Attendant: This is an optional feature provided by Modular Messaging, which allows initial call handling.

  Note:

  In a QSIG integration, if the called subscriber is not reachable, callers are once again presented with the Automated Attendant. The Automated Attendant then guides callers through the process of leaving messages for subscribers.

- Direct Call: Permits automatic login. When subscribers dial the hunt group, they need to enter only their password for mailbox access.
- External Call ID (ANI): The switches pass on the identification of external callers to the Modular Messaging system.
- Internal Call ID: The switches pass on the identification of internal callers to the Modular Messaging system.
- Calling party id display: The calling party id is displayed during a transfer, that is, when transferring from the auto attendant or when zeroing out from a mailbox.

  Note:

  This feature works for native SIP integrations using a SES, Session Manager Release 5.2 SP2 or later, QSIG AudioCodes gateway. This feature is currently not supported when using an Analog AudioCodes gateway or a Dialogic DMG1000 DSE gateway.

- MWI: The ability of the switch to support MWI, by controlling the light (on/off) and stutter dial tone on telephone sets.
- Multiple Call Forward: Multiple Call Forward or Double Call Forward supports transferring calls to two or more recipients, while providing the system greeting of the original recipient. This feature works only when all extensions have coverage to voice mail. For example, if A calls B and the call is automatically diverted to C, and if C does not answer the call, the call is transferred to the voice mail system. The integration retains the Call ID of B, the original target of the call and plays the target that B has activated. The benefit of this feature is that a call may be transferred more than once without losing the original Call

ID (as long as the call continues to forward to voice mail), and callers would still hear the greeting of the original target.

- Multiple Greetings: Enables subscribers to have multiple greetings, depending on the call condition. For example, subscribers can activate a greeting for a time when the extension is busy, and another greeting for a time when there is no response. This feature can be used only when supported by the switch. With Multiple Greetings, subscribers can configure internal calls to act differently from external calls.
- Outcalling: The ability of the switch to support outcalling features, such as Find Me, Call Me, and so on.
- Return to Operator: Enables callers to dial 0 (zero) during Call Answer to transfer the call to an operator. If the operator does not answer the call, callers hear the greeting activated for the subscriber mailbox.
- Personal Operator Zero Out: Redirects call coverage in the Modular Messaging Release 5.2 system configured for QSIG or SIP integration. When a caller transfers the call to a personal operator and the operator does not answer the call, the Modular Messaging systemwide settings determine where the original called party can deposit the message. After the call covers to the Modular Messaging system, the caller's message is deposited either in the original called party's mailbox or in the personal operator's mailbox, based on the system configuration.

  Note:

  When the personal greeting or the optional greeting is active and the caller dials zero, the system transfers the call to the personal operator’s mailbox when the greeting is being played. When EAG is active and the caller dials zero, the system does not transfer the call to the personal operator’s mailbox until EAG is being played. The system transfers the call to the personal operator’s mailbox only after EAG is played.

- Transfer to Messaging: The Communication Manager software provides a feature to transfer to messaging, known also as Transfer to AUDIX. This feature allows an associate, such as an administrative assistant who receives a call either because the assistant is the first coverage path or because the caller pressed zero from a mailbox, to transfer the caller directly to the mailbox associated with the originally dialed number. The transferring party does not have to re-enter the originally called number, nor does that telephone ring again. This is supported with Modular Messaging using a QSIG integration. For other integrations, or other Private Branch Exchanges (PBXs), Modular Messaging can use a caller application to transfer a caller directly into a mailbox.

Switch integration matrix

The following table provides information on the support the different SWINs provide to Modular Messaging features and switch features.

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Features	DSE	T1/E1 QSIG	H.323	SIP	Analog/ RS232
System Forward to Personal Greeting A subscriber's forwarding condition is determined by the PBX programming.					
• All Calls	Yes	Yes	Yes	Yes	Yes
• Ring / No Answer	Yes	Yes	Yes	Yes	Yes
• Busy	Yes	Yes	Yes	Yes	Yes
• Busy / No Answer	No	Yes	Yes	Yes	No
Station Forward to Personal Greeting Subscribers control the forwarding condition from their phones.					
• All Calls	Yes	Yes	Yes	Yes	No
• Ring / No Answer	No	Yes	Yes	Yes	No
• Busy	No	Yes	Yes	Yes	No
• Busy / No Answer	No	No	No	No	No
Automated Attendant	Yes	Yes[1]	Yes[1]	Yes[1]	Yes
Direct Call	Yes	Yes	Yes	Yes	Yes
External Call ID (ANI)	Yes	Yes	Yes	Yes	No
Internal Call ID	Yes	Yes	Yes	Yes	Yes
MWI	Yes	Yes	Yes	Yes	Yes
Multiple Call Forward	Yes	Yes	Yes	Yes	Yes
Multiple Greetings	Yes	Yes	Yes	Yes	Yes
Outcalling	Yes	Yes[2]	Yes[2]	Yes[2]	Yes
Return to Operator	Yes	Yes	Yes	Yes	Yes
Personal Operator Zero Out	No	Yes	No	Yes	No
Find Me	Yes	Yes	Yes	Yes	No
Call Me	Yes	Yes	Yes	Yes	Yes
Fax	Yes	Yes	No	Yes	Yes
Queuing	No	No	No	Yes	No
Forward to a Vector	Yes	Yes	Yes	Yes	Yes

[1] If Automated Attendant transfers an External Call to an extension, Calling Party Number is not passed until the call is answered.

[2] Outcalling to pagers might fail.

Features	DSE	T1/E1 QSIG	H.323	SIP	Analog/ RS232
Forward from a Vector to VDN	Yes	No	No	No	Yes
Transfer to Messaging[3]	No	Yes	Yes	Yes	N/A
Record to Messaging[3]	No	Yes	Yes	Yes	No
Priority Ringing	Yes	No	No	No	N/A
OAN for Modular Messaging —Microsoft Exchange	Yes	Yes	No	No	N/A
N+1 - Redundancy	Yes	Yes	Yes	Yes	N/A
TTY	Yes	Yes	No	Yes	N/A

Signaling

Signaling is required to set up, clear, and supervise telephone connections. With analog telephone lines, digital currents (DCs) perform signaling by using protocols such as E&M, loopstart, and wink start.

Digital trunks must convey signaling information in a digital format. They can use an analog protocol or a protocol developed specifically for digital networks, such as QSIG. Modular Messaging supports the QSIG protocol with T1 and E1 trunks.

Modular Messaging supports the Common Channel Signaling (CCS) digital signaling protocol.

Hunt groups

A hunt group is a pre-programmed collection of extensions that is configured on the switch. A single pilot number presents a call to one of the available ports within the hunt group. Hunt groups can be designated for specific purposes, for example, incoming only or outgoing only. The simplest hunt groups are linear (available ports are hunted in sequential order).

While planning load balancing across MAS units, consider the hunt algorithm that the telephone system uses. Since the hunt group consists of ports spread across multiple MAS units, calls should be distributed as equally as possible among all the MAS units. Hunt algorithms that distribute calls evenly across all ports are the most desirable. Avoid algorithms

[3] A switch feature.

that hunt from either the top or bottom of the hunt group because they tend to load the MAS units unevenly.

If the telephone system does not offer a desirable algorithm, one alternative is to set up the hunt group so that ports alternate between MAS units.

The hunt group can also be configured to provide even distribution of traffic to cards within servers.

Tip:

Customers that use the Find Me feature extensively can consider excluding Find Me ports from the hunt group.

A canonical hunt group number is used by the Automated Attendant to determine which site-specific data should be used when handling an incoming call. The hunt group number is required if multiple sites are configured to use the same PBX. It is also required for the Zero-out feature on the MultiSite systems when a call is placed directly to the Auto Attendant. The hunt group is also used as the "from" extension when making a call out of the system. It only applies to the calls that are not part of a transfer, such as features like Find Me or Auto Attendant transfers.

Types of hunt groups

Some common types of hunt groups are:

- Linear call distribution

  Calls start at the first port. When the first port is busy with the first call, the next call goes to the second port. If the first port becomes free, the next call goes to the first port, and so on.

- Uniform call distribution (UCD)

  Calls start at the first port. Subsequent calls go sequentially to the second, third, and fourth ports, and so on, regardless of whether earlier ports become available. The first port does not receive another call until all ports have taken a call.

- Automatic call distribution (ACD)

  Calls go to the port that has been idle the longest. For example, if the first port has been idle for 30 seconds, the second for 50 seconds, and the third for 40 seconds, the first call goes to the second port.

  Avaya recommends ACD only with DSE integration using legacy Nortel switches and when support for more than 18 ports is required. Avaya does not recommend ACD with any other integration.

- Circular call distribution

In circular call distribution, the switch has the ability to remember the last busy port. When a call comes in, it goes to the last busy port. Subsequent calls go to the first port in the group and then sequentially go to the second, third, and fourth ports, and so on.

Chapter 9: Support for message and call notification

Message notification

Message notification mechanisms provided by Modular Messaging include:

- Message Waiting Indicator (MWI)
- Call Me
- Notify Me - Automatic

The total notification capacity for a Modular Messaging system is affected by the usage of each message notification mechanism.

Message notification capacities

Each subscriber can be enabled with up to three notification mechanisms: MWI, Call Me, and Notify Me. The total combination of enabled notification mechanisms (MWI, Call Me, and Notify Me) must be less than the message notification capacity for the system. If a single subscriber is enabled with all three notification mechanisms, then it counts as three against the total system capacity. Subscribers who are not enabled with MWI, Call Me, or Notify Me can rely on the notification mechanisms provided by the GUI clients.

In Modular Messaging single server configuration, the maximum number of subscribers is 2,500 and the message notification capacity is 2,500.

In all new multi-server installations of Modular Messaging—MSS, the maximum number of subscribers is 40,000 and the message notification capacity is 40,000. All new installations will be installed on an S8800 or a HP DL360 G7 server.

For MSS systems upgraded to Modular Messaging Release 5.2, the MSS can either be a high-availability configuration (MSS—H) or a standard-availability configuration (MSS—S). For MSS—H, the maximum number of subscribers is 40,000 and the message notification capacity is 40,000. For MSS—S, the maximum number of subscribers is 5,000 and the message notification capacity is 5,000.

Modular Messaging—Exchange and Modular Messaging—Domino support up to a maximum of 100,000 subscribers in a voice mail domain. With Modular Messaging—Exchange, the

message notification capacity is 12,000 and with Modular Messaging—Domino the message notification capacity is 4,000.

Subscribers can be notification-enabled through system administration. In Modular Messaging—MSS, administrators can use a COS attribute to disallow notification for subscribers that should not receive notification. In Modular Messaging—Exchange and Modular Messaging—Domino, administrators disallow notification for subscribers by means of an Advanced Properties setting in Subscriber Administration.

Message Waiting Indicator

MWI is a method of alerting subscribers when messages that meet specified criteria arrive in their mailboxes. Subscribers are alerted by either a lamp indicator on the telephone or an audible tone (stutter dialtone) when they pick up the receiver. The indicator is cleared when a subscriber accesses the message and the message moves out of the New message category. Subscribers can set up rules for using MWI in Subscriber Options or Web Subscriber Options. For example, they can choose to be notified only when they receive urgent voice messages.

With Modular Messaging—MSS, broadcast messages do not activate MWI.

An MWI Service provides message waiting indication for the voice mail domain (VMD). The MWI Service communicates with the MAS and the Mailbox Monitor service. The Mailbox Monitoring Service receives notifications from the message store when message count changes for the subscriber's mailbox. The MWI Service then determines when the indicator on the telephone of a subscriber needs to be turned on or off.

Note:

The Call Me Service and MWI Service must be installed on the same MAS and must be set up to share the same Mailbox Monitoring Service.

Using Q.Signaling (QSIG) and Session Initiation Protocol (SIP) SWINs, the switch can query the MAS about the MWI status of specific extensions. When using H.323, DSE, and Analog SWINs, the switch cannot query the MAS about the MWI status of specific extensions. If the MAS is available, the individual MWI status of the requested extensions is sent across to the switch.

AudioCodes Gateways and Dialogic DSE SIP Gateways do not support MWI interrogate.

MWI rules

In Subscriber Options, subscribers set up rules for using MWI on the Assistant page. MWI rules are created by selecting values in the following rule description:

“If [message type] messages, with [importance], have arrived, set my message waiting indicator.”

An example rule might be:

“If [voice] messages, with [high importance], have arrived, set my message waiting indicator.”

For more information on setting rules for using MWI in Subscriber Options, see *Avaya Modular Messaging Subscriber Options*.

Subscribers can also create rules for using MWI on the MWI page in Web Subscriber Options. MWI rules are created by selecting values in the following rule description:

“If [any new message] with [any importance] have arrived, set my message waiting indicator.”

For more information on setting rules for using MWI in Web Subscriber Options, see the online Help system provided with the Web Subscriber Options application.

Subscribers who use the Avaya IP Softphone application to access Modular Messaging messages can use the Picture of Phone tab to view MWI.

Note:

If no MWI rule exists, the administrator can still allow the MWI service and the subscriber can enable it. In this case, the MWI service assumes a default rule (New voice messages only) until a rule is created or MWI is disabled for that subscriber.

MWI in offline mode

New messages, including Call Answer messages, will not activate MWI if those messages are received when either the message store or the MAS on which the MWI Service resides is not accessible. These messages activate MWI only when both are operational again.

MWI configuration

Administrators can use the VMSC application on the MAS to enable MWI at the system level. Subscriber can specify the Messaging Application Server (MAS) on which the Message Waiting Indicator Server service is installed, and list any MASs that support MWI. In Modular Messaging—MSS, once MWI is enabled for the system, administrators can edit the MWI COS parameter on the MSS, to control the number of subscribers enabled for MWI. In Modular Messaging—Exchange, administrators enable MWI for subscribers by means of an Advanced Properties setting.

MWI enabled subscribers can set up rules for MWI from Subscriber Options or Web Subscriber Options. The rules can be enabled or disabled in Subscriber Options or Web Subscriber Options.

Refresh operation of MWI

Modular Messaging provides system administrators with the ability to either request an on-demand MWI refresh or to set a scheduled refresh for a mailbox or a range of mailboxes. The system administrator can configure MWI refreshes using VMSC. For more information on MWI updates, see the *MAS Administration Guide*.

While scheduling refreshes, the administrator can specify the following information regarding the refresh:

- Time of day when the refresh operation must be performed
- Days of the week when the refresh operation must be performed
- Whether to base the refresh on the last known status for the MWI indication status (cached) or to query the mailbox for the current message count (evaluated)

Administrators can also request an on-demand MWI update specifying the following parameters for the refresh:

- All mailboxes, a single mailbox or a range of mailboxes
- Whether to base the refresh on the last known status for the MWI indication status (cached) or to query the mailbox for the current message count (evaluated)
- Priority of the refresh operation

These requests for MWI refresh will cause MWI status updates to be sent from Modular Messaging to the switch. When a range of mailboxes is specified, Modular Messaging will send across the MWI on/off status for the individual mailboxes to the switch.

A cached refresh is faster than an Evaluated refresh as mailbox access is not required however an Evaluated refresh could be more accurate because the most up to date message count is obtained at the time the refresh occurs.

Scheduled refreshes or large on-demand updates could impact the performance of the Modular Massaging system. If there are no known issues, customers should use the on-demand MWI update. Necessary updates must be done at non-peak hours, not at midnight, when the MSS backup is done, and not during the hours when Tracing Server Service jobs are scheduled to run.

Modular Messaging also provides customers with the ability to manually reset MWI by restarting the MWI service however restarting the MWI service significantly impacts the performance of the Modular Messaging system and the switch. Customers must use this capability only when absolutely necessary, such as after a PBX reboot.

MWI Request Prioritization

Features such as MWI Refresh, Audits and Updates increase the workload on the MWI server. To avoid delays in receiving notification of a new message during busy workloads, each MWI activity request is prioritized in a queue based on the request type.

Following table lists the MWI request types and their priorities.

Priority	Request type	Description
1	First Chance	Lamp requests that are a direct correlation to mailbox activity such as a new message being left or a message being read but specifically for the first new message and the last unread message respectively.
2	Redundant	MWI caches the last state change in a local database and when a Mailbox Activity request occurs, the database is checked for the last known state. If the request and the last known state match (for example, a request to turn the lamp on for a new message but the last known state is that the lamp is already on) then the request is redundant and given a lower priority of 2.
3	Start-up	When the MWI service is started, an evaluation of all mailboxes is performed and a MWI notification made regardless of database state. On large systems it can take a while to process all these requests so the priority is lowered to allow real-time Mailbox Activity requests to take precedence in the queue.
3	High priority On-Demand Refresh	System administrators can request an On-Demand MWI Refresh for a mailbox or a range of mailboxes. The system administrator can schedule MWI refreshes in the VMSC. On-Demand Refreshes are prioritized above a Scheduled Refresh. For more information, see Refresh operation of MWI on page 190.
4	Medium priority On-Demand Refresh	
5	Low priority On-Demand Refresh	
6	Retry	If a request cannot be processed when it reaches the top of the queue, the request is marked as a retry with a lower priority. Thus avoiding a request clogging up the system by attempting an activity that will never succeed. There is a maximum retry limit on request types.
7	Scheduled Refresh	System administrators can set Scheduled Refresh for a mailbox or a range of mailboxes. A Scheduled Refresh is typically large and is considered to be the lowest priority of all request types.

Within the priorities, the requests are queued based upon age. For Retry operation, a minimum retry interval is also set; thus preventing that request being processed before that timer has expired. This allows for temporary failures to clear before the retry is attempted.

The queue is optimized to remove conflicting requests. For example, if a request to turn the lamp on is received when there is already a request to turn the lamp off in the queue, both requests are purged from the queue. However, if a request is received to turn the lamp on due to First Chance Mailbox Activity whilst there is also another “on” request in the queue relating to the Start-up of the MWI service, the Start-Up request will be removed from the queue in favour of the higher priority First-Chance request.

Call Me

With Call Me enabled, Modular Messaging calls subscribers at a designated telephone number or telephone list when subscribers receive a message that meets specified criteria. The criteria for requesting Call Me are set by subscribers through rules. For example, subscribers can choose to be informed of all urgent messages that arrive in their mailboxes during the morning commute.

Subscribers can designate a list of telephone numbers for Call Me. If there is no answer at the first number in the list, a call is directed to the next number in the list and so on, until the subscriber answers. When answering a Call Me call, the subscriber logs in to Modular Messaging and reviews the message or messages.

The Call Me Server includes a Call Me service and a Mailbox Monitoring service for monitoring subscriber mailboxes. The Mailbox Monitoring service periodically checks subscriber mailboxes for new messages that meet the criteria set for Call Me. Administrators can set a system-wide minimum polling interval for the Mailbox Monitoring service checks. Subscribers can also configure the polling interval for their mailboxes. However, they can configure the polling interval only to a value greater than or equal to the system-wide minimum. For example, if the system-wide minimum is set to 3, subscribers can set the polling interval for their mailboxes only to a value greater than 3. If a new message arrives between polling intervals, it will only be detected on the next check.

If required, a subscriber can configure Call Me multiple times with different criteria. For example, subscribers can configure to be notified of all messages on Fridays, when they typical work away from the office, in addition to being informed during their daily commute.

When the Mailbox Monitoring service detects a message that meets subscriber-specified criteria, the Call Me Server dials the numbers in the telephone list of the subscriber.

Each number in the list can be configured to be called once or multiple times. If configured to be called once, when the call to that number has been answered the number will not be called

again regardless of whether any acknowledgement to the call is received, or not. For example, if a specified cell phone number is called:

- If the call is not answered, the number can be called once again.
- If the call is answered but the subscriber disconnects, the number cannot be called again.
- If the call is diverted to the voice mail feature of the cell phone, the number cannot be called again as the diversion is counted as answering the call.

If the call remains unanswered after all numbers in the list have been tried, a retry interval comes in to effect before the list is traversed again. Subscribers can set the retry interval to a value equal to or greater than the system-wide minimum. The call-once number will not be called again until the subscriber logs on. When that number has been answered, subscriber must log on before that number can be called again.

During the retry interval, the polling for new messages applicable to this specific criterion is also suspended. A new message received during the retry interval will not trigger an outcall because the subscriber has requested not to be called more frequently than their configured retry interval.

Modular Messaging stops the Call Me calls when subscribers log in to their mailboxes or when subscribers opt to stop the notification when they attend the Call Me call. After the subscriber logs in to the mailbox or opts to stop the Call Me calls, only the next message that meets the specified criteria will trigger Call Me again.

The Call Me call allows recipients to identify a call as a 'nuisance call', if their number is being called by mistake. If the recipient opts to stop notification in this manner, the corresponding criterion is disabled to prevent further unwanted calls.

Outcalls including retries are suspended when the schedule is not active. If a retry was active when the schedule finished for the day, the retry will continue when the schedule becomes active again; unless the subscriber has logged on in the mean time.

Note:

Modular Messaging—Avaya Message Storage Server (MSS) subscribers cannot activate Call Me for corporate e-mail messages that are received in a separate mailbox on the corporate e-mail server.

For all Modular Messaging message stores, a broadcast message will normally activate Call Me. Call Me rules within Subscriber Options and Web Subscriber Options can be defined to exclude broadcast messages from the set of message types that trigger an outcall.

The Call Me Service and MWI Service must be installed on the same Messaging Application Server (MAS) and must be set up to share the same Mailbox Monitoring service.

Security alert:

The Call Me feature can be misused to commit toll fraud. When a message triggers Call Me, the MAS generates an outgoing call to a list of telephone numbers that subscribers provide, thus making the system vulnerable to toll fraud. In Modular Messaging—MSS, the Call Me

feature is enabled at the class of service (COS) level by means of a COS setting. In Modular Messaging—Exchange and Modular Messaging—Domino, the Call Me feature is enabled by means of a subscriber mailbox setting. Avaya recommends administrators to enable Call Me for only those subscribers who truly require this method of notification. Administrators can take additional security measures such as assigning a restrictive Private Branch Exchange (PBX) COS to the PBX ports used to make the outcall, or requiring account codes or authorization codes. When the MultiSite feature is enabled, further control is possible within the Modular Messaging system by using the Cost parameter of the outgoing translations rules. For more information on toll fraud, see *Modular Messaging and Security* on the *Avaya Modular Messaging Documentation Library*.

Call Me configuration

Administrators use the Voice Mail System Configuration (VMSC) application on the MAS to enable Call Me at the system level. In Modular Messaging—MSS, once Call Me is enabled for the system, administrators can edit the Call Me COS parameter on the MSS to control the number of subscribers enabled for Call Me.

Subscribers can enable or disable the Call Me feature by using Subscriber Options or Web Subscriber Options or from the Modular Messaging TUIs.

Call Me enabled subscribers can set up rules for Call Me on the Assistant page in Subscriber Options or on the Call Me page in Web Subscriber Options. The rules can be enabled or disabled by using Subscriber Options and Web Subscriber Options.

For more information on creating Call Me rules by using Web Subscriber Options, see the online Help system provided with the Web Subscriber Options application.

Call Me rules

In Subscriber Options, a Call Me rule is created by selecting values in the following rule description:

“When [schedule] is active, if [message type] with [importance], from [sender] have arrived, call telephone numbers in [phone list] within [minutes] and then every [interval].”

An example rule might be:

“When [commute time] is active, if [new voice messages] with [high importance], from [John Smith] have arrived, call telephone numbers in [my personal list] within [15 minutes] and then every [20 minutes].”

For more information on creating Call Me rules using Subscriber Options, see *Avaya Modular Messaging Subscriber Options*.

Call Me calls

When answering a Call Me call, subscribers are presented with a common Call Me interface. This interface provides options for receiving the call, blocking the call, and logging in to their mailboxes. The options of the Call Me interface are the same for all subscribers, regardless of the telephone user interfaces (TUI) assigned to them.

When Modular Messaging makes a Call Me outcall, it plays the A, B, C, and D tones as part of the outcalling announcement. If Modular Messaging answers a call and detects any (or all) of the A, B, C or D tones, it will assume that the call has been automatically generated and will disconnect. This prevents the outcall covering back to a Modular Messaging system. Some other voice mail systems may also disconnect the call on hearing these tones preventing the prompts being left as a message in that system.

Call Me in offline mode

Outgoing calls from the Call Me feature are not made while either the message store or the MAS on which the Call Me server resides is not accessible. These calls may be made when both are operational again.

Notify Me - Automatic

Modular Messaging includes two forms of Notify Me:

- Notify Me - Automatic provides enhanced notification of new messages that meet the rules defined by the subscriber. The notification for Call Answer messages is in addition to that provided by the Call Me feature.
- Caller-requested Notify Me provides notification of missed incoming calls if requested by the caller, even when the caller chooses not to leave a message. See Caller-requested Notify Me on page 198.

When a subscriber mailbox receives a new message that matches subscriber-defined rules, Modular Messaging sends a text message to the e-mail address or places a call to the numeric pager specified by the subscriber for notification. If the notification is a text message to an e-mail address, the notification may result in a page or short message service (SMS) message due to capabilities provided by the pager or the SMS system.

The From field of a Notify Me notification e-mail contains the e-mail address of the Modular Messaging subscriber. The e-mail address depends on the message store:

- With Modular Messaging—MSS, this e-mail address has the form *firstname.lastname@msshost.company.com*, where *msshost.company.com* is the Domain Name Server (DNS) name of the MSS and can be replaced with an e-mail host

alias name. This notification e-mail is sent from the MSS server to either a single specified e-mail gateway or using MX routing, provided by the customer's DNS infrastructure.

- With Modular Messaging—Exchange and Modular Messaging—Domino, this e-mail address is the subscriber's corporate e-mail address. Typically, this address is of the form *firstname.lastname@company.com*.

For more information, see Primary mailbox address on page 147.

Notify Me capabilities

Notify Me - Automatic includes the following capabilities:

- Rule-based selection of which messages trigger notification

  Notification can be triggered by e-mail messages, voice messages, fax messages, and call-answered voice messages. By setting the subscriber-defined rules, the subscriber can choose whether to receive notification only during scheduled times, only of certain message types, or only when the messages were sent by particular senders.

- Enabling or disabling from the desktop computer or Modular MessagingTUI

  Once Notify Me is configured, subscribers may enable or disable Notify Me from Subscriber Options, Web Subscriber Options, or from any Modular Messaging TUI (Aria, AUDIX or Serenade).

- E-mail gateway support

  Modular Messaging can send notification messages to e-mail gateways, including third-party SMS gateways and pager gateways.

- Internet support

  Notification messages can be sent to any Internet e-mail address configured in the notification address field.

- Notify Me support for pagers

  The Notify Me feature supports notification messages to pagers that have an e-mail address. The feature also supports notification as calls to numeric pagers.

Notify Me in offline mode

When the mail server is offline, messages are held in queue and cannot arrive in the mailbox. When the mail server is back online, held messages will be delivered into the mailbox and a notification will be sent for any new message that matches an automatic notification rule. If a message was sent during a scheduled notification time, but its arrival was delayed until a non-scheduled notification time because the mail server was offline, notification would not be sent for that message.

Configuring Notify Me - Automatic

The Notify Me-Automatic feature for Modular Messaging is facilitated by the Call Me feature. Call Me service must be enabled and running for notifications to occur. See Call Me on page 192.

In Modular Messaging—MSS, administrators can use the Notify Me COS parameter on the MSS to enable the Notify Me feature at the COS level. In Modular Messaging—Exchange and Modular Messaging—Domino, administrators can enable the Notify Me feature by means of an Advanced Properties setting.

Notify Me–enabled subscribers can set up rules for Notify Me - Automatic on the Assistant page in Subscriber Options or on the Notify Me page in Web Subscriber Options. Subscribers can create Notify Me rules by selecting values in rule descriptions for automatic call notification. Subscribers cannot create Notify Me rules using a Modular Messaging TUI.

Subscribers can enable or disable the Notify Me feature by using Subscriber Options or Web Subscriber Options. If notification rules have been defined, subscribers may also enable or disable the Notify Me feature using any Modular Messaging TUI.

Creating Notify Me - Automatic rules

In Subscriber Options, subscribers set up automatic notification rules for e-mail notifications by selecting values in the following rule description.

“When schedule [*schedule*] is active, if [*message type*] with [*importance*], from [*sender*] have arrived then send [*an email*] to [*e-mail address*] with this [*message*] and [*subject*].”

Further, “[*message*]” has the following format:

“A [*Priority*] priority [*Type*] message was left from [*Sender*] at [*Time*] on [*Date*].”

An example rule might be:

“When schedule *always* is active, if *any new messages* with *any importance*, from *anyone* have arrived then send *an email* to *anon@avaya.com* with this *message* and *subject*.”

Similarly, for setting automatic notification rules for numeric pager notifications subscribers can select values in the following rule description:

“When schedule [*schedule*] is active, if [*message type*] with [*importance*], from [*sender*] have arrived then send [a *numeric page*] to [*this pager number*] with this [*message*].”

Subscribers can enable multiple automatic notification rules. If more than one notification rule is active and a message arrives in the mailbox that matches two or more rules, two or more notifications may be generated. For example, if a subscriber creates one rule that generates e-mail notification each time a call answer message is received, and another rule that generates e-mail notification each time a voice message is received, two e-mail notifications are generated.

For more information on creating rules for Notify Me - Automatic in Subscriber Options, see *Avaya Modular Messaging Subscriber Options*.

Note:

For Modular Messaging Release 3.1 (or later) and Subscriber Options 3.1 (or later), there are some differences in the automatic notification rules. For example, the Size token is no longer available to be included in a notification message, Notify Me configurations from the previous release need to be reset, and the default message types have changed. See the online Help system provided with Subscriber Options for more information.

Specification of rules using Web Subscriber Options is similar to the specification using Subscriber Options described above. For information on creating rules for Notify Me - Automatic in Web Subscriber Options, see the online Help system provided with the Web Subscriber Options application.

Call notification

Call notification includes the following features:

- Caller-requested Notify Me
- Find Me
- Intercom paging
- Call screening from the Automated Attendant
- One-number connectivity
- Multiple notifications

Caller-requested Notify Me

Modular Messaging includes two forms of Notify Me:

- Caller-requested Notify Me, described here, provides notification of missed incoming calls if requested by the caller, even when the caller chooses not to leave a message.
- Notify Me - Automatic on page 195, provides enhanced notification of new messages that meet the rules defined by the subscriber. The notification for Call Answer messages is in addition to that provided by the Call Me feature.

Note:

Subscribers can enable either Notify Me - Automatic or Caller-requested Notify Me, while the administrator can allow or disallow both forms of Notify Me.

With Caller-requested Notify Me, subscribers can enable a service that prompts callers to request that the subscriber is notified of their calls. The caller does not have to leave a message

for this notification to happen. When caller-requested notification is enabled, callers hear the following prompt:

“To have <name of subscriber> notified, press `[9]` now”

When a caller requests that the subscriber be notified of a missed call, Modular Messaging sends a text message to the e-mail address specified by the subscriber for notification. This may result in a page or SMS message due to capabilities provided by the pager or the SMS system. The notification message can contain the telephone number of the caller as well as additional information.

Once enabled, Caller-requested Notify Me sends a notification of the call even if the Notify Me - Automatic feature is disabled or if the caller does not leave a message. The caller-requested notification cannot be restricted to particular callers or limited by a schedule.

A caller-requested notification message also may be sent to the inbox of a subscriber. This notification message can be used in the following ways:

- Third-party notification applications can monitor the inbox of a subscriber and send a notification message when a notification message is detected. For example, Microsoft Outlook provides a way of editing Exchange server rules that execute even when Microsoft Outlook is not in use or connected to the Exchange server. Such rules can be made to forward an incoming message or send a notification to a specified e-mail address, such as a gateway to an SMS network (applicable only to Modular Messaging—Exchange).
- Subscribers can access their inboxes from a desktop computer or telephone and review their notification messages.
- Subscribers can keep a record of Notify Me requests that may include caller information, such as the telephone number of the caller and the time the call arrived.

For information on the capabilities of Notify Me, see Notify Me capabilities on page 196.

Configuring Caller-requested Notify Me

In Modular Messaging—MSS, administrators can use the Notify Me COS parameter on the MSS to enable the Notify Me feature at the COS level. In Modular Messaging—Exchange and Modular Messaging—Domino, administrators can enable the Notify Me feature by means of an Advanced Properties setting.

Modular Messaging subscribers can configure Caller-requested Notify Me using a desktop personal computer running Subscriber Options, or from a computer on the network with access to Web Subscriber Options. After Caller-requested Notify Me is configured, subscribers may enable or disable Caller-requested Notify Me from Subscriber Options, Web Subscriber Options, or from any Modular Messaging TUI (Aria, AUDIX or Serenade).

To control the destination and content of the notification message, subscribers can enable or disable the Caller-requested notification rules in Subscriber Options or Web Subscriber Options.

The caller-requested notification cannot be restricted to particular callers or limited by a schedule.

Creating Caller-requested Notify Me rules

Notify Me–enabled subscribers can create or modify rules for Caller-requested Notify Me on the Assistant page in Subscriber Options or on the Notify Me page in Web Subscriber Options. Subscribers can create Notify Me rules by selecting values in rule descriptions for Caller-requested call notification.

In Subscriber Options, subscribers set up Caller-requested notification rules by selecting values in the following rule description.

“When anyone calls and requests I am notified, send a notification message with this [message body] and with this [subject] to [e-mail address] and [don’t save a copy] in my Inbox.”

An example rule might be:

“When anyone calls and requests I am notified, send a notification message with this [*caller’s name*] and with this [*notification message*] to [*anon@avaya.com*] and [*don’t save a copy*] in my Inbox.”

For more information on creating Caller-requested notification rules in Subscriber Options, see *Avaya Modular Messaging Subscriber Options*. For more information on creating rules for Caller-requested Notify Me in Web Subscriber Options, see the online Help system provided with the Web Subscriber Options application.

Find Me

Find Me is a feature that redirects unanswered calls to a list of telephone numbers specified by the subscriber. With Find Me, subscribers can set up schedules (times for rules) with an associated list of telephone numbers for forwarding unanswered calls. Find Me is implemented only for calls that are not answered because the extension rings, and there is no answer, and not for calls that are not answered because the extension is busy.

When unanswered calls are directed to Modular Messaging, the system checks to see if Find Me is enabled, and, if so, whether the call has arrived within an active schedule. If the call has arrived within an active schedule, Modular Messaging asks callers if they want to leave a message or have the system try to locate the subscriber; in this case, the system prompts callers to record their name and then plays the Please Hold prompt.

Depending on the type of integration used, callers will hear a tone or music or silence when on hold. For example, in the QSIG and SIP integration, callers hear the music on hold music when on hold. In the meantime, the system dials the first Find Me number in the telephone list associated with the schedule. This process is known as making an enquiry call. If the call is answered, Modular Messaging responds with the name of the calling party and provides the recipient with an opportunity to accept or reject the call. If the recipient answers the call, the

system completes the transfer. If the call is unanswered, Modular Messaging calls the next number in the Find Me list. If it reaches the end of the list and all the calls are either unanswered or rejected, Modular Messaging allows the caller to leave a message.

When Modular Messaging makes a Find Me outcall, it plays the A, B, C, and D tones as part of the outcalling announcement. These tones represent, dial with full call progress, listen for busy, invalid number, and no answer or connect.

Note:

Find Me is not supported for analog integrations.

Depending on the integration type, Find Me uses one or two ports:

- On systems that use DSE integrations, Find Me uses only one port. The same port that handles the incoming call is also used to complete the transfer.
- On systems that use QSIG, SIP, and H.323 integration, Find Me uses two ports.

  One port is used for the incoming call and the other port is used to dial the called subscriber and to attempt transfer. The two ports used by Find Me must be in the same port group. The ports are used for the duration of the transfer attempt. If the transfer is unsuccessful, the second port acquired for the enquiry call is dropped. If the transfer attempt is successful, then the transfer will be completed and path replacement will ensure that both ports are dropped.

Certain switch configurations cause path replacement to fail; both ports on the MAS stay busy for the duration of the successfully transferred call. To avoid such switch-specific failure scenarios, make sure that the switch configuration is implemented as described in the relevant configuration note. Configuration notes are available from a Modular Messaging support representative or from the Avaya Support Center at http://www.avaya.com/support.

Security alert:

The Find Me feature can be misused to commit toll fraud. When a call triggers Find Me, the MAS generates an outgoing call to a list of telephone numbers that subscribers provide, thus making the system vulnerable to toll fraud. In Modular Messaging—MSS, the Find Me feature is enabled at the class of service (COS) level by means of a COS setting. In Modular Messaging—Exchange and Modular Messaging—Domino, the Find Me feature is enabled by means of a subscriber mailbox setting. Avaya recommends administrators to enable Find Me for only those subscribers who truly require this method of notification. Administrators can also take additional security measures such as assigning a restrictive PBX COS to the PBX ports used to make the outcall, or requiring account codes or authorization codes. When the MultiSite feature is enabled, further control is possible within the Modular Messaging system by using the Cost parameter of the outgoing translations rules. For more information on toll fraud, see *Modular Messaging and Security* on the *Avaya Modular Messaging Documentation Library*.

Configuring Find Me

In Modular Messaging—MSS, administrators use the Find Me COS parameter to determine which subscribers are enabled for Find Me. Subscribers can enable or disable the Find Me feature in Subscriber Options or Web Subscriber Options or from the Modular Messaging TUIs.

Find Me–enabled subscribers set up rules for Find Me on the Assistant page in Subscriber Options or on the Find Me page in Web Subscriber Options.

For more information on creating rules for using Find Me in Web Subscriber Options, see the online Help system provided with the Web Subscriber Options application.

Subscribers can enable or disable the Find Me rules in Subscriber Options or Web Subscriber Options.

Creating Find Me rules

In Subscriber Options, a Find Me rule is created by selecting values in the following rule description:

“When anyone phones me when schedule [*schedule name*] is active call phone numbers in [*phone list*].”

An example rule might be:

“When anyone phones me when schedule [*weekend schedule*] is active call phone numbers in [*personal list*].”

For more information on setting rules for using Find Me in Subscriber Options, see *Avaya Modular Messaging Subscriber Options*.

Using Find Me in offline mode

Find Me information (such as Find Me rules, schedules, and telephone lists) uses the message store to keep the master copy and is cached on each MAS.

When a call comes in that requires Find Me, the MAS checks to see if the cache is up to date. If not, the MAS reads the updated information from the message store, updates the cache, and then applies the rule.

When a subscriber changes a Find Me rule, the cache on an MAS is not updated until the MAS handles a call for the subscriber. If the message store cannot be accessed when that call arrives, the MAS cannot reach the message store and cannot check to see if it has the most recent Find Me information. In this case, the MAS will use the last available information that is cached on the MAS to control Find Me.

Intercom Paging

Subscribers can set Modular Messaging to contact them through Intercom Paging when they are not at their desks. Once subscribers are paged, they must return to their extensions to pick up the call. If subscribers do not respond to the page, the system transfers the callers to the subscriber's mailbox. As is the case with Find Me, Intercom Paging increases the probability of establishing a live connection on the first attempt.

Where Find Me is typically used when a subscriber is out of the office, Intercom Paging is used when the subscriber is in the office but is not available to answer a call.

Modular Messaging supports station-level paging. For Modular Messaging to be able to support trunk-level paging, customers must provide additional hardware between Modular Messaging, the switch, and the paging system.

Configuring Intercom Paging

Administrators can use the VMSC application on the MAS to enable Intercom Paging at the system level. In Modular Messaging—MSS, once Intercom Paging is enabled for the system, administrators can edit the page through PBX COS parameters to control the number of subscribers enabled for Intercom Paging. Administrators can use the Web-based administration pages of the MSS to edit subscribers and to configure Intercom Paging (On, Off, Manual, or Automatic). In Modular Messaging—Exchange and Modular Messaging—Domino, once Intercom Paging is enabled for the system, administrators can enable or disable Intercom Paging by means of an Advanced Properties setting.

Intercom Paging–enabled subscribers configure Intercom Paging options (On, Off, Manual, or Automatic) from the Modular Messaging Aria TUI or from Web Subscriber Options or from Subscriber Options.

Call screening from the Automated Attendant

Subscribers can configure their mailboxes to support call screening from the Automated Attendant. Call screening is a Modular Messaging call answering option that requires callers to announce themselves before subscribers answer their calls. Subscribers can then decide whether to take the call. Call screening screens only those calls that come through the Automated Attendant and is not applicable to direct inward dialing (DID) calls.

If subscribers have chosen to screen calls but are not available to answer screened calls, callers have the choice of leaving a message, being diverted to a different extension, or transferring to the operator.

Note:

Screening calls from the Automated Attendant has no relation to the Find Me call screening capability.

Configuring call screening

In Modular Messaging—MSS, administrators can use the Call screening COS parameter to determine which subscribers are enabled for call screening. In Modular Messaging—Exchange and Modular Messaging—Domino, administrators can enable the Call screening feature by means of a Advanced Properties setting.

Subscribers can enable or disable call screening from the Modular Messaging Aria TUI, from Web Subscriber Options, and from Subscriber Options.

For Call screening from the Automated Attendant to be available, the Automated Attendant must be enabled at the system level. Administrators can use the VMSC application on the MAS to enable the Automated Attendant. For more information, see the *Modular Messaging, Messaging Application Server administration guides*, available on the *Avaya Modular Messaging Documentation Library*.

One-number connectivity

Modular Messaging enables subscribers to combine notification features.

By combining features, subscribers can offer their callers a single number where they can be reached for all purposes.

Multimedia messaging allows subscribers to have a single number for voice and fax calls. Find Me allows callers to the business line to still reach the subscribers on their cell phones, remote or virtual office from that single number.

When subscribers offer their callers the option of Caller-initiated Notify Me, callers can trigger a notification during the same session as their Call Answer session, and they do not need to go through a second step of locating additional contact information and issuing a notification request.

Multiple notifications

A subscriber receives multiple notifications if a caller requests a notification and leaves a message. This is because Modular Messaging notification mechanisms are independent of each other. For example, consider that a subscriber has provided a cell number where the subscriber can be reached at when Find Me is activated. When a caller calls this subscriber and this subscriber is away, the cell phone rings. If the subscriber chooses not to answer, the caller is given the option to leave a message and page a notification. Once the caller

disconnects, the MWI on the desktop set is lit, and the subscriber receives two notification messages—one for the Call Answer message and one for the Caller-requested message to the pager. Call Me makes an outcall to the cell phone number based on the arrival of the new urgent message. While the subscriber is away, the subscriber's e-mail client indicates that a new message has arrived.

Chapter 10: Designing voice mail domains

General rules for voice mail domains

Some general rules that apply to voice mail domains (VMDs) of Modular Messaging—MSS, Modular Messaging—Exchange, and Modular Messaging—Domino systems are as follows:

Messaging Application Server (MAS)

- Each MAS can belong to only one VMD.
- A VMD can contain multiple MAS units.
- Distributed MAS servers are not supported. All MASs units must co-reside with the message store.

Subscriber

- Each voice mail subscriber can belong to only one VMD.

Data Collection Tool (DCT)

- Only a single DCT file that contains information for all the MAS units in the VMD should be used for all MAS installations.

MultiSite

- All MAS units in the VMD must be Modular Messaging Release 5.0 or later.
- All MASs in the VMD must integrate using SIP.

Fax Sender Service

- Although Fax Sender Service is installed on each MAS in the VMD, there can be only one enabled instance of Fax Sender Service in the VMD.
- A Fax Sender Service can provide services to only one VMD.

Tracing Service

- Although Tracing Service is installed on each MAS in the VMD, there can be only one enabled instance of Tracing Service in the VMD.
- A Tracing Service can provide services to only one VMD.

Message Waiting Indicator (MWI) Service

- Although MWI Service is installed on each MAS in the VMD, there can be only one enabled instance of MWI Service in the VMD.
- An MWI Service can provide services to only one VMD.
- An MWI Service uses the Mailbox Monitor Service from the same VMD.
- An MWI Service must be configured along with Call Me Service and Mailbox Monitor Service on the same server.

Call Me Service

- Although Call Me Service is installed on each MAS in the VMD, there can be only one enabled instance of Call Me Service in the VMD.
- A Call Me Service can provide services to only one VMD.
- A Call Me Service uses the Mailbox Monitor Service from the same VMD.
- A Call Me Service must be configured along with MWI Service and Mailbox Monitor Service on the same server.

Mailbox Monitor Service

- Although Mailbox Monitor Service is installed on each MAS in the VMD, there can be only one enabled instance of Mailbox Monitor Service in the VMD.
- A Mailbox Monitor can provide services to only the MWI Service and Call Me Service that belong to its own VMD.
- Mailbox Monitor Service must be configured along with Call Me Service and MWI Service on the same server.

Offline Call Answer Store

- A VMD can contain only one Offline Call Answer Store.
- An Offline Call Answer Store can provide services to only one VMD.
- An Offline Call Answer Store can reside on an MAS. However, for larger systems, Avaya recommends installing the Offline Call Answer Store on a Supplementary Server. For more information, see Messaging application server load balancing on page 266.

Multiple switches in a non-MultiSite environment

- A VMD can provide services to multiple switches provided that all the switches share a common dial plan.
- The MWI Service connects to a single switch that can light the MWI of any other switches associated with the VMD.
- A single switch can support multiple VMDs.
- A VMD can provide services to a network of switches provided that:
  - the administrator ensures that the network uses a single switch as a gateway to the VMD

- the switches are networked using a supported switch networking protocol.

Switch integration in a non-MultiSite environment

Note:

A VMD can support only a single integration type.

- For H.323 integration, an MAS must be on the same local area network (LAN) segment as the Communication Manager.
- Modular Messaging 5.1 and later supports SIP integration with Communication Manager over the WAN. An MAS is not needed to be collocated with the Communication Manager whether MultiSite is enabled or not.

Multiple voice mail domains networking

- A VMD can be connected to only one Avaya Message Networking server.
- An Avaya Message Networking server can be connected to multiple VMDs.

Message encoding

- The encoding format that the Modular Messaging system uses to record messages is administered on a VMD basis.
- If administrators change the VMD encoding format, they must make appropriate changes to the following parameters for each class of service (COS).
  - Maximum Mailbox Size
  - Maximum Call Answer Message
  - Maximum Voice Mail Message
- An MAS supports only one encoding format for recording messages, either the G.711 or the GSM.
- A message store can support both formats, GSM and G.711, for message encoding. For example, an MSS might receive G.711-encoded messages from the MAS and GSM-encoded messages from remote subscribers.

Modular Messaging Web Subscriber Options

- A Web server for Web Subscriber Options can support multiple Web Subscriber Options applications.
- A VMD can contain multiple Web servers each running Web Subscriber Options.
- A Web server for Web Subscriber Options can be hosted on any of the following servers:
  - An MAS, provided the Modular Messaging system has less than 500 subscribers
  - A Web server that also hosts Modular Messaging Web Client. Only the Modular Messaging—MSS version supports Modular Messaging Web Client.
  - A stand alone Web server.
  - Web Subscriber Options allows arbitrary files to be uploaded to the WSO server by clients.

For more information on the Web Subscriber Options requirements, see Web Subscriber Options requirements on page 346 and Web Subscriber Options requirements on page 359.

Supplementary Server

- For large systems, Avaya recommends installing some Modular Messaging services on a separate computer, other than an MAS. This separate computer is known as a Supplementary Server. For more information, see Messaging application server load balancing on page 266.

Rules for MSS messaging environments on multi-server configuration

Topology

- All MAS units must be physically co-located with the MSS.
- All MAS units must be on the same LAN segment as the MSS.

Message store

- An Avaya Message Storage Server (MSS) can host only one VMD.
- A VMD can contain only one MSS.
- Large configuration systems require the MSS—H to be implemented. In new installations of Modular Messaging systems, MSS is classed as MSS—H. However, in the Modular Messaging systems upgraded to Modular Messaging Release 5.2 multi-server configuration, MSS is available as MSS—H and MSS—S. For more information about when an MSS—H is required, see Message Storage Server redundancy.

DCT

- The same DCT file must not be used for multiple systems in a networked environment. The name for the private Windows domain must be unique throughout the entire messaging network, or errors will occur. If the private domain name is duplicated anywhere in the network, all Modular Messaging software must be reloaded on all affected servers to correct the problem. A unique private domain name must be used on each Modular Messaging system.

Directory server

- Each MAS must have a single directory server.
- In Modular Messaging—MSS system, all MASs must be configured to use the same directory server; that is the MSS.

Capacity

- A VMD supports a maximum of five MAS units and one Supplementary server that run the various MAS services like Tracing Service, Call Me Service, MWI Service and Mailbox

Monitor Service. The maximum number of MAS units supported includes the additional server in an N+1 configuration.

- The Web server for Modular Messaging Web Client or for Web Subscriber Options does not count toward the maximum MAS units supported.

Modular Messaging Web Client

- A Web server for Modular Messaging Web Client can support multiple Modular Messaging systems.
- A VMD can use multiple Modular Messaging Web Client Web servers.
- A Web server for Modular Messaging Web Client is used exclusively for Modular Messaging. This Web server does not support other voice-messaging systems.
- A Web server for Modular Messaging Web Client can be hosted on any server that does not belong to the VMD. The Web server for Modular Messaging Web Client cannot be hosted on an MAS or with other MAS applications or services, such as Tracing Service.

  For more information, see Modular Messaging Web Client requirements on page 343.

Rules for MSS messaging environments on single server configuration

Message store

- An Avaya Message Storage Server (MSS) can host only one VMD.
- A VMD can contain only one MSS.

Directory server

- The MAS must have a single directory server.

Capacity

- The VMD supports only one MAS unit that runs the various MAS services and Tracing Service, Call Me Service, MWI Service, and Mailbox Monitor Service.
- The Web Client server and the Web Subscriber Options server also run on the same single server.

Rules for Microsoft Exchange messaging environments

Topology

- All MAS units must be on the same LAN segment as the Microsoft Exchange server that hosts the VMD mailbox. By default this server will be the Peer Exchange Server of the first MAS installed.
- All Microsoft Exchange servers that host Modular Messaging enabled mailboxes must be on the same LAN as the MAS.

Peer Exchange server

- Each MAS has a single primary peer Exchange server. The administrator can configure the MAS to communicate with another Exchange server to act as a peer when the primary peer Exchange server goes offline.
- Different MAS units in a VMD can have different peer Exchange servers and different failover peers.

Directory Server

- Different MAS units in a VMD can have different directory servers that are replicas of each other.
- Each directory server can be a server of more than one VMD.
- Each MAS can have only one directory server. The directory server must be an Active Directory Domain controller configured as a global catalog.
- Each MAS will communicate with other domain controllers as part of communicating with Exchange. It is recommended that multiple local Global catalog servers are available to provide suitable redundancy.

Capacity

- An e-mail server can be a peer server for more than one MAS.
- An Active Directory Forest can contain more than one VMD.
- An e-mail server can be a host to more than one VMD.
- A VMD can have multiple e-mail servers.
- A VMD can contain subscribers in different Active Directory sites, provided that subscribers are in the same forest.
- A VMD can contain a maximum of 10 MAS units. A Supplementary Server that hosts Tracing Service, Offline Call Answer Store, or both does not count toward the maximum MAS units supported.

Additional rules for Exchange 2007 messaging environments

Rules for Microsoft Exchange 2007 messaging environments are:

- Support for Octel Analog Networking will not be available in a native Exchange 2007 environment and hence a voice network using Avaya Message Networking will not be possible in such environments. Octel Analog Networking requires an Exchange 2003 Peer Mail Server to host the gateway. This Peer Mail Server must be the same Exchange server that hosts the Voice Mail Domain mailbox.
- All Exchange 2007 mail servers, either Peers or Non-Peers, must have the 'Mailbox Server' role installed and configured.
- All Exchange 2007 mail servers must comply with the Microsoft guidelines for the provision of Exchange servers providing the 'Hub' role.
- A Microsoft Exchange 2007 domain can contain more than one voice mail domain (VMD).

  If a customer has an existing Exchange Organization configured with a Modular Messaging Release 3.0 Voice Mail Domain with Exchange 2003 mail servers, they can add a Modular Messaging Release 3.1 or later Voice Mail Domain with Exchange 2007 mail servers. However, there can be no overlap of Exchange servers between the two Voice Mail Domains until both Voice Mail Domains are running Release 3.1 or later. For example, no subscribers in the Modular Messaging Release 3.0 Voice Mail Domain can have mailboxes on an Exchange 2007 server.

Considerations related to Microsoft Exchange 2010

- The CAS server through which the VMD mailbox is accessed must be on the same LAN segment as all MAS servers in the VMD.
- The CAS server or CAS array configured as the Peer Exchange server for a MAS must be available on the same LAN segment as the MAS.
- The Database Availability Group should contain mailbox servers that are on the same physical site as the CAS server.

Topology

- All MAS units must be on the same LAN segment as the IBM Lotus Domino server.

Domino domain

- Each MAS must have one directory server or cluster per Domino domain in which voice mail–enabled subscribers exist.
- A Domino domain can contain more than one VMD.
- A VMD can contain subscribers in more than one Domino domain.

Peer server

- When customers create a VMD, the peer directory server for the first MAS in the VMD becomes the primary server in the VMD.
- Different MAS units in a VMD can have different peer Domino servers.

Directory Server

- Different MAS units in a VMD can have different directory servers that are replicas of each other.
- Each directory server can be a server of more than one VMD.

Capacity

- An e-mail server can be a peer server for more than one MAS.
- An e-mail server can be a host to more than one VMD.
- A VMD can have multiple e-mail servers.
- A VMD can contain a maximum of 10 MAS units. If a dedicated server hosts Tracing Service or Offline Call Answer Store, or both, this server does not count toward the maximum MAS units supported.

Considering the proximity of the switch to e-mail message stores

When implementing Modular Messaging with Exchange or Domino, consider the proximity of the e-mail message store to the switch or communication servers.

MAS units must be located on the same LAN as the message store. If the switch is remotely located, make arrangements to get the traffic from the switch to the site with the e-mail server and MAS units. To accommodate this, extend communication facilities or network traffic from the remote site to a switch at the same location as the e-mail server and MAS units. Only SIP traffic can be routed over a WAN directly to a MAS.

In a Modular Messaging—MSS system, MAS units and the MSS are on the same private LAN and are at the same location as the switch.

Chapter 11: Modular Messaging system capacities

Voice mail domain capacities

The following table provides information about the Voice mail domain (VMD) capacities for the different versions of Modular Messaging—MSS.

Feature	Single server	MSS—S	MSS—H	
		S3500 S8730	S3500 S8730 (4 HDs) S8800 (3 HDs)	S8730 (6 HDs) S8800 (4 HDs) HP DL360 G7
Maximum number of MAS units in a VMD[4]	1	2	5	5
Maximum number of message stores per VMD	1			
Total number of MAS voice ports supported per VMD	48	64	144 (S3500) 288 (S8730 and S8800)	288
Subscriber mailboxes per VMD[5]				
• Maximum local subscribers	2,500	5,000	9,000	40,000
• Maximum remote networked subscribers	250,000			
• Message Waiting Indicator (MWI), Call Me, and/or Notify Me	5,000	5,000	40,000	40,000
Class of service (COS)	512			

[4] A Supplementary Server that hosts Tracing Service, Offline Call Answer Store, and other services does not count toward the maximum MAS units supported.

[5] Customers can purchase additional mailboxes, for example, in increments of one, provided that system resources can support additional mailboxes.

Feature	Single server	MSS—S	MSS—H	
		S3500 S8730	S3500 S8730 (4 HDs) S8800 (3 HDs)	S8730 (6 HDs) S8800 (4 HDs) HP DL360 G7
Enhanced-list application (ELA)	1,000			
List members per ELA[6]	1,500			
Personal Distribution Lists (PDLs) and contacts per subscriber	500[7]			
List members per PDL	999[87]			
Maximum number of Caller Applications deployed per VMD	5,000			
Maximum Call Answer message size[9]	45.78 MB (default 2.33 MB)			
Maximum Call Answer message length[9]	G.711: 100 minutes (default 5 minutes) GSM: 484[10] minutes (default 25 minutes)			
Maximum mailbox size[11]	64 MB			
Maximum mailbox size, in minutes[9]	G.711: 139 GSM: 677			
Storage for offline Call Answer	1 to 99 hours[11] (default 24 hours)			
Communities	15			
Secondary extensions per mailbox	Unlimited			

The following table provides information about the Voice mail domain (VMD) capacities for the different versions of Modular Messaging—Exchange and Modular Messaging—Domino.

6 ELA can be nested to create larger lists.

7 No hard limit established for the product.

8 7

9 These values are administered and assigned to subscribers on a class of service (COS) basis and are not maximum values for a VMD. The maximum value for a VMD would depend on the values that are administered for all the COSs that are assigned to subscribers and on the number of subscribers each COS is assigned to.

10 The maximum of 484 minutes cannot be achieved with all switch integrations (SWINs) or through all interfaces. Dialogic cards cannot keep a recording session open for longer than 109 minutes; thus resulting in a smaller maximum size when the TUIs are used with SWINs involving a Dialogic card.

11 Subject to storage limits and quotas.

Feature	Microsoft Exchange	IBM Lotus Domino
Maximum number of MAS units in a VMD[12]	10	
Maximum number of message stores per VMD	No limit	
Total number of MAS voice ports supported per VMD	288	
Subscriber mailboxes per VMD[13]		
• Maximum local subscribers	100,000	
• Maximum remote networked subscribers	250,000	
• Message Waiting Indicator (MWI), Call Me, and/or Notify Me	12,000	4,000
Class of service (COS)	24	
Enhanced-list application (ELA)	NA	
List members per ELA[14]	NA	
Personal Distribution Lists (PDLs) and contacts per subscriber	Subject to Microsoft Outlook limitations	Subject to IBM Lotus Domino limitations
List members per PDL		
Maximum number of Caller Applications deployed per VMD	5,000	
Maximum Call Answer message size[15]	45.78 MB (default 2.33 MB)	
Maximum Call Answer message length[15]	G.711: 100 minutes (default 5 minutes) GSM: 484[16] minutes (default 25 minutes)	
Maximum mailbox size[17]	Unlimited	
Maximum mailbox size, in minutes[15]	Unlimited	
Storage for offline Call Answer	1 to 99 hours[17] (default 24 hours)	

[12] A Supplementary Server that hosts Tracing Service, Offline Call Answer Store, and other services does not count toward the maximum MAS units supported.

[13] Customers can purchase additional mailboxes, for example, in increments of one, provided that system resources can support additional mailboxes.

[14] ELA can be nested to create larger lists.

[15] These values are administered and assigned to subscribers on a class of service (COS) basis and are not maximum values for a VMD. The maximum value for a VMD would depend on the values that are administered for all the COSs that are assigned to subscribers and on the number of subscribers each COS is assigned to.

[16] The maximum of 484 minutes cannot be achieved with all switch integrations (SWINs) or through all interfaces. Dialogic cards cannot keep a recording session open for longer than 109 minutes; thus resulting in a smaller maximum size when the TUIs are used with SWINs involving a Dialogic card.

[17] Subject to storage limits and quotas.

Feature	Microsoft Exchange	IBM Lotus Domino
Communities	NA	
Secondary extensions per mailbox	Unlimited	

Avaya Message Storage Server capacities

The following table provides information about the capacities of an Avaya MSS with the S8800 or the HP DL360 G7 hardware.

Feature	Single server configuration	Multi-server configuration	
		MSS with 3 HDs	MSS with 4 HDs
Hours of storage[18]			
• Using GSM 6.10 encoding	7,500	15,000	27,000
• Using G.711 encoding	1,500	3,000	5,400
Subscriber mailboxes			
• Maximum local subscribers	2,500	9,000	40,000
• Maximum remote networked subscribers, includes spoken names	250,000	250,000	250,000
IMAP4 client sessions[19]			
• Maximum number of clients, clients poll every 2 minutes These capacities exclude MAS IMAP4 (TUI session) use.	1,000	2,500	5,000
POP3 client sessions			
• Maximum number of clients, clients poll every 2 minutes	2,500	2,500	2,500

[18] The MSS calculations account for the need to have at least 20% free space available for the system to run. System free space is built into these calculations for the MSS. Additional space is also reserved to support the storage of IMAP4 client data.

[19] Some IMAP4 clients use two IMAP4 sessions per connection. For more information, see IMAP4 client limits on page 280.

Feature	Single server configuration	Multi-server configuration	
		MSS with 3 HDs	MSS with 4 HDs
• Maximum number of clients, clients poll every 10 minutes[20]		5,000	5,000
• Maximum number of active client sessions	80	80	80
Simple Message Transfer Protocol (SMTP) messages per hour, includes MAS-initiated deliveries	15,000	15,000	15,000

The following table provides information about the capacities of an Avaya MSS with the S8730 and S3500 hardware.

Feature	MSS—S	MSS—H with 4 HDs with S3500 and S8730	MSS—H with 6 HDs with S8730
Hours of storage[18]			
• Using GSM 6.10 encoding	7,500	15,000	27,000
• Using G.711 encoding	1,500	3,000	5,400
Subscriber mailboxes			
• Maximum local subscribers	5,000	9,000	40,000
• Maximum remote networked subscribers, includes spoken names	250,000	250,000	250,000
IMAP4 client sessions[19]			
• Maximum number of clients, clients poll every 2 minutes These capacities exclude MAS IMAP4 (TUI session) use.	2,500	5,000	5,000
POP3 client sessions			
• Maximum number of clients, clients poll every 2 minutes	2,500	2,500	2,500
• Maximum number of clients, clients poll every 10 minutes[20]	5,000	5,000	5,000

[20] More than 5,000 simultaneous sessions affects system performance.

Feature	MSS—S	MSS—H with 4 HDs with S3500 and S8730	MSS—H with 6 HDs with S8730
• Maximum number of active client sessions	80	80	80
Simple Message Transfer Protocol (SMTP) messages per hour, includes MAS-initiated deliveries	15,000	15,000	15,000

Messaging Application Server capacities

The following table provides information about the capacities of an MAS.

Feature	MAS capacity
Hours of Storage for Off-line Call-Answer mode	
• Maximum for GSM 6.10 storage	5,000 hours
• Maximum for G.711 storage	1,000 hours
Text-to-Speech (TTS) sessions	
• All languages, using RealSpeak Telephony 3.5	24
Switch Link: High bandwidth for SIP integrations	
• Maximum calls	15,000 per hour
• MWI updates	15,000 per hour
Maximum Recording Length for Dialogic Integrations (T1 QSIG, E1 QSIG, DSE and Analog)	109 minutes

MAS port capacities for Modular Messaging

This section provides information about the port capacities of an MAS with a Modular Messaging—MSS, Modular Messaging—Exchange, and Modular Messaging—Domino system. This information is applicable to Modular Messaging with mailboxes enabled for any or all of the Modular Messaging telephone user interfaces (TUIs).

Note:

With new installations of Modular Messaging, CPE will be equal to or greater than the Avaya S8800, or S8730, or HP DL360 G7 server in terms of memory, disk, and CPU power. For

upgrades from existing systems, depending on the hardware used before performing the upgrade, CPE will be equal to or greater than the Avaya S8800, S8730, S3500, or HP DL360 G7 server in terms of memory, disk, and CPU power.

The following table provides information about the port capacities of a Modular Messaging system, where the MAS software resides on the S8800 or the HP DL360 G7 hardware.

S8800 or equivalent CPE		SIP integration	
		Multi-server configuration	Single server configuration
Cards per MAS		NA	NA
Voice ports per card		NA	NA
Voice ports per MAS		96	48
Voice ports per VMD	MSS	288	48
	Exchange / Domino	288	NA
Fax resources per card		NA	NA
Fax resources per MAS		96	48
Fax resources per VMD[21]	MSS	288	48
	Exchange / Domino	288	NA

The following table provides information about the port capacities of a Modular Messaging system, where the MAS software resides on the Avaya S8730, the HP DL360 G7 server, or the customer-provided server.

S8730 or equivalent CPE	Integration type						
	SIP	H.323	QSIG		DSE[22]	Analog	
			T1	E1		12-port[22]	4-port[22]
Cards per MAS[23]	NA[24]	NA[24]	3	3	3	3	3
Voice ports per card	NA[24]	NA[24]	23	30	8	12	4
Voice ports per MAS	96	30	69	90	24	36	12

[21] When using the client fax printing capability, there is a limit of 4 simultaneous outbound fax sessions per VMD since there are only 4 instances of the Modular Messaging Fax Service Provider created for the Windows Fax Service. In addition to these sessions the Fax Sender Service can also use any available fax resources on any of the MASs within the VMD to send outgoing faxes submitted from the TUI or via the fax mailbox. Each MAS can be handling incoming fax sessions up to the simultaneous fax call limit for the MAS.

[22] Modular Messaging Release 5.1, and later supports four card slots in customer-provided servers for analog and DSE cards.

[23] The Avaya S8730 MAS has three PCI-E card slots available for port cards.

[24] H.323 and SIP transmit voice as IP data, thus separate port cards are not needed

S8730 or equivalent CPE		Integration type						
		SIP	H.323	QSIG		DSE[22]	Analog	
				T1	E1		12-port[22]	4-port[22]
Voice ports per VMD	MSS—S	192	60	138[25]	180[25]	48	72	12
	MSS—H	288	150	288	288	120	180	12
	Exchange / Domino	288	288	288	288	240	288	12
Fax resources per card		NA[24]	NA[26]	4	4	2	4	4
Fax resources per MAS		96	NA[26]	12	12	6	12	12
Fax resources per VMD[21]	MSS—S	192	NA[26]	24	24	12	24	12
	MSS—H	288	NA	60	60	30	60	12
	Exchange / Domino	288	NA	120	120	60	120	12

The following table provides information about the port capacities of a Modular Messaging system, where the MAS software resides on the S3500 hardware.

S3500 or equivalent CPE		Integration type						
		SIP[27]	H.323[27]	QSIG		DSE	Analog	
				T1	E1		12-port[28]	[28] 4-port[29]
Cards per MAS		NA	NA	2	2	2	2	2
Voice ports per card		NA	NA	23	30	8	12	4
Voice ports per MAS		48 30[30]	30	46	60	16	24	8
Voice ports per VMD	MSS—S	96	60	92	120	32	48	8
	MSS—H	144	144	144[31]	144[31]	80	120	8
	Exchange / Domino	240	240	230	240	160	240	8

22 Modular Messaging Release 5.1, and later supports four card slots in customer-provided servers for analog and DSE cards.
25 Not all ports are used on the last card.
26 H.323 does not support fax.
27 SIP and H.323 integration transmit voice as IP packets over the local area network (LAN) cards; thus separate port cards are not required.
28 Find Me is not supported for analog integrations.
29 Analog systems with four-port cards can be purchased as a new system in four-port and eight-port configurations only. Expansions after market are supported to capacity.
30 For SIP with SRTP
31 Not all ports are used on the last card.

S3500 or equivalent CPE		Integration type						
		SIP[27]	H.323[27]	QSIG		DSE	Analog	
				T1	E1		12-port[28]	[28] 4-port[29]
Fax resources per card		NA	NA	4	4	2	4	4
Fax resources per MAS		48 30[30]	NA	8	8	4	8	8
Fax resources per VMD[21]	MSS—S	96	NA	16	16	8	16	8
	MSS—H	144[32]	NA[32]	28	20	20	40	8
	Exchange / Domino	240	NA	40	32	40	80	8

Overriding maximums

Overriding maximums for Modular Messaging—MSS with the S8800, S8730, S3500, HP DL360 G7, or customer-provided server are:

- With MSS—S: two MAS units per VMD.
- With MSS—H: five MAS units per VMD.
- With MSS—H: 144 ports per VMD with S3500 server and 288 ports per VMD with S8800, S8730, or HP DL360 G7 server.
- MSS: 48 ports per VMD with S8800 server in single server configuration and 288 ports per VMD with S8730 server in multi-server configuration.

Overriding maximums for Modular Messaging—Exchange and Modular Messaging—Domino with the S8800, S8730, S3500, HP DL360 G7, or customer-provided server are:

- 10 MAS units per VMD.
- 240 ports per VMD with S3500 server and 288 ports per VMD with S8730 server. (Modular Messaging—Exchange)
- 288 ports per VMD. (Modular Messaging—Domino)
- 288 ports per VMD with S8730 server in multi-server configuration.

Note:

A VMD can contain a mix of S8800, S8730, HP DL360 G7, and S3500 servers, provided that the overriding maximum for the VMD does not exceed that of the S3500.

[27] SIP and H.323 integration transmit voice as IP packets over the local area network (LAN) cards; thus separate port cards are not required.

[28] Find Me is not supported for analog integrations.

[29] Analog systems with four-port cards can be purchased as a new system in four-port and eight-port configurations only. Expansions after market are supported to capacity.

[32] SIP supports fax. All channels are available for inbound/outbound fax with SIP. H.323 does not support fax.

Chapter 12: Port Sizing

Based on the results of a detailed system study, Avaya has developed port sizing recommendations to assist planners in the port sizing exercise. This chapter explains how planners can make use of the Modular Messaging recommendations.

This chapter also provides information about analyzing port sizing requirements without the aid of the Modular Messaging recommendations.

To validate planning assumptions, use Modular Messaging reports, such as:

- Hourly Statistics
- Port Statistics
- Feature Daily or Hourly Traffic Report
- Load Daily or Hourly Traffic Report
- Network Load Daily or Hourly Traffic Report
- Remote Message Daily or Monthly Traffic Report
- Subscriber Daily or Monthly Traffic Report

For more information about reports, see MAS and MSS reports on page 403.

For information on port requirements and IP network requirements in a MultiSite-enabled Modular Messaging system, see the *Modular Messaging MultiSite Guide*, available on the Avaya Support Web site at http://www.avaya.com/support.

Identifying the recommended configuration for a customer

Modular Messaging recommendations make it easier for planners to estimate the number of voice ports the system requires for a given number of subscribers.

The recommendations also provide information about the number of MAS units a system needs for a given combination of voice ports and subscribers.

To identify which Modular Messaging recommendation a customer needs, planners must know the approximate number of subscribers and the integration protocol that the system will use.

The recommendations for Modular Messaging—MSS also provide information about the single server configuration and multi-server configuration. To identify which Modular Messaging—MSS configuration recommendation a customer needs, planners must know the hardware being used, approximate number of subscribers, and the integration protocol that the system

will use. For more information, see Recommendations for Modular Messaging—MSS on page 230.

Consider the example of an organization implementing a Modular Messaging—Exchange system to provide services to approximately 3,000 subscribers.

Further specifications include:

- The customer has purchased a software-only configuration that is, Avaya-provided software and customer-provided equipment.
- The Modular Messaging system connects to the telephone system using SIP integration.

For such an implementation, a planner can consider the Modular Messaging SIP integration recommendation for Modular Messaging—Exchange. See Recommendations for Modular Messaging—Exchange and Modular Messaging—Domino with customer-provided server on page 251.

The Modular Messaging SIP integration provides support for 96 voice ports that service 7,400 subscribers of Modular Messaging—Exchange. The system requires only one MAS unit to support 96 ports.

Port sizing using Modular Messaging recommendations

When sizing port requirements, planners must be able to estimate the following:

- Number of subscribers in a voice mail domain (VMD)
- Number of ports required to support the estimated number of subscribers
- Number of Messaging Application Server (MAS) units required to provide that number of ports

To simplify the planning process, Avaya has designed recommendations that have precalculated estimations of the number of ports and MAS units required for a given number of subscribers.

Important:

The Modular Messaging recommendations eliminate the need to calculate port requirements, the number of MAS units required, and the number of port boards required. Planners who want to perform a more detailed study of the port requirements can refer to Port sizing without using Modular Messaging recommendations on page 252. However, those instructions are meant only for planners with sufficient prior experience in implementing a messaging system.

Port usage patterns

When planning a system, planners must make an accurate estimate of the number of ports required to provide services to a given number of subscribers.

The Modular Messaging recommendations provide precalculated estimates of the required number of ports. However, a planner benefits from understanding how the port usage patterns of subscribers affect the estimation of port capacity.

Modular Messaging—MSS

Modular Messaging—MSS subscribers often use the system for voice and fax messaging. A separate, customer-provided system is used for e-mail messages.

Subscribers use the system primarily for retrieval of voice and fax messages by means of a telephone; thus port usage is high. Subscribers who want to have corporate e-mails read to them over the telephone can use the one-X Speech client. When subscribers access messages through one-X Speech, they are not using Modular Messaging ports; thus port usage decreases on the Modular Messaging system.

With the new installations of Modular Messaging systems, MSS is shipped with 3 hard drives for systems with up to 9,000 subscribers, and with 4 hard drives for systems with more than 9,000 subscribers.

The following table shows the resulting per-mailbox capacities for the S8800, S8730, HP DL360 G7 server.

Subscribers	Minutes per subscriber			
	4@72GB with S8730 3@146GB with S8800		6@72GB with S8730 4@146GB with S8800 HP DL360 G7	
	G.711	GSM	G.711	GSM
9,000	20	98	36	179
20,000	9	44	16	81

The following table shows the resulting per-mailbox capacities for the single server configuration.

Server	Minutes per subscriber	
	G.711	GSM
S3500	35	174
Single server configuration	35	174

Port usage consists primarily of Call Answer sessions and message retrieval using the telephone user interfaces (TUIs).

Modular Messaging—Exchange and Modular Messaging—Domino

Subscribers of Modular Messaging—Exchange and Modular Messaging—Domino use the system for voice, fax, and e-mail messaging.

Usually, subscribers use graphical user interface (GUI) clients for messaging; thus port usage is lower, with 4.5 minutes of messaging per day per subscriber. This includes TTS conversion of e-mail messages.

The connect time for mobile subscribers increases because of access to e-mail messages. However, the connect time for desktop users decreases relative to traditional voice mail because of accessing messages over the LAN. The net effect is lower port usage per user.

Port usage consists primarily of Call Answer sessions. A significant portion of retrieval time using the voice ports is for TTS of e-mail messages.

Recommendations for Modular Messaging—MSS

Consider the following items before referring to the recommendations:

- Modular Messaging Release 5.2 system for MSS is available as single server configuration and multi-server configuration.
- Single server configuration provides both MSS and MAS on a single server.
  - Ideally suited for up to 2,500 mailboxes
  - Provides up to 48 ports of SIP
  - Simplified installation as only Avaya-provided hardware is allowed
  - N+1 server configuration cannot be implemented in the single server configuration
  - There is no Survivable Modular Messaging solution available for single server configurations
  - It is not possible to upgrade to this platform from previous versions of Modular Messaging
  - Provides cost-savings over equivalent multi-server configuration
- Multi-server configuration provides MSS and MAS as separate servers.
  - Allows for more than one MAS units and a single Avaya MSS providing much greater capacity
  - Up to 288 ports depending on hardware specifications
  - An MAS unit can be an Avaya-provided server or customer-provided equipment
- The Modular Messaging—MSS system is intended for traditional port usage. See Table: Per-mailbox capacities on page 229 for capacities of total voice messaging minutes of recording.

- The recommendations indicate the maximum number of subscribers supported by the given port configuration. When provisioning a new system, allow for growth. If the initial number of subscribers is within 5% to 15% of the maximum, Avaya recommends the next size system.
- The recommendations provide for traffic patterns of 14% busy-hour traffic.

  Note:

  If callers and subscribers are spread across multiple time zones, port usage might be spread across time zones. In such cases, the traffic during the busy hour might be less than 14%.
- The recommendations are applicable to switch integrations (SWINs) that support queuing and to switches that do not support queuing. SWINs that support queuing allow calls to be queued on the switch until a port is available on the Modular Messaging system. SWINs that do not support queuing cause callers to hear a busy signal when no ports are available on the Modular Messaging system.

  The recommendations reflect both Queuing and Nonqueuing sizing recommendations. Nonqueuing sizing recommendations use the Erlang B model and P.02 Grade of Service (GOS). Queuing sizing recommendations use the Erlang C model and P.05 GOS. Currently, most Modular Messaging SWINs do not support switch queuing. For example, the Communication Manager implementation with Q.Signaling (QSIG) integration does not support queuing.
- These recommendations are based on the assumption that the system is used primarily for voice and fax messaging. This version does not support TUI access to corporate e-mail messages stored on a separate e-mail server.
- These recommendations are based on the assumption that 10% of the subscribers use fax messaging regularly, with 0.75 three-page faxes per day per subscriber.
- The number of subscriber mailboxes is rounded to the nearest hundred.

Recommendations for Modular Messaging single server configuration

This section provides information about the port sizing recommendations for Modular Messaging—MSS systems on single server configuration with Avaya S8800 MAS units.

Modular Messaging system single server configuration supports only SIP integration.

Subscriber mailboxes	Voice ports	Fax ports	Minimum MAS units
2,500	48	48	1

Recommendations for Modular Messaging—MSS with Avaya S8800 and HP DL360 G7 MAS units

This section provides information about the port sizing recommendations for Modular Messaging—MSS multi-server configuration with Avaya S8800 and HP DL360 G7 MAS units.

Note:

New installations of Modular Messaging Release 5.2 support only the SIP integration. The maximum number of ports supported per MAS is 96 for SIP.

Systems with less than 9,000 subscribers require an MSS with 3 hard drives. Systems with more than 9,000 subscribers require an MSS with 4 hard drives.

SIP integration

The following table provides information about the Session Initiation Protocol (SIP) integration recommendation for Modular Messaging—MSS with Avaya S8800 and HP DL360 G7 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	Minimum MAS units
5,500	96	96	1
11,500	192	192	2
18,200	288	288	3

Recommendations for Modular Messaging—MSS with Avaya S8730 MAS units

This section provides information about the port sizing recommendations for Modular Messaging—MSS systems with Avaya S8730 MAS units.

Note:

The maximum number of ports supported per MAS is 96 for SIP, 30 for H.323, 69 for T1 QSIG, 90 for E1 QSIG, 24 for DSE, and 36 for analog integration.

Systems with between 5,000 and 9,000 subscribers require an MSS—H with 4 hard drives. Systems with more than 9,000 subscribers require an MSS—H with 6 hard drives.

SIP integration

The following table provides information about the Session Initiation Protocol (SIP) integration recommendation for Modular Messaging—MSS with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	Minimum MAS units
5,500	96	96	1
11,500	192	192	2
18,200	288	288	3

H.323 integration

The following table provides information about the H.323 integration recommendation for Modular Messaging—MSS with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Minimum MAS units
1,400	30	1
3,300	60	2
5,100	90	3
7,100	120	4
9,100	150	5

T1 QSIG integration

The following table provides information about the T1 QSIG integration recommendation for Modular Messaging—MSS with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	23-port T1 boards	Minimum MAS units
1,000	23	4	1	1
2,400	46	8	2	1
3,800	69	12	3	1
5,300	92	16	4	2
6,700	115	20	5	2
8,200	138	24	6	2
9,800	161	28	7	3
11,300	184	32	8	3
12,900	207	36	9	3
14,300	230	40	10	4
15,900	253	44	11	4
17,400	276	48	12	4
18,200	288	52	13	5

E1 QSIG integration

The following table provides information about the E1 QSIG integration recommendation for Modular Messaging—MSS with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	30-port E1 boards	Minimum MAS units
1,400	30	4	1	1
3,300	60	8	2	1
5,100	90	12	3	1
7,100	120	16	4	2
9,100	150	20	5	2
11,000	180	24	6	2
13,000	210	28	7	3
15,000	240	32	8	3
17,000	270	36	9	3
18,200	288	40	10	4

Digital Set Emulation integration

The following table provides information about the Digital Set Emulation (DSE) integration recommendation for Modular Messaging—MSS with Avaya S8730 MAS units.

Note:

In general, Avaya recommends DSE integration for Modular Messaging systems only if the system contains 500 or fewer mailboxes.

Subscriber mailboxes	Voice ports	Fax ports	8-port DSE boards	Minimum MAS units
200	8	2	1	1
600	16	4	2	1
1,100	24	6	3	1
1,600	32	8	4	2
2,000	40	10	5	2
2,500	48	12	6	2
3,000	56	14	7	3
3,500	64	16	8	3
4,000	72	18	9	3
4,500	80	20	10	4

Subscriber mailboxes	Voice ports	Fax ports	8-port DSE boards	Minimum MAS units
5,000	88	22	11	4
5,500	96	24	12	4
6,000	104	26	13	5
6,500	112	28	14	5
7,000	120	30	15	5

Analog integration (12-port board)

The following table provides information about the analog integration (12-port board) recommendation for Modular Messaging—MSS with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	12-port boards	Minimum MAS units
400	12	4	1	1
1,100	24	8	2	1
1,800	36	12	3	1
2,500	48	16	4	2
3,300	60	20	5	2
4,000	72	24	6	2
4,800	84	28	7	3
5,500	96	32	8	3
6,300	108	36	9	3
7,100	120	40	10	4
7,900	132	44	11	4
8,700	144	48	12	4
9,500	156	52	13	5
10,300	168	56	14	5
11,000	180	60	15	5

Analog integration (4-port board)

The following table provides information about the analog integration (4-port board) recommendation for Modular Messaging—MSS with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	4-port boards	Minimum MAS units
70	4	4	1	1

Subscriber mailboxes	Voice ports	Fax ports	4-port boards	Minimum MAS units
240	8	8	2	1
440	12	12	3	1

Recommendations for Modular Messaging—MSS with Avaya S3500 MAS units

This section provides information about the port sizing recommendations for Modular Messaging—MSS systems with Avaya S3500 MAS units.

Note:

The maximum number of subscriber mailboxes could be greater than 8,600 for systems that have low port usage.

SIP integration with RTP

The following table provides information about the Session Initiation Protocol (SIP) integration with RTP recommendation for Modular Messaging—MSS with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	Minimum MAS units
2,500	48	48	1
Larger systems require an MSS—H message store.			
5,500	96	96	2
Larger systems require a Supplementary Server.			
8,600	144	144	3

SIP integration with SRTP

The following table provides information about the Session Initiation Protocol (SIP) integration with SRTP recommendation for Modular Messaging—MSS with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	Minimum MAS units
1,400	30	30	1
3,300	60	60	2
Larger systems require an MSS—H message store.			
5,100	90	90	3
Larger systems require a Supplementary Server.			

Subscriber mailboxes	Voice ports	Fax ports	Minimum MAS units
7,100	120	120	4
8,600	144	144	5

H.323 integration

The following table provides information about the H.323 integration recommendation for Modular Messaging—MSS with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Minimum MAS units
1,400	30	1
3,300	60	2
Larger systems require an MSS—H message store.		
5,100	90	3
Larger systems require a Supplementary Server.		
7,100	120	4
8,600	144	5

T1 QSIG integration

The following table provides information about the T1 QSIG integration recommendation for Modular Messaging—MSS with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	23-port T1 boards	Minimum MAS units
1,000	23	4	1	1
2,400	46	8	2	1
Larger systems require an MSS—H message store.				
3,800	69	12	3	2
5,300	92	16	4	2
6,700	115	20	5	3
8,200	138	24	6	3
Larger systems require a Supplementary Server.				
8,600	144	28	7	4

E1 QSIG integration

The following table provides information about the E1 QSIG integration recommendation for Modular Messaging—MSS with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	30-port E1 boards	Minimum MAS units
1,400	30	4	1	1
3,300	60	8	2	1
Larger systems require an MSS—H message store.				
5,100	90	12	3	2
7,100	120	16	4	2
Larger systems require a Supplementary Server.				
8,600	144	20	5	3

Digital Set Emulation integration

The following table provides information about the Digital Set Emulation (DSE) integration recommendation for Modular Messaging—MSS with Avaya S3500 MAS units.

Note:

In general, Avaya recommends DSE integration for Modular Messaging systems only if the system contains 500 or fewer mailboxes.

Subscriber mailboxes	Voice ports	Fax ports	8-port DSE boards	Minimum MAS units
200	8	2	1	1
600	16	4	2	1
1,100	24	6	3	2
1,600	32	8	4	2
2,000	40	10	5	3
2,500	48	12	6	3
3,000	56	14	7	4
3,500	64	16	8	4
Larger systems require an MSS—H message store.				
4,000	72	18	9	5
4,500	80	20	10	5

Analog integration (12-port board)

The following table provides information about the analog integration (12-port board) recommendation for Modular Messaging—MSS with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	12-port boards	Minimum MAS units
400	12	4	1	1
1,100	24	8	2	1
1,800	36	12	3	2
2,500	48	16	4	2
Larger systems require an MSS—H message store.				
3,300	60	20	5	3
4,000	72	24	6	3
4,800	84	28	7	4
5,500	96	32	8	4
6,300	108	36	9	5
7,100	120	40	10	5

Analog integration (4-port board)

The following table provides information about the analog integration (4-port board) recommendation for Modular Messaging—MSS with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	4-port boards	Minimum MAS units
70	4	4	1	1
200	8	8	2	1

Note:

Analog systems with 4-port cards can be purchased as a new system in 4-port and 8-port configurations only. For larger systems, use configurations with 12-port analog cards.

Recommendations for Modular Messaging—MSS with customer-provided server

This section provides information about the port sizing recommendations for Modular Messaging—MSS systems with customer-provided server (Software-only) MAS units.

A software-only configuration is a configuration in which Avaya provides the Modular Messaging software and the customer provides the hardware. Modular Messaging Release 5.1, and later allows the MAS of a Modular Messaging—MSS system to be a customer-provided server. The MSS must still be installed onto a server supplied by Avaya.

Note:

Customer-provided server is not available with Modular Messaging single server configuration.

Customer-provided equipment can have either an AMD or an Intel processor. The specification of the hardware must be at least equal to that of an equivalent Avaya-provided server. For example for new installations of Modular Messaging, CPE will be equal to or greater than the Avaya S8800 in terms of memory, disk, and CPU power. For upgrades from existing systems, depending on the hardware used before performing the upgrade, CPE will be equal to or greater than the Avaya S8800, S8730, HP DL360 G7, or S3500 server in terms of memory, disk, and CPU power.

Note:

The installation routine for Modular Messaging assumes that the operating system of the customer-provided server is originally configured similar to that of an Avaya-provided server and has not been hardened prior to the installation. Customers can use the *LAN Port Usage* guide, available at http://www.avaya.com/support to help identify further requirements that will lead to successful installation and operation of the Modular Messaging system.

For more information about the port sizing recommendations for Modular Messaging—MSS systems with customer-provided server (Software-only) MAS units, see:

- Recommendations for Modular Messaging—MSS with Avaya S8800 and HP DL360 G7 MAS units on page 232, when customer-provided server is equivalent to the Avaya S8800 and HP DL360 G7 server.
- Recommendations for Modular Messaging—MSS with Avaya S8730 MAS units on page 232, when customer-provided server is equivalent to the Avaya S8730 server.
- Recommendations for Modular Messaging—MSS with Avaya S3500 MAS units on page 236, when customer-provided server is equivalent to the Avaya S3500 server.

Recommendations for Modular Messaging—Exchange

Consider the following items before referring to the recommendations:

- Usually, subscribers use GUI clients for messaging; therefore, port usage is lower, with 4.5 minutes of messaging per day per subscriber. This includes TTS conversion of corporate e-mail messages.
- These recommendations provide for traffic patterns of 14% busy-hour traffic.
- These recommendations are applicable to SWINs that support queuing and to switches that do not support queuing. SWINs that support queuing allow calls to be queued on the switch until a port is available on the Modular Messaging system. SWINs that do not

support queuing cause callers to hear a busy signal when no ports are available on the Modular Messaging system.

The recommendations reflect both nonqueuing and queuing sizing recommendations. Nonqueuing sizing recommendations use the Erlang B model and P.02 GOS. Queuing sizing recommendations use the Erlang C model and P.05 GOS. Currently, most Modular Messaging SWINs do not support switch queuing. For example, the Communication Manager QSIG integration implementation does not support queuing.

- Calculations are based on the assumption that the system is used for all messaging types, including voice, fax, and e-mail.
- The number of subscriber mailboxes is rounded to the nearest hundred.

Recommendations for Modular Messaging—Domino

Consider the following items before referring to the recommendations:

- Typically, subscribers use GUI clients for messaging; therefore, port usage is lower, with 4.5 minutes of messaging per day per subscriber (including text-to-speech conversion of corporate e-mail messages).

  The connect time for mobile subscribers increases because of access to e-mail messages, but connect time for desktop users decreases relative to traditional voice mail because of accessing messages over the LAN. The net effect is lower port usage per user.
- These recommendations provide for traffic patterns of 14% busy-hour traffic.
- These recommendations are applicable to SWINs that support queuing and to switches that do not support queuing. SWINs that support queuing allow calls to be queued on the switch until a port is available on the Modular Messaging system. SWINs that do not support queuing cause callers to hear a busy signal when no ports are available on the Modular Messaging system.

  The recommendations reflect both nonqueuing and queuing sizing recommendations. Nonqueuing sizing recommendations use the Erlang B model and P.02 GOS. Queuing sizing recommendations use the Erlang C model and P.05 GOS. Currently, most Modular Messaging SWINs do not support switch queuing. For example, the Communication Manager QSIG integration implementation does not support queuing.
- These recommendations are based on Erlang B with P.02 GOS and Erlang C with P.05 GOS.

  The Erlang B model represents a scenario in which incoming calls are not queued on the switch. The Erlang C model represents a scenario in which incoming calls are queued on the switch.

- Calculations are based on the assumption that the system is used for all messaging types, including voice, fax, and e-mail.
- The number of subscriber mailboxes is rounded to the nearest hundred.

Recommendations for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8800 and HP DL360 G7 MAS units

This section provides information about the port sizing recommendations for Modular Messaging—Exchange and Modular Messaging—Domino systems with Avaya S8800 and HP DL360 G7 MAS units.

Note:

New installations of Modular Messaging Release 5.2 support only the SIP integration. The maximum number of ports supported per MAS is 96 for SIP.

Systems with less than 9,000 subscribers require an MSS with 3 hard drives. Systems with more than 9,000 subscribers require an MSS with 4 hard drives.

SIP integration

The following table provides information about the Session Initiation Protocol (SIP) integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8800 and HP DL360 G7 MAS units.

Subscriber mailboxes	Voice ports	Fax ports		Minimum MAS units
		Incoming FAX	Outgoing FAX	
7,400	96	96	4	1
15,600	192	192	8	2
19,700	288	288	12	3

Recommendations for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units

This section provides information about the port sizing recommendations for Modular Messaging—Exchange and Modular Messaging—Domino systems with Avaya S8730 MAS units.

Note:

The maximum number of ports supported per MAS is 96 for SIP, 30 for H.323, 69 for T1 QSIG, 90 for E1 QSIG, 24 for DSE, and 36 for analog integration.

SIP integration

The following table provides information about the Session Initiation Protocol (SIP) integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports		Minimum MAS units
		Incoming FAX	Outgoing FAX	
7,400	96	96	4	1
15,600	192	192	8	2
19,700	288	288	12	3

H.323 integration

The following table provides information about the H.323 integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Minimum MAS units
1,900	30	1
4,500	60	2
7,100	90	3
9,700	120	4
12,400	150	5
15,100	180	6
17,800	210	7
20,500	240	8
24,100	280	9
24,800	288	10

T1 QSIG integration

The following table provides information about the T1 QSIG integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	23-port T1 boards	Minimum MAS units
1,400	23	4	1	1
3,300	46	4	2	1
5,200	69	4	3	1
7,200	92	8	4	2
9,300	115	8	5	2
11,300	138	8	6	2
13,400	161	12	7	3
15,400	184	12	8	3
17,600	207	12	9	3
19,600	230	16	10	4
21,700	253	16	11	4
23,700	276	16	12	4
24,800	288	20	13	5

E1 QSIG integration

The following table provides information about the E1 QSIG integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	30-port E1 boards	Minimum MAS units
1,900	30	4	1	1
4,500	60	4	2	1
6,900	90	4	3	1
9,700	120	8	4	2
12,400	150	8	5	2
15,100	180	8	6	2
17,800	210	12	7	3
20,500	240	12	8	3
23,200	270	12	9	3
24,800	288	16	10	4

Digital Set Emulation integration

The following table provides information about the Digital Set Emulation (DSE) integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units.

Note:

In general, Avaya recommends DSE integration for Modular Messaging systems only if the system contains 500 or fewer mailboxes.

Subscriber mailboxes	Voice ports	Fax ports	8-port DSE boards	Minimum MAS units
300	8	4	1	1
900	16	4	2	1
1,500	24	4	3	1
2,100	32	8	4	2
2,700	40	8	5	2
3,400	48	8	6	2
4,000	56	12	7	3
4,700	64	12	8	3
5,300	72	12	9	3
6,000	80	16	10	4
6,700	88	16	11	4
7,400	96	16	12	4
8,000	104	20	13	5
8,700	112	20	14	5
9,400	120	20	15	5
10,100	128	24	16	6
10,800	136	24	17	6
11,500	144	24	18	6
12,100	152	28	19	7
12,800	160	28	20	7
14,000	168	28	21	7
14,700	176	32	22	8
15,400	184	32	23	8
16,200	192	32	24	8

Subscriber mailboxes	Voice ports	Fax ports	8-port DSE boards	Minimum MAS units
16,900	200	36	25	9
17,600	208	36	26	9
18,300	216	36	27	9
19,000	224	40	28	10
19,800	232	40	29	10
20,500	240	40	30	10

Analog integration (12-port board)

The following table provides information about the analog integration (12-port board) recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	12-port boards	Minimum MAS units
600	12	4	1	1
1,500	24	4	2	1
2,400	36	4	3	1
3,400	48	8	4	2
4,300	60	8	5	2
5,300	72	8	6	2
6,400	84	12	7	3
7,400	96	12	8	3
8,400	108	12	9	3
9,400	120	16	10	4
10,400	132	16	11	4
11,500	144	16	12	4
12,500	156	20	13	5
13,500	168	20	14	5
14,500	180	20	15	5
16,200	192	24	16	6
17,200	204	24	17	6
18,300	216	24	18	6
19,000	228	28	19	7

Subscriber mailboxes	Voice ports	Fax ports	12-port boards	Minimum MAS units
20,500	240	28	20	7
21,600	252	28	21	7
22,700	264	32	22	8
23,700	276	32	23	8
24,800	288	32	24	8

Analog integration (4-port board)

The following table provides information about the analog integration (4-port board) recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	4-port boards	Minimum MAS units
95	4	4	1	1
330	8	4	2	1
600	12	4	3	1

Recommendations for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units

This section provides information about the port sizing recommendations for Modular Messaging—Exchange and Modular Messaging—Domino systems with Avaya S3500 MAS units.

SIP integration

The following table provides information about the Session Initiation Protocol (SIP) integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports		Minimum MAS units
		Incoming FAX	Outgoing FAX	
3,400	48	48	4	1
7,400	96	96	8	2
Larger systems require a Supplementary Server.				
11,500	144	144	12	3
15,600	192	192	16	4

Subscriber mailboxes	Voice ports	Fax ports		Minimum MAS units
		Incoming FAX	Outgoing FAX	
19,700	240	240	20	5

H.323 integration

The following table provides information about the H.323 integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Minimum MAS units
1,900	30	1
4,300	60	2
6,900	90	3
Larger systems require a Supplementary Server.		
9,400	120	4
11,500	144	5
12,000	150	5
14,500	180	6
17,100	210	7
19,700	240	8

T1 QSIG integration

The following table provides information about the T1 QSIG integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	23-port T1 boards	Minimum MAS units
1,400	23	4	1	1
3,200	46	4	2	1
5,100	69	8	3	2
7,000	92	8	4	2
9,000	115	12	5	3
Larger systems require a Supplementary Server.				
11,000	138	12	6	3
11,500	144	16	7	4
12,900	161	16	7	4

Subscriber mailboxes	Voice ports	Fax ports	23-port T1 boards	Minimum MAS units
14,900	184	16	8	4
16,800	207	20	9	5
18,800	230	20	10	5

E1 QSIG integration

The following table provides information about the E1 QSIG integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	30-port E1 boards	Minimum MAS units
1,900	30	4	1	1
4,300	60	4	2	1
6,900	90	8	3	2
9,400	120	8	4	2
Larger systems require a Supplementary Server.				
11,500	144	12	5	3
12,000	150	12	5	3
14,500	180	12	6	3
17,100	210	16	7	4
19,700	240	16	8	4

Digital Set Emulation integration

The following table provides information about the Digital Set Emulation (DSE) integration recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units.

Note:

In general, Avaya recommends DSE integration for Modular Messaging systems only if the system contains 500 or fewer mailboxes.

Subscriber mailboxes	Voice ports	Fax ports	8-port DSE boards	Minimum MAS units
300	8	4	1	1
900	16	4	2	1
1,500	24	8	3	2

Subscriber mailboxes	Voice ports	Fax ports	8-port DSE boards	Minimum MAS units
2,100	32	8	4	2
2,700	40	12	5	3
3,400	48	12	6	3
4,000	56	16	7	4
4,700	64	16	8	4
5,300	72	20	9	5
6,000	80	20	10	5
6,700	88	24	11	6
7,400	96	24	12	6
8,000	104	28	13	7
8,700	112	28	14	7
Larger systems require a Supplementary Server.				
9,400	120	32	15	8
10,100	128	32	16	8
10,800	136	36	17	9
11,500	144	36	18	9
12,100	152	40	19	10
12,800	160	40	20	10

Analog integration (12-port board)

The following table provides information about the analog integration (12-port board) recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	12-port boards	Minimum MAS units
600	12	4	1	1
1,500	24	4	2	1
2,400	36	8	3	2
3,400	48	8	4	2
4,300	60	12	5	3
5,300	72	12	6	3
6,400	84	16	7	4

Subscriber mailboxes	Voice ports	Fax ports	12-port boards	Minimum MAS units
7,400	96	16	8	4
8,400	108	20	9	5
Larger systems require a Supplementary Server.				
9,400	120	20	10	5
10,400	132	24	11	6
11,500	144	24	12	6
12,500	156	28	13	7
13,500	168	28	14	7
14,500	180	32	15	8
15,600	192	32	16	8
16,600	204	36	17	9
17,600	216	36	18	9
18,700	228	40	19	10
19,700	240	40	20	10

Analog integration (4-port board)

The following table provides information about the analog integration (4-port board) recommendation for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units.

Subscriber mailboxes	Voice ports	Fax ports	4-port boards	Minimum MAS units
95	4	4	1	1
300	8	4	2	1

Recommendations for Modular Messaging—Exchange and Modular Messaging—Domino with customer-provided server

This section provides information about the port sizing recommendations for Modular Messaging—Exchange and Modular Messaging—Domino systems with customer-provided server (Software-only) MAS units.

A software-only configuration is a configuration in which Avaya provides the Modular Messaging software and the customer provides the hardware. Modular Messaging Release

5.1, and later allows the MAS of an Modular Messaging—Exchange and Modular Messaging—Domino system to be installed onto a customer-provided server.

Customer-provided equipment can have either an AMD or an Intel processor. The specification of the hardware must be at least equal to that of an equivalent Avaya-provided server. For example for new installations of Modular Messaging, CPE will be equal to or greater than the Avaya S8800 in terms of memory, disk, and CPU power. For upgrades from existing systems, depending on the hardware used before performing the upgrade, CPE will be equal to or greater than the Avaya S8800, S8730, S3500, or HP DL360 G7 server in terms of memory, disk, and CPU power.

Note:

The installation routine for Modular Messaging assumes that the operating system of the customer-provided server is originally configured similar to that of an Avaya-provided server and has not been hardened prior to the installation. Customers can use the *LAN Port Usage* guide, available at http://www.avaya.com/support to help identify further requirements that will lead to successful installation and operation of the Modular Messaging system.

For more information about the port sizing recommendations for Modular Messaging—Exchange and Modular Messaging—Domino systems with customer-provided server (Software-only) MAS units, see:

- Recommendations for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8800 and HP DL360 G7 MAS units on page 242, when customer-provided server is equivalent to the Avaya S8800 and HP DL360 G7 server.
- Recommendations for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S8730 MAS units on page 242, when customer-provided server is equivalent to the Avaya S8730 server.
- Recommendations for Modular Messaging—Exchange and Modular Messaging—Domino with Avaya S3500 MAS units on page 247, when customer-provided server is equivalent to the Avaya S3500 server.

Port sizing without using Modular Messaging recommendations

Planners that have sufficient prior experience in planning and implementing messaging systems might prefer to carry out the port sizing exercise without referring to the Modular Messaging recommendations.

This section provides guidelines and calculations that planners can use to make estimations, such as traffic generated during the busy hour, port usage, storage capacity, and additional TTS resources.

Concepts a planner must know

Before a planner estimates port requirements, a planner must be familiar with the following concepts.

Busy hour:

Busy hour is the one-hour period of the day when traffic intensity is the highest.

Suppose that during the busiest day of a business week, a total of 3,500 calls are received. The hour between 9:00 a.m. and 10:00 a.m experiences the heaviest traffic, with 490 incoming calls. This makes 9:00 a.m. to 10:00 a.m. the busy hour.

Another way of expressing busy-hour traffic is as a percentage of total daily traffic. In the example above, 490 busy-hour calls is 14% of the 3,500 calls received for the day.

Determining the busy hour:

Most switches can generate traffic reports that provide statistics on a weekly, daily, or hourly basis. Usually these reports break up the traffic statistics by type of call, for example, incoming calls, outgoing calls, and calls to specific hunt groups. Use these reports to determine what the specific traffic patterns are and when the busy hour occurs. If traffic statistics are unavailable, an educated guess at busy-hour traffic is required. The default planning assumption is 14%.

When calculating the busy hour, planners must realize that the busy hour for different divisions or user groups might vary. For example, in an organization that has 1,000 employees in the sales division and 2,000 employees in the technical support division, the busy hour for the sales division may be different from that of the technical support division. Calculate the busy hour for the entire organization. For more information on calculating busy-hour traffic on the MultiSite-enabled Modular Messaging system, see the *Modular Messaging MultiSite Guide*.

Units of measurement for busy-hour traffic:

Busy-hour traffic is normally expressed in minutes, Erlangs, or Centum Call Seconds (CCSs), using the formula:

Busy-hour traffic in Erlangs = (Calls during busy hour x Average duration of each call) /3600

For example:

- Number of calls generated during busy hour = 120
- Average duration of each call = 30 seconds
- Busy-hour traffic = (120 x 30) / 3600 = 1 Erlang
- 1 Erlang of busy-hour traffic = 3,600 call seconds, or 60 call minutes, or 36 CCSs of busy-hour traffic

Note:

1 CCS = 100 call seconds. There are 3,600 seconds in 1 hour.

3,600 call seconds(/60) = 60 call minutes(/60) = 1 call hour or Erlang = 36 CCSs

Busy-hour offered traffic:

Busy-hour offered traffic is the total traffic offered to a group of ports during the busy hour. Traffic includes calls that are delayed or blocked. Offered traffic is usually expressed in minutes, Erlangs, or CCSs.

GOS:

GOS is the probability that an incoming call is significantly delayed or blocked because all ports are in use.

With switches that support queueing, calls are queued up on the switch, and the caller hears multiple rings because all ports are in use. The call is eventually answered if the caller does not hang up.

With switches that do not support queuing, calls are blocked when all ports are in use and the callers hear a busy tone.

GOS is expressed as a percentage of busy-hour calls that are delayed or blocked. For example, if the number of ports is sized so that only 2 of 100 calls might be delayed or blocked during the busy hour, the system is said to provide a P.02 GOS. If only 5 of 100 calls are likely to be delayed or blocked, the system provides a P.05 GOS. P.01 is a better GOS than P.05 and, therefore, requires more ports.

Common industry GOS for messaging servers are P.01, P.02, P.03, and P.05.

There is a trade-off between cost and GOS. The choice is a business decision based on several factors, including:

- An assessment of how critical the application is to the business
- An assessment of the cost of ports required to provide the required GOS

For more information, see Grade of service on page 385.

Estimating port requirements

Planners must make an accurate estimate of ports needed to provide an acceptable level of service to subscribers.

Ports are utilized when incoming calls are made to the system or when the system makes outgoing calls. Planners must estimate the traffic generated by the following call types:

- Calls made by subscribers and external callers during the busiest hour of the day
- Calls made by the system to support features that require outgoing calls

Calculating the busy-hour offered traffic

Most newer switches provide traffic statistic reports that provide an accurate picture of traffic patterns on the switch. When planners prepare for the implementation of a messaging system, they need to study a minimum of traffic data from 1 week to determine daily and hourly call volumes.

Standard traffic-engineering tables are used to determine the proper number of ports based on busy-hour offered traffic.

To calculate the busy-hour offered traffic, planners must know or estimate the following values:

- The average number of incoming and outgoing calls generated during the busy hour.
- The average hold time (AHT) or duration of a call.

  AHT is usually expressed in seconds or minutes. The hold time must include call setup and tear-down time. Setup time starts from the moment a port is seized, that is, when ringing starts. Tear-down time is the time it takes for the port to be available to process another call after a caller hangs up or is disconnected by the server.

Busy-hour offered traffic = (Average number of incoming and outgoing calls during the busy hour) x (AHT in seconds) / 3600 Erlangs

The following table is an example of busy-hour calculation.

Calls generated during busy hour	1500
AHT of a call	45 seconds
Total busy-hour traffic	1,500 calls x 45 seconds = 67,500 call seconds 67,500/60 = 1,125 call minutes 67,500/3600 = 18.75 Erlangs 67,500/100 = 675 CCSs

To predict busy-hour traffic accurately, planners must collect reliable traffic data that reflects the calling patterns specific to an installation or application. If busy-hour calls are underestimated, the number of ports might not be sufficient to provide users with an acceptable level of service. If busy-hour calls are overestimated, the additional number of ports increases the cost of providing the service needlessly.

Estimating traffic generated by incoming and outgoing calls

Traffic generated by incoming and outgoing calls include traffic generated by:

- Incoming calls
  - Call Answer messages
  - Automated Attendant and Caller Applications
  - Incoming fax messages

- Find Me - Caller
- Caller-requested Notify Me calls
- Subscribers using the TUI
- Record, for example, conference calls

• Outgoing calls

- Outgoing fax messages
- Automated Attendant and Caller Applications, when transferring answered calls

  The use of a port for an outgoing call during call transfers is integration dependent.
- Call Me
- MWI

  The use of a port for an outgoing call for MWI is integration dependent.
- Find Me - subscriber being called
- Client Access through dual connect (command and control from the computer; listen and record through the telephone)

Traffic estimation guidelines

Some guidelines to help planners estimate the traffic generated by incoming and outgoing calls include:

• To place an outgoing call, the MAS uses a port. The traffic generated by these features can significantly affect the GOS if this traffic is not included in the estimate of busy-hour offered traffic.

  If outgoing call delivery traffic is managed so that the majority of it occurs outside the busy hour, the impact on busy-hour GOS is minimized. If a large amount of outgoing call traffic is expected during the busy hour, size a separate group of outgoing ports and dedicate them to applications that require outgoing calls.

• With some SWINs, such as T1, E1, SIP, and H.323 integration, features that require a call transfer use two ports on the same MAS. These features include:

  - Find Me. Whenever a Find Me call is made, two ports are used. One port is used for the incoming call, and one port is used for the outgoing call to the subscriber.
  - Automated Attendant and Caller Applications. Whenever Automated Attendant or a Caller Application transfers an answered call, two ports are used.

    When such features are used often, a higher number of ports are required. Planners must take this into account when estimating the number of ports required.

- Calculation of port usage for MWI varies, depending on the SWIN that the Modular Messaging system and the switch support. For IP integrations, T1, E1, or DSE integrations, administrators must configure port groups for MWI.

  When Modular Messaging uses Analog or DSE switch integration (SWIN) to integrate with an Avaya switch that supports Port Affinity, an increased number of ports must be allocated for MWI than with any other switch integration type or with any non-Avaya switch.

  Port Affinity is a feature on Avaya switches that affects the way in which ports are used to handle MWI requests. Port Affinity necessitates that when an MWI lamp is lit on a subscriber's extension by a specific MAS port, the same port must be used to reset the MWI lamp. If a different port is used to reset the lamp, the lamp remains lit. This is a feature of MWI on Avaya switches when the MAS uses Analog or DSE SWINs.
- Port usage varies, depending on the medium used to retrieve messages. When subscribers use the TUI or telephone to retrieve messages, port usage is high. When subscribers use a computer to retrieve messages, port usage is low. For example:
  - From Modular Messaging Outlook Client or Modular Messaging Restricted Outlook Client, if subscribers use a telephone to play or record messages, port usage is high.
  - From Modular Messaging Outlook Client or Modular Messaging Restricted Outlook Client, if subscribers use the local multimedia capabilities to play or record messages, port usage is low.
- When subscribers use Modular Messaging Web Client or the one-X Speech client to retrieve messages, Modular Messaging port usage is low.
- When subscribers use the TUI to retrieve e-mail messages, TTS resources are in use and the AHT of a call increases. With an increase in AHT, ports are busy for a longer time.

Total estimated port requirements

To size port requirements:

1. Calculate the total estimated traffic generated by incoming and outgoing calls
2. For the number of ports required for a given GOS, see the tables in Grade of service on page 385.
   - If the telephone system does not support queuing calls, see the calculations based on the Erlang B model.
   - If the telephone system supports queuing calls, see the calculations based on the Erlang C model.

A system planner needs to allow for a safety or growth factor of 5% to 15% when sizing the initial implementation.

Planning for port requirement

The following table provides an example for planning port requirements of a Modular Messaging—MSS system.

Modular Messaging—MSS port requirements planning

Feature using ports	Average hold time (AHT)	Percent capable	Frequency per day per user	Percent busy hour	Seconds per day	Erlangs	CCS
Per subscriber							
Call Answer	35	100	2.000	14.0	70.00	0.02	0.70
Fax Answer	5	100	0.050	14.0	0.25	0.00	0.00
Fax inbound	120	100	0.050	14.0	6.00	0.00	0.06
Fax outbound	120	100	0.025	14.0	3.00	0.00	0.03
Automated Attendant	20	100	3.000	14.0	60.00	0.02	0.60
Caller Application 1	60	100	0.250	10.0	15.00	0.00	0.15
Caller Application 2	30	100	2.000	14.0	60.00	0.02	0.60
Caller Application 3	120	100	0.100	10.0	12.00	0.00	0.12
Call Me	180	20	2.000	5.0	72.00	0.02	0.72
Find Me - calling party	120	10	6.000	5.0	72.00	0.02	0.72
Find Me - called party	300	10	3.000	5.0	90.00	0.03	0.90
TUI access	180	100	3.000	14.0	540.00	0.15	5.40
Client access/dual connect	60	30	3.000	14.0	54.00	0.02	0.54
Record[1]	2,700	100	0.001	10.0	2.70	0.00	0.03
Total per day	—	—	—	—	1,056.95	0.29	10.57
Total per busy hour	—	—	—	11.9	125.73	0.03	1.26
Per system (5,000 subscribers)							
Total per day	—	—	—	—	5,284,750	1,467.99	52,847.50
Total per day busy hour	—	—	—	—	628,625	174.62	6,286.25

1. For example, conference calls.

The following table provides an example for planning port requirements of a Modular Messaging—Exchange and Modular Messaging—Domino system.

Modular Messaging (Exchange or Domino) port requirements planning

Feature using ports	AHT	Percent capable	Frequency per day per user	Percent busy hour	Seconds per day	Erlangs	CCS
Per Subscriber							
Call Answer	35	100	2.000	14.0	70.00	0.02	0.70
Fax Answer	5	100	0.050	14.0	0.25	0.00	0.00
Fax inbound	0	100	0.000	14.0	0.00	0.00	0.00
Fax outbound	0	100	0.000	14.0	0.00	0.00	0.00
Automated Attendant	20	100	3.000	14.0	60.00	0.02	0.60
Caller Application 1	60	100	0.250	10.0	15.00	0.00	0.15
Caller Application 2	30	100	2.000	14.0	60.00	0.02	0.60
Caller Application 3	120	100	0.100	10.0	12.00	0.00	0.12
Call Me	180	20	3.000	5.0	108.00	0.03	1.08
Find Me - calling party	120	10	6.000	5.0	72.00	0.02	0.72
Find Me - called party	300	10	3.000	5.0	90.00	0.03	0.90
TUI access	360	100	2.000	14.0	720.00	0.20	7.20
Client access/dual connect	60	60	3.000	14.0	108.00	0.03	1.08
Record[1]	2,700	100	0.001	10.0	2.70	0.00	0.03
Total per day	—	—	—	—	1,317.95	0.37	13.18
Total per busy hour	—	—	—	12.1	159.03	0.04	1.59
Per system (5,000 subscribers)							
Total per day	—	—	—	—	6,589,750.00	1,830.49	65,897.50
Total per day busy hour	—	—	—	—	795,125.00	220.87	7,951.25

1. For example, conference calls.

Calculations of the number of Messaging Application Servers required

The number of slots available and the number of cards supported restricts the number of ports that an MAS supports.

Modular Messaging—MSS supports a maximum of five MAS units per VMD. Modular Messaging—Exchange and Modular Messaging—Domino support a maximum of 10 MAS units per VMD.

To determine the correct, not the minimum, number of servers needed, consider the effects of the following factors:

- The VMD design. For more information, see General rules for voice mail domains on page 207.
- Switch configuration and integration. For more information, see Switch integration and telephony protocols on page 173.
- The number of PCI slots available and the number of ports on the voice card.
- Port usage patterns. For more information, see Estimating traffic generated by incoming and outgoing calls on page 255.
- MAS load balancing. For more information, see Messaging application server load balancing on page 266.

Examples of the number of MAS units recommended

The examples in this section show the number of MAS units recommended, depending on the integration type and number of voice ports.

For more information about integration types, see Switch integration and telephony protocols on page 173.

Modular Messaging—MSS using analog integration

In this example, an organization has 5,500 subscribers.

- Recommended number of voice ports = 96
- Maximum number of cards supported per MAS = 2
- Number of ports per card = 12
- Number of ports per MAS = 24
- Number of MAS units recommended for 96 voice ports = 4

In this example, two voice cards can be installed on each MAS. However, to allow for future expansion, administrators might want to distribute the ports across five MAS units.

Modular Messaging—MSS using SIP integration

In this example, an organization has 4,000 subscribers, with a requirement of approximately 70 IP sessions.

- Maximum number of IP sessions per MAS = 96
- Number of IP sessions supported by 2 MAS units = 192

In this example, administrators can use only one MAS for all IP sessions.

Evaluating the additional load on the network and e-mail servers

Implementing Modular Messaging results in the flow of voice data over the data network. This section provides the information required to calculate the additional network traffic generated by a Modular Messaging system.

This section provides guidelines for evaluating the additional network traffic when the message store is Microsoft Exchange or IBM Lotus Domino.

Note:

Customers must keep their systems within performance operating ranges prescribed by Microsoft and IBM Lotus. To support the extra load for voice messaging, Avaya requires that the CPU utilization is no more than 50%.

The calculation for additional network traffic is based on several factors, including:

- Number of MAS units in the VMD
- Number of ports on each MAS
- Usage characteristics
- Voice encoding rate: 13 kilobits per second for GSM, 64 kilobits per second for G.711

Worst-case network load

Use the following formula to calculate the worst-case network load contributed by a VMD.

Worst-case network bandwidth:

GSM encoding: Number of MAS units in the VMD x Number of ports on each MAS x 13 kilobits per second

G.711 PCommunication Manager encoding: Number of MAS units in the VMD x Number of ports on each MAS x 64 kilobits per second

For example, for a site with a VMD containing five MAS units, each with 24 ports, the worst-case network bandwidth is:

For GSM encoding, 5 x 24 x 13 = 1,560 kilobits per second

For G.711 PCommunication Manager encoding, 5 x 24 x 64 = 7,680 kilobits per second

You must also apply a factor of 10% to allow for the overhead that is applicable to the network protocols and options that are in operation.

This calculation is based on the worst-case assumption that all ports are recording or playing voice data at the same time. This calculation estimates the total network traffic potentially added but does not indicate how many ports receive calls and how many ports make calls.

Note:

The worst-case network load calculation does not include burst rates caused by bursty message deliveries or bursty message playback.

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This calculation is based on the worst-case assumption that all ports are recording or playing voice data at the same time. This calculation estimates the total network traffic potentially added but does not indicate how many ports receive calls and how many ports make calls.

Note:

The worst-case network load calculation does not include burst rates caused by bursty message deliveries or bursty message playback.

Chapter 13: Other planning considerations

Planning for redundancy

Administrators must include redundancy while planning for a Modular Messaging implementation.

Planning for redundancy includes:

- Messaging application server redundancy on page 263
- Message Storage Server redundancy on page 265

In addition, administrators must consider power redundancy. Avaya requires that all servers are connected to an Uninterruptible Power Supply (UPS) for power backup.

Messaging Application Server redundancy

Messaging Application Server (MAS) redundancy means that when an MAS in a multi-MAS voice mail domain (VMD) goes out of service, the system can continue to send and receive messages.

Use the following guidelines when planning for MAS redundancy:

- Install a balanced number of voice cards on each MAS to ensure that the voice ports are distributed evenly across MAS units in the VMD. Voice port distribution ensures that if one or more MAS units are out of service, an adequate number of voice ports are still available.
- With Digital Set Emulation (DSE) or Q-Signaling (QSIG) telephony, ensure that incoming port groups for all MAS units are in the same hunt group. If incoming port groups are in different hunt groups, calls presented to a port group on an unavailable MAS might not be routed to another port on an available MAS.

  For more information about hunt groups, see Switch integration and telephony protocols on page 173.
- With analog telephony, use wiring to enable a single extension on the switch to serve two MAS units. Thus, if one MAS is unavailable, calls from the switch extension can go to the other MAS.

  When using wiring to enable two MAS units to be serviced by a single extension on the switch, ensure that only one MAS unit is allowed to make outgoing calls. Also note that

the ring count on the second MAS must be greater than the first to avoid a race to answer the call.

- For greater reliability, ensure that extension numbers for the port boards on the MAS are distributed over several switch boards.

N+1 server configuration for MAS redundancy

Modular Messaging offers redundancy of voice ports by an N+1 server configuration.

N+1 server configuration is the implementation of more than the minimum number of MASs recommended to increase availability and reliability. An N+1 server configuration can be implemented only if certain established maximum limits are not exceeded:

- A five MAS limit for Modular Messaging—Avaya MSS version
- A 10 MAS limit for Modular Messaging—Microsoft Exchange version and Modular Messaging—IBM Lotus Domino version

Added redundancy with N+1 server configuration

An N+1 server configuration provides redundancy for the following inbound services:

- Call Answer
- Subscriber access
- Dual-connect for GUI access
- Automated Attendant
- Caller Applications
- Fax answer and transfer (Microsoft Exchange and IBM Lotus Domino message stores)
- Inbound fax receipt

Some Modular Messaging services are MAS dependent and could be affected if they are on the MAS that goes out of service:

- The Tracing Service (if the Tracing Service resides on an MAS). Operation History events are queued on the local MAS until the Tracing server is operational again, subject to the buffer size that has been configured in VMSC.
- The Audit Service is installed to run on each Messaging Application Server (MAS) in the voice mail domain, and the supplementary server. To activate MAS Auditing, the service on one MAS in the voice mail domain must be assigned to be the Modular Messaging Audit Server. If the Audit Server is unavailable, then the Audit Service does not work.
- The Offline Call Answer Store server. An MAS will not offer offline access if it is unable to communicate with the Offline Call Answer Store server. This condition does not arise unless both the message store and the Offline Call Answer Store server are unavailable.

- Call Me and MWI are installed on a single MAS. If that MAS is not running, neither of these services will work.
- Outbound fax

  Administrators can install the Fax Sender Server on more than one MAS in a voice mail domain. If subscribers do not use the Modular Messaging Shared Fax Driver then the system can easily be reconfigured to use a different MAS to send faxes before a planned outage. If subscribers do use the Modular Messaging Shared Fax Driver then that becomes more difficult because each subscriber's fax printer would have to be reconfigured.

Distributing ports in an N+1 server configuration

In an N+1 server configuration, ports can be distributed in any of the following methods:

- Add extra port capacity to provide redundancy

  More ports than are required for day-to-day use are deployed. Additional ports may be added to the N+1 MAS until the system limits on ports and MAS units are reached. The additional ports are used for normal operation and ensure that even when an MAS is not running, customers still have the number of ports they need to provide needed service levels.

- Spread existing capacity over extra servers to provide redundancy

  The port capacity of the voice mail domain remains unchanged even after implementing an additional MAS (N+1). The required number of ports is spread across all MAS units, including the N+1 MAS. If a server stops running, the system will have less capacity than normal but is still able to provide service.

Message Storage Server redundancy

If a message store becomes unavailable to MAS units, Modular Messaging is able to provide the following services:

- Call Answer
- Emergency retrieval of new Call Answer messages from the Modular Messaging telephone user interface (TUI)

For more information, see Offline access to Call Answer messages on page 142.

The MSS provides backup capabilities that include backing up data to a digital versatile disc (DVD) Random Access Memory (RAM) drive or to a remote storage location on the LAN through Distributed Transaction Process (DTP) and Secure File Transfer Protocol (SFTP).

One DVD-RAM medium holds approximately 4.7 GB of data. If a system failure occurs, administrators can use the data stored on the media to restore the system to an operational state. For more information, see Backup capabilities on page 130.

Messaging Application Server load balancing

Modular Messaging services and components are installed on each MAS in the VMD, but are enabled only on the MAS on which the service is configured to run.

In a multi-MAS VMD, Avaya recommends the following guidelines for the placement of services:

- Configure the Call Me Service and MWI Service along with Mailbox Monitor on the same MAS.
- For smaller systems, the following services and components reside on the same MAS:
  - Tracing Service
  - Call Me Service
  - MWI Service
  - Mailbox Monitor
  - Fax Sender Service
  - Windows Fax Service
  - Offline Call Answer Store

For large systems, Avaya recommends installing these services on a separate computer, other than an MAS. This separate computer, known as a Supplementary Server, is either:

- an Avaya-provided S8800, S8730, S3500, or HP DL360 G7 server that is purchased additionally, or
- a customer-provided equipment that meets the requirements specified in Supplementary Server requirements on page 348

Note:

The separate computer recommended for installing the Modular Messaging services was known as Tracing Server in some previous releases of Modular Messaging.

Note:

If customers purchase a Supplementary Server, Avaya recommends hosting Offline Call Answer Store and Administration Clients also on this same server.

Recommended placement of server components

The following table provides information about the recommended placement of services and components for Modular Messaging with the S3500, S8730, S8800, and HP DL360 G7 server.

Note:

Call Me Service and MWI Service are coresident with Mailbox Monitor.

The following table lists the recommended placement for Modular Messaging with the S3500 server.

Number of MAS units	SWIN and TUI	MAS no. 1[1]	MAS no. 2	MAS no. 3	MAS no. 4 to 10[2]	Supplementary Server
1	Any	Tracing Service Call Me Service MWI Service Mailbox Monitor Service Fax Sender Service Web Subscriber Options[3] WebLM[4]	NA	NA	NA	NA
2	Any	Call Me Service MWI Service Mailbox Monitor Service WebLM[4]	Tracing Service Fax Sender Service Offline Message Store	NA	NA	NA
3[5]	Any (when less than 120 ports)	Fax Sender Service[6] WebLM[4]	Call Me Service MWI Service Mailbox Monitor Service	Tracing Service Offline Message Store	NA	NA
4[5] to 10[2]	Any (when greater than 120 ports)	Call Answer WebLM[4]	Call Answer	Call Answer	Call Answer	Tracing Service Call Me Service MWI Service Mailbox Monitor Service Fax Sender Service Web Subscriber Options[3]
4[5] to 10[2]	Offline Message Store will be holding more than hours: 10,000 – GSM 2,000 – G.711	Call Answer WebLM[4]	Call Answer	Call Answer	Call Answer	Tracing Service Call Me Service MWI Service Mailbox Monitor Service Fax Sender Service Web Subscriber Options[3]

1 This MAS must have the smallest number of ports.

2 Modular Messaging—MSS supports a maximum of five MAS units in a VMD.

3 If the Modular Messaging system has less than 500 subscribers.

4 WebLM is not a required service. WebLM only needs to be installed in the absence of another license server that Modular Messaging can use.

5 Modular Messaging systems with more than 500 subscribers must have Web Subscriber Options installed on a separate standalone server.

6 Fax Sender service is unavailable for the H.323 integration.

The following table lists the recommended placement for Modular Messaging with the S8730 server.

Number of MAS units	SWIN and TUI	MAS no. 1[1]	MAS no. 2	MAS no. 3	MAS no. 4 to 10[2]	Supplementary Server
1	Any	Tracing Service Call Me Service MWI Service Mailbox Monitor Service Fax Sender Service Web Subscriber Options[3] WebLM[4]	NA	NA	NA	NA
2	Any	Call Me Service MWI Service Mailbox Monitor Service WebLM[4]	Tracing Service Fax Sender Service Offline Message Store	NA	NA	NA
3[5]	Any	Fax Sender Service[6] WebLM[4]	Call Me Service MWI Service Mailbox Monitor Service	Tracing Service Offline Message Store	NA	NA
4[5] to 10[2]	288 ports and Heavy call volume (35,000 calls per MAS per day)	Call Answer WebLM[4]	Call Answer	Call Answer	Call Answer	Tracing Service Call Me Service MWI Service Mailbox Monitor Service Fax Sender Service Web Subscriber Options[3]
4[5] to 10[2]	Offline Message Store will be holding more than hours: 10,000 – GSM 2,000 – G.711	Call Answer WebLM[4]	Call Answer	Call Answer	Call Answer	Tracing Service Call Me Service MWI Service Mailbox Monitor Service Fax Sender Service Web Subscriber Options[3]

1 This MAS must have the smallest number of ports.

2 Modular Messaging—MSS supports a maximum of five MAS units in a VMD.

3 If the Modular Messaging system has less than 500 subscribers.

4 WebLM is not a required service. WebLM only needs to be installed in the absence of another license server that Modular Messaging can use.

5 Modular Messaging systems with more than 500 subscribers must have Web Subscriber Options installed on a separate standalone server.

6 Fax Sender service is unavailable for the H.323 integration.

The following table lists the recommended placement for Modular Messaging with the S8800 and the HP DL360 G7 server.

Number of MAS units	SWIN and TUI	MAS no. 1[1]	MAS no. 2	MAS no. 3	MAS no. 4 to 10[2]	Supplementary Server
1	SIP	Tracing Service Call Me Service MWI Service Mailbox Monitor Service Fax Sender Service Web Subscriber Options[3] WebLM[4]	NA	NA	NA	NA
2 to 10	SIP	Call Answer WebLM[4]	Call Answer	Call Answer	Call Answer	Tracing Service Call Me Service MWI Service Mailbox Monitor Service Fax Sender Service Admin Tools

1 This MAS must have the smallest number of ports.

2 Modular Messaging—MSS supports a maximum of five MAS units in a VMD.

3 If the Modular Messaging system has less than 500 subscribers.

4 WebLM is not a required service. WebLM only needs to be installed in the absence of another license server that Modular Messaging can use.

Recommendations for Offline Call Answer Store

Modular Messaging provides Call Answer Services to callers that cannot reach subscribers. Callers can use these Call Answer services to leave voice or fax messages for subscribers.

Modular Messaging continues to provide Call Answer services to callers, even when a message store cannot be accessed. This feature is known as Offline Call Answer. In addition, Modular Messaging provides subscribers with emergency access to these Offline Call Answer messages from the Common Offline Access interface. For more information, see Offline Call Answer on page 141.

The MAS caches all Call Answer messages that it receives in a local message store. In a multi-MAS VMD, each MAS migrates copies of Call Answer messages in its local offline message store to a common repository. This repository, known as Offline Call Answer Store, contains copies of messages from all MAS units in a VMD.

Offline Call Answer Store is a single repository for Call Answer messages taken for all subscribers in the VMD, in the last *x* number of hours. The value of *x* is 24 by default but can be changed to any value from 1 to 99.

Offline Call Answer Store can reside on any one of the following computers:

- An MAS

  Offline Call Answer Store can reside on an MAS that can store up to 5,000 hours of GSM-encoded messages, that is, 1,000 hours of G.711-encoded messages. This storage space is used by Call Answer messages in the local store and Call Answer messages in Offline Call Answer Store.

- A Supplementary Server

  The Supplementary Server can be an Avaya S8800, S8730, S3500, or HP DL360 G7 server, an auto-configured Avaya Store Supplementary Server, or a customer-provided equipment that meets the requirements specified in Supplementary Server requirements on page 348.

  An auto-configured Avaya Store Supplementary Server can be used only with a Modular Messaging—MSS system. Similarly, an auto-configured Exchange Supplementary Server can be used only with a Modular Messaging—Exchange system.

  Note:

  When a Supplementary Server is used as the Offline Call Answer Store, each MAS still needs to maintain it's own local cache of Call Answer messages it has handled.

  An Avaya server on which the Modular Messaging software has not been installed provides up to 10,000 hours of GSM-encoded messages or 2,000 hours of G.711-encoded messages. This capacity is sufficient to store one copy of Call Answer messages from each MAS in the VMD.The Supplementary Server must be on the customer's LAN with Modular Messaging—Exchange. With Modular Messaging—MSS, this system must be on the private LAN that connects the MAS units with the MSS.

  If customers purchase a Supplementary Server for Offline Call Answer Store, Avaya recommends installing the following services also on this system:

  - Tracing Service
  - Call Me Service and MWI Service, with Mailbox Monitor
  - Fax Sender Service
  - Modular Messaging Audit database

Avaya recommends that Modular Messaging administration clients be run from this system because of their intensive resource requirements.

Modular Messaging does not support configurations with Offline Call Answer Store over a Metropolitan Area Network (MAN) or Wide Area Network (WAN).

Calculating the number of hours for message storage

To calculate the number of hours required for Offline Call Answer Store to store messages, planners must have these details:

- Total number of mailboxes on the system. (M)
- Total number of voice and fax Call Answer messages received daily per subscriber. The default is 5. (nCA)
- Average length of voice and fax Call Answer messages, in seconds. The default is 30. (L)
- Number of MAS units in the VMD. (nMAS)
- Retention time, in hours, for offline Call Answer messages. The default is 24 but can be changed to any value from 1 to 99. (HRS)
- Message encoding format: GSM 6.10 or G.711

The rules for calculating the hours of storage are:

- Hours required for 24-hour period (24HRS): (M x nCA x L)/3600
- Hours required for *n* hour periods (nHRS): 24HRS x nHRS/24

The calculations for evaluating whether Offline Call Answer Store must be located on an MAS or on the Supplementary Server are:

- An MAS can host Offline Call Answer Store if the MAS meets the following criteria:

  nHRS + (nHRS/nMAS) <_5,000 (GSM) or 1,000 (G.711)

- A Supplementary Server can host Offline Call Answer Store if the server meets the following criteria:

  nHRS <_10,000 (GSM) or 2,000 (G.711)

Example of Offline Call Answer Store message storage

The following table provides an example for calculating the requirements for storing offline Call Answer messages.

Input	Value
Number of seats or mailboxes (M)	5,000
Average number of incoming Call Answer messages per seat in a 24-hour period (nCA)	5
Average length of messages, in seconds (L)	30
Number of MAS units in configuration (nMAS)	2

Input	Value
Number of hours of storage required (HRS)	24
Message encoding format	GSM
Hours of storage	
Hours of storage required for 24-hour period (24HRS)	(M x nCA x L)/3600 = 208
Total hours of storage for *n* hour periods (nHRS)	24HRS x HRS/24 = 208
On-board evaluation (located on one of the MAS units)	
Total on-board hours (copy for all MAS units plus local MAS copy)	nHRS + (nHRS/nMAS) = 313
On-board MAS is OK or not OK Maximum 5,000 GSM/1,000 G.711	Is OK
Off-board evaluation (On Supplementary Server)	
Total off-board hours (copy of all MAS units)	nHRS = 208
Off-board S8730, assuming 60 GB available, is OK or not OK Maximum 10,000 GSM/2,000 G.711 hours	Is OK

Calculating the message storage capacity

Modular Messaging supports the GSM and G.711 encoding formats.

The following table shows the storage spaces required to encode voice messages using the GSM and G.711 formats.

Encoding rate	GSM	G.711
Voice messages		
Bytes per second (Bps)	1,625	8,000
Kilobytes per second (KBps)	1.58	7.81
Kilobytes per minute (KB per minute)	95.2	468.8
Megabytes per hour (MB per hour)	5.6	27.5
Fax messages		
Kilobytes per page (subject to coverage, quality, file format)	80	80

Note:

These calculations use the following definitions:

1024 bytes = 1 KB

1024 KB = 1 MB

Storage space available on message application server

The maximum hours available on the MAS for storage of Call Answer messages are:

- For GSM storage: 5,000 hours
- For G.711 storage: 1,000 hours

Note:

These values are estimated maximum values and are not guaranteed. The storage capacity might be reduced by the use of other files, such as log files.

This storage space is used by Call Answer messages in the local store and Call Answer messages in Offline Call Answer Store.

Storage space available on the Message Storage Server

Modular Messaging supports the GSM, G.711 A-law, and G.711 μ-law encoding formats.

An MAS can play and record the GSM, G.711 A-law, and G.711 μ-law audio encoding formats. The single format specified by the VMD setting refers to the format used to record voice messages, recorded names, and greetings by the TUI and graphical user interface (GUI) clients.

The MSS can support both encoding formats simultaneously, as the MSS might receive messages from remote subscribers in any supported format.

The G.711 encoding format consumes approximately five times as much storage space as the GSM format. However, the G.711 format provides better sound quality and also provides Teletypewriter (TTY) support.

For more information on the maximum hours of storage available on an MSS, see Avaya Message Storage Server capacities on page 220.

Calculating the storage space on e-mail servers

Administrators of the e-mail environment usually define a maximum amount of space that each subscriber is entitled to have on the corporate e-mail system. If voice and fax messages are going to be added to the e-mail message store, this needs to be accounted for.

Subscribers must be able to operate within existing allocations or be granted incremental space as required.

The amount of additional storage space required for voice and fax messaging on Microsoft Exchange or IBM Lotus Domino e-mail servers depends on several factors, including:

- Average number of Call Answer messages sent and received per day
- Average duration of Call Answer messages
- Average number of voice messages sent and received per day
- Average duration of voice messages
- Average number of fax messages sent and received per day
- Average length and size of fax messages
- Average retention period for storage of messages
- Number of subscribers in the organization
- Average retention period for storage of messages

Example of e-mail server storage capacity calculation

To calculate the impact that voice messages will have on the current e-mail store based on which encoding algorithm is being used, consider the example shown in the following table.

Assumption per subscriber		GSM encoding	G.711 encoding
Voice and Call Answer messages			
Total number of voice and Call Answer messages sent and received per day	6	—	—
Average length (seconds)	40	—	—
Size (KBps)	—	1.58	7.81
Space required for storage of new messages (MB)	—	0.370	1.830
Fax messages			
Total number of fax messages sent and received per day	0.075	—	—

Assumption per subscriber		GSM encoding	G.711 encoding
Average length of fax (pages)	3	—	—
Size in KB per page (subject to coverage, quality, file format)	80	—	—
Space required for storage of new fax messages (MB)	—	0.018	0.018
Total storage requirements			
Total daily storage (MB)	—	0.388	1.848
Average retention period (days)	10	—	—
Total message store requirement (MB)	—	3.88	18.48
E-mail storage allocation			
Current e-mail storage allocation per subscriber (MB)	50	—	—
Percentage of current e-mail allocation for voice mail	—	7.76	36.96

Storage planning

The following table provides a calculator for storage planning.

	Assumption	GSM	G.711
Assumptions per subscriber			
Subscribers	5,000	—	—
Call Answer messages per day	4	—	—
Average duration of Call Answer messages	30 seconds	47 KB	234 KB
Fax messages per day	0.05	—	—
Length of fax messages	3 pages	240 KB	240 KB
Local messages sent	1	—	—
Network messages sent	0.04	—	—
Local messages received	1	—	—
Network messages received	0.06	—	—
Average message length	60	95 KB	469 KB
Average retention period	2 days	—	—

	Assumption	GSM	G.711
Message Store (1=MSS, 0 = E-mail)	1	—	—
Subscriber summary			
Total voice or Call Answer messages per day (sent or received)	6.1	—	—
Weighted average length of messages	40.3 seconds	—	—
MAS requirements			
MAS requirement	167 hours	—	—
Fax	750 pages	—	—
MAS requirement	—	1,035 MB	4,800 MB
Number of MAS units	—	Needs to be calculated	
Offline access requirements			
Retention period	48 hours	—	—
Offline Call Answer Store Assumes equal distribution of messages over period	—	1,987 MB	9,167 MB
Message Store requirements			
Message Store requirement Assumes each recipient is charged with space	683.3 hours	—	—
Fax	750 pages	—	—
Message Store requirement	—	3,887 MB	18,792 MB
Planning for Unified Message store			
Total MB per user for voice and fax messaging	—	0.777	3.758
Current e-mail storage allocation per user	50 MB	—	—
Percentage of current allocation for voice mail	—	1.55%	7.5%

Fax port and storage planning

Planners can use the calculator provided in the following table for fax port and storage planning.

Planning assumptions		
Number of subscribers	500	—

Planning assumptions			
Average length of fax messages	3 pages		
Page coverage	80%		
Storage format	.tif		
Fax per day per heavy user	0.75 faxes		
Percentage of heavy users	10%		
Fax per day per user	0.075 faxes		
Retention time	2 days		
Percentage of busy hour	14%		
	Standard	Fine	Average
Mix	50%	50%	100%
Storage per page	40.0 KB	80.0	60.0
Port utilization per page	40.0 seconds	70.0	55.0
Storage			
Per fax	120.0 KB	240.0	180.0
Per user per day	9.0 KB	18.0	13.5
Per user base per day	4.5 MB	9.0	6.8
Retention	9.0 MB	18.0	13.5
Port utilization			
Per fax	120.0 seconds	210	165.0
Per user per day	9.0 seconds	15.8	12.4
Per user base per day	4,500.0 seconds	7,875.0	6,187.5
Per user base per busy hour	630.0 seconds	1,102.5	866.3
Per user base per busy hour	6.3 CCS	11.0	8.7
Per user base per busy hour	0.2 Erlangs	0.3	0.2

Message retention estimate

To calculate the message retention estimate, planners need the following information:

- Percentage of daily messages retained (A)
- Maximum retention limit (B)
- Average retention time relative to retention limit (C)

The calculations for message retention estimate are:

- Average retention time for retained messages (D): [B x C]
- Average retention for all messages; includes 1-day cycle time for daily messages not retained: [1 x A + D x (1-A)]

The following table provides an example for calculating the message retention estimate.

Planning inputs	Value
Percentage of daily messages retained	0.55 %
Maximum retention limit	20 days
Average retention time relative to retention limit	0.4 days
Calculation	
Average retention time for retained messages	[20 x 0.4] 8 days
Average retention for all messages (includes 1-day cycle time for daily messages not retained)	[1 x 0.55 + 8 x (1-0.55)] 4.15 days

Calculating the number of desktop users per voice mail domain

System message notification is limited to a certain number of subscribers within a VMD. Subscribers that are not enabled for system message notification can rely on the notification mechanisms provided by the GUI clients for being notified of new messages. For more details, see Message notification capacities on page 187.

Modular Messaging—MSS supports two types of standards-based e-mail clients:

- E-mail clients based on IMAP4 standards, known as IMAP4 clients
- E-mail clients based on POP3 standards, known as POP3 clients

The Modular Messaging recommendations show the number of ports that are required to provide service to a given number of subscriber mailboxes. The number of mailboxes is based on port calculations alone. The number of IMAP4 and POP3 clients that Modular Messaging supports is limited by the maximum number of sessions supported.

In addition to the GUI clients, Modular Messaging—MSS also supports Modular Messaging Web Client and Web Subscriber Options. In addition to the GUI clients, Modular Messaging—Exchange and Modular Messaging—Domino also supports Web Subscriber Options.

The Modular Messaging Web Client allows subscribers to access, send, and manage voice, text, and fax messages from a Web browser. Modular Messaging Web Client uses IMAP4 client connections to communicate with Modular Messaging—MSS.

The Web Subscriber Options application allows subscribers to modify their mailbox settings from a Web browser.

IMAP4 client limits

With a Modular Messaging—MSS system, all active IMAP4 clients require an IMAP4 session on the Avaya MSS.

In Modular Messaging—MSS, S8000 and S8700 MSS—H hardware supports up to 5,000 simultaneous IMAP4 connections to an MSS. S8730 MSS—S hardware, S3500 MSS—H and S3500 MSS—S hardware supports up to 2,500 simultaneous IMAP4 connections to an MSS.

Applications that affect client limits

The applications that count toward the limit of simultaneous connections include:

- Modular Messaging Outlook Client
- Modular Messaging Restricted Outlook Client (applicable only to Modular Messaging—MSS)
- Modular Messaging Lotus Notes Client
- Modular Messaging Web Client
- one-X Speech
- Standard e-mail clients that use the IMAP4 protocol, such as Outlook Express

Note:

Subscribers might also be using one-X Speech and an IMAP4 e-mail client simultaneously.

Some clients use two IMAP4 sessions per connection, based on the way that the client applications have implemented the IMAP4 standard. These clients include Microsoft Outlook Express and Microsoft Outlook (with or without Modular Messaging Outlook Client).

When clients that require two IMAP4 sessions are in use, Modular Messaging supports a reduced number of users. A client, such as Modular Messaging Outlook Client, only requires the second IMAP4 session when sending a message. It can be assumed that at a given time 10% of Outlook Clients require two sessions and 90% require one session, reducing a limit of 5,000 IMAP4 sessions to 4,500.

Inactive IMAP4 clients are timed out by the server after 30 minutes. However, clients that check for new messages at a periodic interval of less than approximately 30 minutes are never timed out.

Calculating IMAP4 client limits

Use the following rule for calculating IMAP4 client limits:

(User population x [% given IMAP4 access] x [% logged in at one time]) <_2,500 (S3500) or 5,000 (S8730, S8800, or HP DL360 G7)

To determine the IMAP4 requirement for a single MSS VMD, planners must calculate the estimated simultaneous IMAP4 users.

For example, if the total user population is 1,750 and the percentage of users with IMAP4 access is 50%, the total number of IMAP4 users is 875. If the percentage of IMAP4 users simultaneously logged in is 80%, the estimated simultaneous IMAP4 requirement is 700.

The number of users with IMAP4 access depends on customer deployment and usage patterns.

A single Web server for Modular Messaging Web Client can support 1,000 Web Client connections. A VMD can use multiple Web servers. However, the total number of Web Client connections is subject to the MSS limit of 5,000 simultaneous IMAP4 client connections.

POP3 client limits

POP3 clients perform background polling to check for new messages every few minutes. This polling is CPU intensive and limits the number of POP3 clients that can be configured on a Modular Messaging—MSS system.

The following table provides information about the POP3 client limits with Modular Messaging.

POP3 client sessions	On S3500, S8730, S8800, or HP DL360 G7 hardware
Maximum number of clients, clients poll every 2 minutes	2,500
Maximum number of clients, clients poll every 10 minutes	5,000[33]
Maximum number of active client sessions	80

[33] More than 5,000 simultaneous sessions affects system performance.

Note:

Modular Messaging supports up to 2,500 IMAP4 and POP3 clients that poll at an interval of 2 minutes or more and require only one IMAP4 or POP3 connection for the client session.

Modular Messaging Web Client limits

The Modular Messaging Web Client requires a standalone computer as a Web server that hosts the Web content. Web Client cannot be installed on a Supplementary Server.

Only one instance of Modular Messaging Web Client can exist on a Web server. Other MAS applications or services must not be installed on the Web server of Modular Messaging Web Client. However, Web Subscriber Options can be installed on the Web server of Modular Messaging Web Client. A Web server of Modular Messaging Web Client can support up to 1,000 Modular Messaging Web Client connections.

The following table provides information about the server capacities of various Modular Messaging features.

Feature	Web Server capacity
Web Client	
Maximum number of simultaneous Web Client connections	1,000
Maximum number of simultaneous Web Client users	60
Web Client and Web Subscriber Options	
Maximum number of simultaneous connections with both applications running	1,500
Maximum number of simultaneously active users with both applications running	60

Multiple Web servers of Modular Messaging Web Client can exist on a VMD. However, the maximum number of simultaneous Modular Messaging Web Client connections depends on the number of simultaneous IMAP4 connections supported for the Modular Messaging—MSS system. For information on the IMAP4 connection limits, see IMAP4 client limits on page 280.

Web Subscriber Options

You can use a standalone computer, an MAS of a Modular Messaging system with less than 500 subscribers, or the Web server of Modular Messaging Web Client as the Web server of Web Subscriber Options.

Only one instance of Web Subscriber Options can exist on a Web server. Modular Messaging Web Client can be installed on the Web server of Web Subscriber Options. Other MAS

applications or services can also be installed on the Web server of Web Subscriber Options. However, if Modular Messaging Web Client installed on the Web server of Web Subscriber Options, other MAS applications or services cannot be installed.

Multiple Web servers of Web Subscriber Options can exist on a VMD. If Web Subscriber Options is installed on an MAS, 100 subscribers can be logged in to Web Subscriber Options at any given time. Five subscribers, of the 100 subscribers logged in to the application, can simultaneously use Web Subscriber Options.

The following table provides information about the server capacities of various Modular Messaging features.

Feature	Web Server capacity
Web Subscriber Options	
Maximum number of Modular Messaging subscribers for Web Subscriber Options co-resident on the MAS	500
Maximum number of simultaneous Web Subscriber Options connections when co-resident on the MAS	100
Maximum number of simultaneously active Web Subscriber Options users when co-resident on the MAS	5
Maximum number of simultaneous Web Subscriber Options connections using a standalone web server	1,500
Maximum number of simultaneously active Web Subscriber Options users using a standalone web server	60
Web Client and Web Subscriber Options	
Maximum number of simultaneous connections with both applications running	1,500
Maximum number of simultaneously active users with both applications running	60

Centralized Modular Messaging

Centralized voice messaging allows an enterprise to consolidate resources and ensure uniform messaging services to its employees in various locations. With centralized messaging, an enterprise can provide messaging services by managing fewer messaging systems rather than operating separate messaging systems at different geographic locations.

The MultiSite feature of Modular Messaging enables Message Application Servers (MASs) in a single Voice Mail Domain (VMD) to communicate with multiple switches with different dial plans, in different locations. With MultiSite the message stores and MASs can be centralized

in a data center. For more information on the MultiSite feature, see the *Modular Messaging MultiSite Guide*, available on the Avaya Support Web site at http://www.avaya.com/ support.

The scalability of Modular Messaging makes it an ideal solution to support the deployment of centralized messaging. For more information, see Scalability on page 24.

The benefits of centralized messaging include:

- Reduced administrative costs: Server consolidation can reduce administrative costs by reducing the number of physical servers that must be managed.
- Larger systems provide better economies of scale that lower acquisition and maintenance costs.
- Consistent messaging services: When an enterprise extends centralized service to all its members, a consistent set of capabilities is provided to each employee, regardless of the employee's geography. This ensures that all members of the organization benefit from these business applications, and training and support to associates can be standardized.

Topologies

Avaya provides several network topologies to support centralized messaging with Modular Messaging.

In a distributed topology, a messaging system, which includes both a message server and associated MAS servers, is collocated with each private branch exchange (PBX). Modular Messaging systems can network directly to each other. To network with traditional voice messaging systems, Modular Messaging uses Avaya Message Networking. Message Networking might also be used to provide hub and spoke networking to reduce network administration and to act as a directory concentrator for all messaging systems.

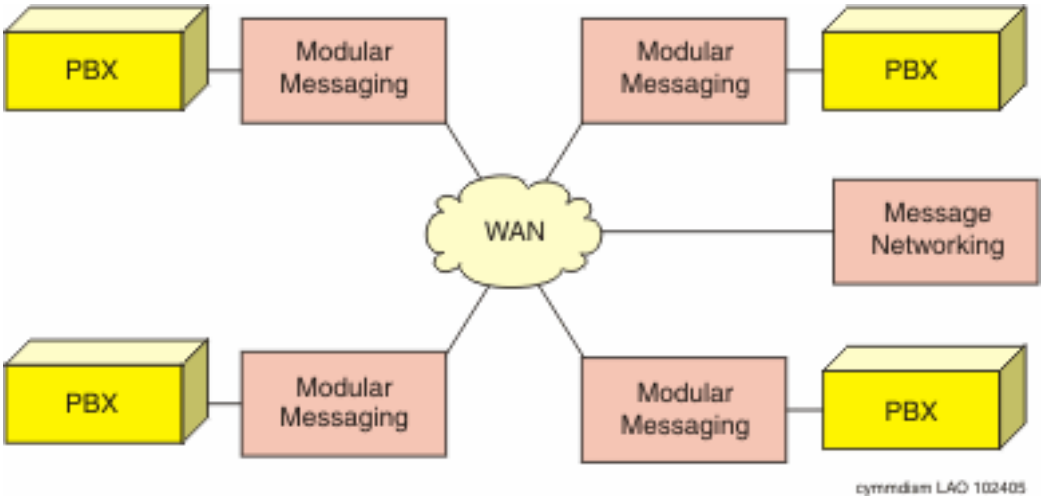


Figure 1: Distributed Messaging

As customers move toward IP Telephony, they can use Communication Manager to deploy communication servers at a primary location. These communication servers provide services

across the network to gateways at remote locations. These gateways, in turn, provide telephony services to users at those locations.

Modular Messaging can be integrated with the Avaya S8730 Media Server, which in turn can provide voice messaging services for any user on the system.

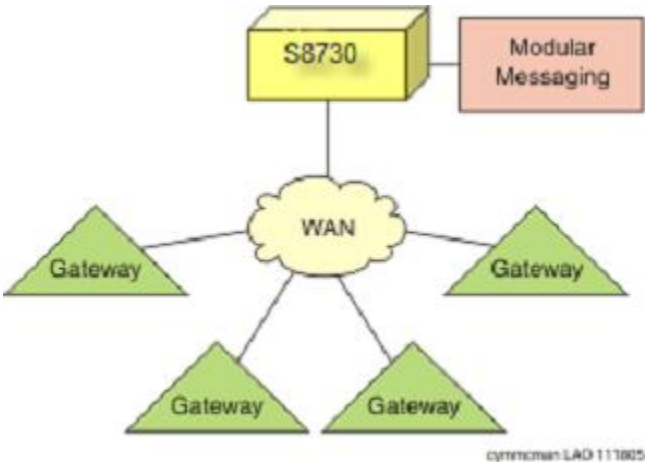


Figure 2: Centralized messaging with Modular Messaging and Communication Manager

By networking individual switches together, Modular Messaging can provide voice messaging services to users on multiple communication servers, each of which may be supporting its own network of gateways. With Communication Manager, the switches can use QSIG as the signaling protocol and be connected using IP, T1, E1, or SBS trunks. Alternatively, Communication Manager can also be networked through DCS+ or DCS.

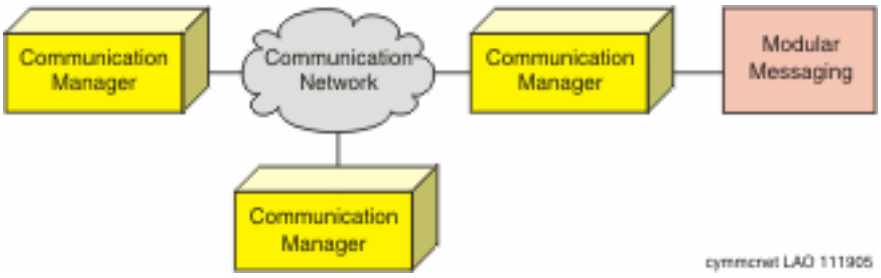


Figure 3: Server to server networking

The following figure shows a MultiSite configuration using remote SIP integration. The MASs are collocated with the message store and the directory servers in a data center and are remote from the switches. This is done by installing one or more SIP Gateways near each switch, and having the MASs talk secure SIP and secure RTP (SRTP) to the gateways over the WAN. Each gateway translates the SIP requests and SRTP audio data to and from its switch's native protocol like QSIG.

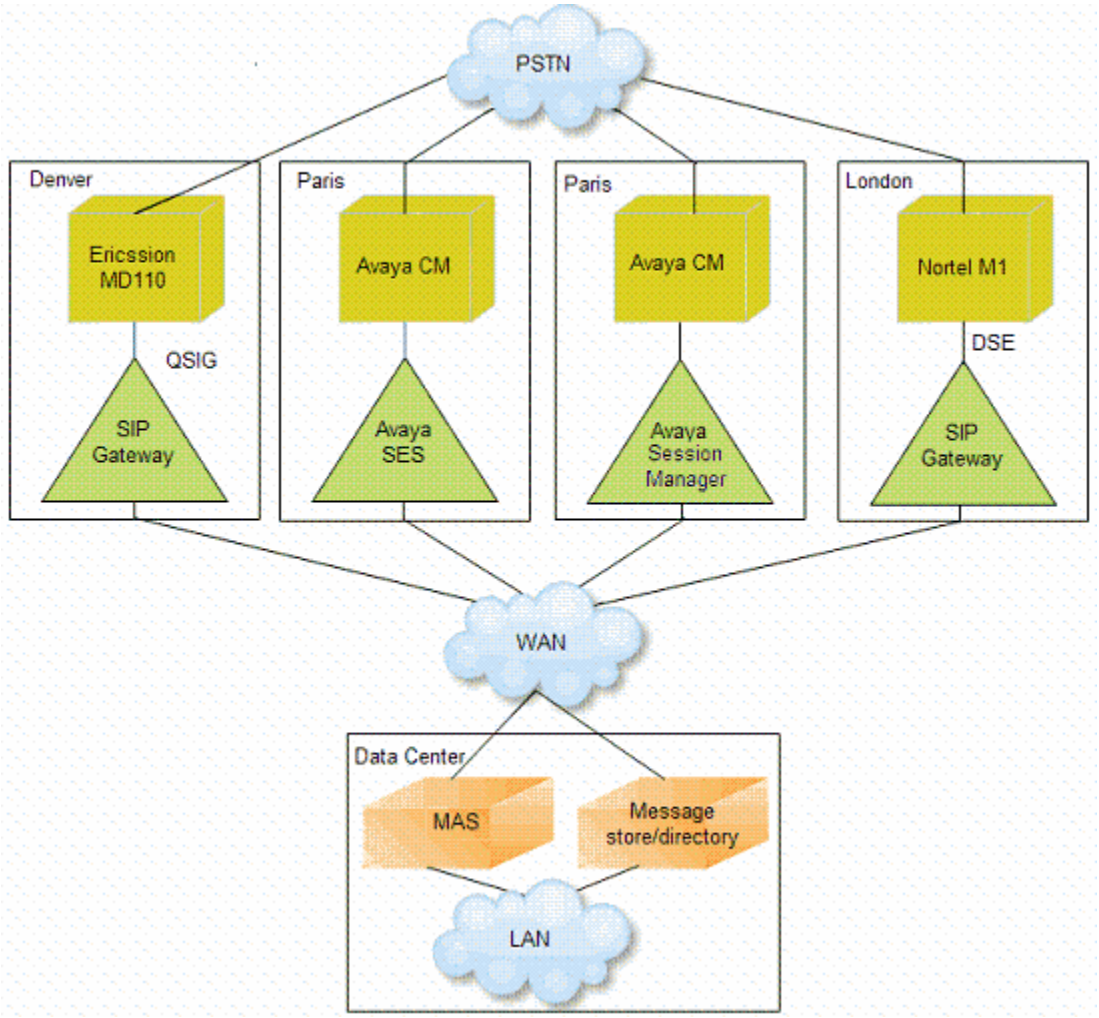


Figure 4: Remote SIP integration

All MASs in a VMD can service requests from subscribers who are associated with any site, and can handle calls from any configured switch.

Each SIP Gateway needs the IP address of all MASs in the VMD to spread the call load between all MASs. If the MAS is added or removed from a VMD then the configuration of all the SIP Gateways should be updated.

For Avaya switches, SIP Enablement Services (SES) servers and Avaya Session Manager can be used. For other switches, AudioCodes Mediant 1000 Media Gateways and Dialogic DMG 1000 DSE SIP Gateways can be used. AudioCodes Gateways support T1 QSIG, E1 QSIG, or analog/SMDI native integrations. For more information, see AudioCodes Gateway on page 178. Dialogic DMG 1000 DSE SIP Gateways support DSE integration. The switch connects to the Dialogic DMG 1000 DSE SIP Gateway using DSE integration, and the Dialogic DMG 1000 DSE SIP Gateway in turn uses SIP over an IP network to communicate with the Modular Messaging MASs. For more information, see DSE SIP Gateways on page 178.

Modular Messaging system that uses one or more Dialogic SIP Gateways as well as AudioCodes SIP Gateways or Avaya SES servers or Avaya Session Manager cannot be

configured to use SRTP; use RTP instead. SRTP can be used for systems that contain any combination of AudioCodes Gateways or SES servers or Avaya Session Manager, or those that contain only Dialogic SIP Gateways.

Note:

With Modular Messaging release 5.2, SIP integration with a single server configuration or a single MAS configuration can be integrated to a Communication Manager 5.2.1 or 6.0 using SIP without the need for a SES proxy or Avaya Session Manager. Consult your ATAC or Sales Engineer representative for this type of complex integration.

Considerations when implementing centralized Modular Messaging

When planners and customers implement centralized Modular Messaging, they must consider the factors described in this section. For information on port requirements and IP network requirements in a MultiSite-enabled Modular Messaging system, see the *Modular Messaging MultiSite Guide*, available on the Avaya Support Web site at http://www.avaya.com/support.

Voice messaging and e-mail capacity

When customers consolidate their systems from distributed to centralized, the single system must meet the capacity requirements that were previously met with a series of independent systems.

With Modular Messaging—MSS single server configuration, a single VMD can support up to 48 ports, 2,500 mailboxes. With Modular Messaging—MSS multi-server configuration, a single VMD can support up to 288 ports, 40,000 mailboxes. For more information, see Avaya Message Storage Server capacities on page 220.

Modular Messaging with Microsoft Exchange or IBM Lotus Domino message stores support up to 288 ports and 100,000 mailboxes in a single VMD.

Modular Messaging is ideally suited for a centralized messaging solution.

Messaging network

To extend centralized messaging services to an entire enterprise, Modular Messaging can be networked with traditional voice messaging systems through Message Networking. Modular Messaging can exchange messages directly with other Modular Messaging using SMTP/MIME.

Voice mail integration features

With centralized Modular Messaging, voice mail features that are a function of switch integration work across the network. These features include MWI, Call Information, and Find Me. This also includes features that are unique to Communication Manager, such as Transfer to Messaging.

Reliability

Required steps to ensure reliability of a centralized Modular Messaging system include:

- Implementation of N+1 core application redundancy with Communication Manager. For more information, see N+1 server configuration for MAS redundancy on page 264.
- Implementation of Tracing Service on a Supplementary Server.
- Use of an Uninterruptible Power Supply.
- Installation of virus protection software.
- Management of Microsoft patch updates and security hot fixes.

Mailbox administration

In Modular Messaging—MSS, mailbox administration can be performed using the MSS Web administration pages, Avaya Site Administration or Avaya Multi-Site Administration, or 2nd Nature. Active Directory is used to administer mailboxes in Modular Messaging—Exchange. In Modular Messaging—Domino, mailbox administration can be performed using Domino Unified Communication (DUC). Large systems, or those that require regional administrators, might require multiple administrators to access the system simultaneously.

Mailbox administration on a MultiSite-enabled Modular Messaging system is similar to a non-MultiSite system. When administering subscribers on a MultiSite-enabled system, full mailbox numbers must be used as subscribers are associated with sites by their full mailbox numbers.

GUIs

Subscribers can use desktop applications, such as Subscriber Options and Web Subscriber Options to configure their mailboxes. For managing messages, subscribers can use applications such as:

- Modular Messaging Outlook Client. Works best over high-speed data connections.
- Modular Messaging Restricted Outlook Client. Works best over high-speed data connections.
- Modular Messaging Lotus Notes Client. Works best over high-speed data connections.
- Modular Messaging Web Client.

Note:

Subscriber Options is not recommended over a slow network link. In this case, Web Subscriber Options should be used.

For more information, see Graphical user interfaces on page 63.

Message Addressing

With a non-MultiSite Modular Messaging system, a fixed-length uniform dial plan must be used. Usually, subscribers' mailbox numbers will be configured to be the same as their extension numbers. When mailbox numbers cannot be the same as extension numbers, subscribers need to understand the difference between an extension number and a mailbox number. The extension is used for calling an associate. A mailbox number is used for addressing messages.

The mailbox number is a fixed length that is used consistently for all users, regardless of the location of the sender or the recipient.

With a MultiSite-enabled Modular Messaging system, subscribers can send messages to other subscribers in the same site by using the short mailbox number of the intended recipient. Subscribers can also send messages to anyone in the VMD by using their full mailbox number. For more information, see the *Modular Messaging MultiSite Guide*.

Outdialing

With a non-MultiSite Modular Messaging system, the programming of numbers for calls to be generated must take into context the PBX to which it is directly connected. The user or administrator must be sure to program the number that must be dialed from the prime PBX and not just the extension number associated with the remote switch. This includes:

- Covering extension of a given mailbox
- Operator associated with Automated Attendant or a Caller Application
- Fax number for printing or addressing faxes
- Rules associated with Call Me for outcalling
- Rules associated with Find Me
- Number that the system should call when a GUI user wants to work in dual connect mode (that is, command and control from the computer; listen and record through the telephone).

With MultiSite-enabled Modular Messaging system, the difference, compared to a non-MultiSite system, is that the users do not need any knowledge of the PBX that will be used to dial the numbers that are entered. Users can enter numbers in canonical form. MultiSite-enabled Modular Messaging converts the canonical numbers using a set of outgoing phone number translation rules that are configured independently for each PBX.

Administrator need to plan subscribers' mailbox numbering scheme. While configuring sites, administrators must follow the rules listed below:

- Each site must have a unique site identifier
- For each site, the full mailbox length must be less than or equal to the total of the length of the site identifier and the short mailbox length
- If a site group is a child of another site group and it is not simply a container, then the site identifier of the child group must consist of all of the digits of the site identifier of the parent group, plus at least one more digit
- If a site is in a group then its identifier must consist of all of the digits in the parent group's identifier, plus at least one more digit
- If one site identifier is an abbreviated version of another site identifier, then these sites must have different full mailbox lengths to be valid

Avaya recommends using the E.164 scheme that is used for phone numbers, but without the leading '+', because most administrators and subscribers like their mailbox number and phone number to be the same. If administrator wants to enable MultiSite for an existing Modular Messaging system, then they should consider designing the mailbox numbering scheme so that subscribers' new short mailbox numbers are the same as their old mailbox numbers. For more information, see the *Modular Messaging MultiSite Guide*.

Time zone

Modular Messaging supports the multiple time zones feature that enables subscribers to adjust the time zone settings for their mailboxes. This feature is beneficial to subscribers that might reside in different time zones than that of the Modular Messaging system or to mobile users of the Modular Messaging system. Time zone adjustments impact the time stamp associated with messages and schedules associated with mailbox rules.

Automated Attendant and Caller Applications schedules are not adjusted by the time zone settings, and need special attention by system administrators.

Network topology

The communication server networking topology has impact on the choice of switch integration used with Modular Messaging. Modular Messaging supports centralized messaging for a homogeneous set of PBXs using a common networking protocol. With a non-MultiSite Modular Messaging system, it is necessary to implement separate Modular Messaging VMDs per PBX type. With MultiSite, MASs in a single Voice Mail Domain (VMD) communicates with multiple PBXs possibly with different dial plans, in different locations. The QSIG standards allow a third party PBX such as a Cisco to network to a Communication Manager server that is integrated with a Modular Messaging system. When using remote SIP integration in a MultiSite environment, all MASs in a VMD can communicate with all the configured SIP switches, and possibly with several simultaneously.

SIP Gateway allows a Modular Messaging system to work with PBXs that are not supported by the SIP Enablement Services (SES) and Avaya Session Manager, mainly those from third-party vendors. AudioCodes Gateways support analog/inband, analog/SMDI, T1 QSIG, E1 QSIG and SIP integrations to the PBX. Dialogic DMG 1000 gateways support DSE. For more information, see the *Modular Messaging MultiSite Guide*.

Note:

With Modular Messaging release 5.2, SIP integration with a single server configuration or a single MAS configuration can be integrated to a Communication Manager 5.2.1 or 6.0 using SIP without the need for a SES proxy or Avaya Session Manager. Consult your ATAC or Sales Engineer representative for this type of complex integration.

Dial plan

A DCS or DCS+ network requires that all extensions are of the same length. This would typically match directly to the voice mailbox number in Modular Messaging. A QSIG network supports mixed-number length dial plans according to E.164 numbering standards. Interswitch dialing, however, must conform to using uniform dial plan (UDP), private network access (PNA), or automatic alternate routing (AAR). A prefix can be added to convert the station number to the same length as the mailbox number in Modular Messaging.

With MultiSite-enabled Modular Messaging systems, MASs in a single Voice Mail Domain communicate with multiple PBXs possibly with different dial plans, in different locations. MultiSite mailbox numbers and extension numbers can be up to 50 digits long. MultiSite-enabled Modular Messaging stores all primary and secondary extension numbers in canonical form. MASs convert all phone numbers received from PBXs into canonical form before looking them up in the subscriber database. Canonical numbers follow the ITU E.164 standard. Avaya recommends that the site ID and mailbox numbering scheme use the same digits as the

subscriber's E.164 phone number. This ensures the numbers used in the VMD are unique. For more information on the MultiSite feature, see the *Modular Messaging MultiSite Guide*.

PBX network provisioning

The PBX network needs to support the traffic associated with getting Call Answer calls across the network and for subscribers retrieving their messages. Traffic studies might be necessary, and once the messaging system is implemented, actual traffic can be measured for tuning the network. For planning purposes, expect the voice mail system to be used an average of 16 minutes per day per subscriber. Also for initial planning purposes, assume a 14% busy hour if all users are in the same time zone. If callers and users are across multiple time zones, the percentage of traffic during the busy hour will likely be lower.

Provisioning the network for Automated Attendant and Caller Applications also needs to be accounted for.

PBX programming and network implementation

Special attention is required to coordinate the dial plan, consisting of extensions with prefixes with the mailbox numbering scheme in the Modular Messaging system. Attention is also required when using translations from DCS+ to QSIG. Customers must acquire the services of Avaya's Network Integration Center to assist with the implementation of a centralized messaging system, to ensure that the translations and routing tables and Communication Manager features are implemented correctly. Mailbox numbering schemes for MultiSite environment are discussed in the *Modular Messaging MultiSite Guide*.

Fail over

Consider how to deal with the backup scenario of coverage to voice mail at the central site when the PBX network is unavailable. The remote switch can be programmed so that the secondary coverage path is to a Caller Application on the Modular Messaging system at the central site through the PSTN. A gateway in local survivable processor (LSP) mode should be programmed to cover to voice mail through a Caller Application. Communication Manager 2.2 and later inserts the digits into the application to connect the caller to the correct mailbox.

Resiliency

While installing Modular Messaging system using remote SIP integration, all Modular Messaging service is lost if the WAN breaks, because Modular Messaging can no longer communicate with any of the SIP Gateways. Therefore the Modular Messaging system cannot make or answer calls. The WAN must be designed to be resilient, with redundant links and routers. Some SIP Gateways offer features aimed at making them more resilient to WAN failures.

Planning and implementation

When considering centralized messaging deployments, customers should engage the assistance of their Avaya account team or authorized Avaya Partner with the assistance of the Avaya Advanced Technology and Consulting (ATAC) organization. To assist with the implementation of a centralized Modular Messaging system with Communication Manager, customers are advised to procure the services of Avaya's Network Integration Center (NIC). NIC will supply engineering expertise to ensure that the routing and translations in context of the desired dial plan are properly configured to support the centralized messaging solution.

Appendix A: Key features and capabilities

Key features and capabilities

The following table discusses the key features of Modular Messaging.

Feature and capability	Description and benefit
Caller Applications	These are separate applications, such as complex Automated Attendants, listen-only mailboxes, and bulletin boards, which can be designed using a Microsoft Windows graphical user interface (GUI)-based editor tool that is deployed across voice mail domains. Caller Applications can be used to accomplish most of the same functions as Automated Attendants (including nested Automated Attendants).
MultiSite	The MultiSite feature enables you to use a single Modular Messaging system to serve subscribers at multiple locations. With MultiSite, Message Application Servers (MASs) in a single Voice Mail Domain (VMD) communicate with multiple switches with different dial plans, in different locations. With MultiSite you can centralize the message stores and MASs in a data center. **Note:** When MultiSite is being used, only SIP integration is supported.
Telephone user interface (TUI) for accessing messages	
Playback messages	Subscribers can play back messages received in their mailbox. While listening to messages subscribers can use the playback buttons such as Rewind and Forward. You can decide which messages are played first when you call your mailbox using the TUI. You can choose any of the following sort orders:

Feature and capability	Description and benefit
	• Urgent messages first, then remaining messages with newest first • Urgent messages first, then remaining messages with oldest last • Most recently received first • Most recently received last
Reply to sender or all recipients	When replying to messages, subscribers can reply only to the sender or to all recipients of which Modular Messaging is aware. When replying to messages that are received through a Message Networking system, subscribers can reply only to the sender. Messages coming through a Message Networking server will not contain a complete list of recipients because the Message Networking server cannot be sure that it received a complete list of recipients from the originating node. Modular Messaging respects the use of Blind Carbon Copy (BCC) when used with a GUI client.
Priority of messages	Subscribers can assign a priority to messages.
Print fax messages	Subscribers can print fax messages with Tag Image File Format (TIFF)/F Profile for Facsimile attachments.
Cross-media response	Subscribers can reply to messages in one medium (for example, fax) with another medium (for example, voice).
Specifying message type and sorting messages by message type	When accessing messages in a Modular Messaging Aria TUI, subscribers can specify the message type. The TUI then moves the messages in their respective queues. Modular Messaging Aria TUI provides separate queues for each message type. Modular Messaging AUDIX TUI and Modular Messaging Serenade TUI do not provide separate queues for each message type. However, subscribers of these TUIs can sort messages by message type, which allows subscribers to quickly access messages of a type such as voice messages. Messages are sorted first by their message type and then by the subscriber-specified order: Urgent, Last In First Out (LIFO), or First In First Out (FIFO).
GUI clients for accessing messages	
Receive, respond to, and send messages	Subscribers can use a standards-based e-mail client or a supported GUI client to receive, reply to, forward, and send messages.

Feature and capability	Description and benefit
	For more information, see Graphical user interfaces on page 63.
Manage and respond to all messages	Subscribers can store, organize, delete, or respond to all types of messages.
Reply to messages	Subscribers can reply to only the sender, to all recipients, or to an edited list of recipients.
Cross-media response	Subscribers can reply to messages in one medium (for example, voice) with another medium (for example, text).
Print driver	
Windows Fax Service	Modular Messaging subscribers can use Fax Print Driver to print from Windows-based applications, using the Windows Fax Service.
Mailbox personalization	
Mailbox personalization using the TUI	Subscribers can perform the following tasks: • Record and activate greetings and spoken names. • Enable or disable Find Me, Call Me, and Notify Me. • Set up call handling. • Configure a fax number for printing. • Record announcements for use in Caller Applications. • Change passwords. • Configure a personal operator.
Mailbox personalization using the computer	Using Subscriber Options and Web Subscriber Options, subscribers can perform the following tasks: • Record and activate greetings and spoken names. • Personalize call handling. • Set up rules for Message Waiting Indicator (MWI), Find Me, Call Me, and Notify Me. • Change password. • Configure desktop computer and TUI preferences and options. • Change the display language.
Call Me	This feature alerts subscribers of new messages in their inboxes by calling them at one or more designated numbers.

Feature and capability	Description and benefit
Notify Me	This feature provides the following capabilities: • Automatic notification capabilities: Notifies subscribers of new messages that meet certain subscriber-specified criteria. • Caller-requested notification capabilities: Notifies subscribers of missed incoming calls, provided that the caller requests that the subscriber be notified. The notification is sent as an e-mail message that can be directed to any e-mail address or as a call to a numeric pager. If the notification is an e-mail message, the e-mail address might not be a conventional mailbox. For example, through a suitable gateway, the address can identify a pager, an Short Message Service (SMS) cell phone, or any other e-mail–enabled notification mechanism.
MWI	This feature alerts subscribers that new messages are waiting by using a lamp indicator or a stutter dial tone.
Find Me	This feature redirects unanswered calls to another location, allowing callers to reach Modular Messaging subscribers live. Find Me is not supported for analog integrations.
International product considerations	
Language pack support	Modular Messaging supports multiple languages, which allows companies to use the messaging system worldwide. A Modular Messaging language pack contains user interface resources for all administration and client applications for a particular language. This feature allows subscribers to update all Modular Messaging applications for a language by using a single language pack.
Multi-Byte character set	Some languages, such as Japanese and Chinese, have large character sets. Each character of these languages consists of more than one byte. To support language packs for languages with large character sets, Modular Messaging supports Multi-Byte character set. This feature allows subscribers to view and use non-English versions of Modular Messaging clients and Modular Messaging administration GUIs.
Native language operating system support	When subscribers run a non-English version of Microsoft Windows, they can run the respective non-English version of the Modular Messaging clients. For example, Subscriber Options with the German

Feature and capability	Description and benefit
	language pack is supported when running on the German version of Windows 2000 Professional or the German version of Windows XP Professional. All Modular Messaging Web Client Server installations will support the English versions as well as non-English version of Operating System. Modular Messaging MAS with S3500 or S8730 hardware will only be supported on English versions of Operating System. However, Modular Messaging MAS with customer provided hardware will support non-English version of Operating Systems.
Multilingual Call Answer	Subscribers can enable up to three Call Answer languages for their mailbox. Subscribers can record a separate greeting for each language. This feature allows callers to select a language for system prompts and announcements. Subscribers can set the Call Answer languages in Subscriber Options or Web Subscriber Options.

Functional differences based on message store

The following table discusses the features and capabilities that have functional differences based on the message store, that is Modular Messaging—Message Storage Server (MSS), Modular Messaging—Exchange, and Modular Messaging—Domino.

Feature and capability	Description and benefit	
	Modular Messaging—MSS	Modular Messaging—Exchange and Modular Messaging—Domino
Voice and fax messaging		
Combined voice and fax messaging capabilities	The Modular Messaging system stores voice, fax, and text messages, as well as messages with binary attachments in the MSS.	The Modular Messaging system stores voice, fax, and e-mail messages in Microsoft Exchange and IBM Lotus Domino.
TUI for accessing, sending, and composing messages		
Receive, respond to, and send messages	Subscribers can receive, reply to, forward, and send voice and fax messages over the telephone.	Subscribers can receive, reply to, forward, and send voice, fax, text, and corporate e-mail messages over the telephone. Modular Messaging reads corporate e-mail messages and subject headers by

Feature and capability	Description and benefit	
	Modular Messaging—MSS	**Modular Messaging—Exchange and Modular Messaging—Domino**
		using e-mail readers for text-to-speech (TTS) conversion. For Modular Messaging—Domino, response time for login and TUI may be slow for large mailboxes.
Printing messages	From the TUI, subscribers can print fax messages to a default fax destination or to a new fax destination. When calling from a fax machine, subscribers can print the current fax message in the same call, thus terminating the subscriber log-in session.	Subscribers can print e-mail or fax messages with TIFF attachments. From the TUI, subscribers can print fax messages to a default fax destination or to a new fax destination. When calling from a fax machine, subscribers can print the current fax message in the same call, thus terminating the subscriber login session.
Read receipt and delivery receipt		Requests for read receipt from the TUI are supported.
Future delivery	Subscribers schedule messages for future delivery. The message is kept in the mailbox of the sender and not delivered until scheduled.	When subscribers mark a message for future delivery, the message is delivered to the destination Exchange or Domino server immediately. The TUI marks the message with a deferred delivery time before sending it out of the sender's mailbox. The message-transport feature in Exchange or Domino holds the message internally, hidden from the destination mailbox, until the scheduled delivery time. At the scheduled delivery time, Exchange or Domino delivers the message to the mailbox of the intended recipient. The time stamp on the delivered message shows or announces the time when the sender sent the message and not when the message was delivered to the recipient's mailbox.
System lists and sending restrictions		
Enhanced-List Application (ELA)	ELA enables subscribers to deliver messages to a large number of recipients. Subscribers can	

Feature and capability	Description and benefit	
	Modular Messaging—MSS	**Modular Messaging—Exchange and Modular Messaging—Domino**
	address messages to these lists from the TUI and from a computer, or by calling the extension associated with an ELA. ELA can only be created by administrators.	
Broadcast messages	Administrators can designate any ELA to be a local broadcast list. A subscriber who has broadcast message privileges can send a broadcast message to all local subscribers and to all list members in the local broadcast list. The Modular Messaging TUIs identify broadcast messages and present new broadcast messages before other messages. The TUIs also announce the number of broadcast messages. Modular Messaging Web Client, Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, and Modular Messaging Lotus Notes Client provide visual indicators for identification of broadcast messages.	Modular Messaging—Exchange will automatically create a broadcast list, Broadcast Distribution List (BDL). A subscriber who has access to the broadcast group can send a broadcast message to all local subscribers and to all list members. Modular Messaging—Domino will automatically create and manage a Domino group that consists of all Modular Messaging subscribers in the VMD. Modular Messaging—Exchange will automatically create and manage a Broadcast Distribution List. If there is more than one VMD, the directory objects are created for each VMD. Due to constraints on the number of entries in a group, the list is split over multiple sub-groups. If there are duplicate entries in the directory, the group will also contain these duplicate entries. Modular Messaging—Domino does not control access to the broadcast group, therefore anyone who knows details regarding the group may send a message to all subscribers. Modular Messaging—Exchange and Modular Messaging—Domino do not differentiate between normal and broadcast messages.
Enterprise-wide class of service and sending restrictions	Administrators can prevent the delivery of messages from certain originators to specific groups of mailboxes residing within the Modular Messaging system. Thus,	

Feature and capability	Description and benefit	
	Modular Messaging—MSS	**Modular Messaging—Exchange and Modular Messaging—Domino**
	administrators can prevent unwanted enhanced-list usage and unauthorized broadcast message creation. Administrators can also isolate mailboxes that should not receive inbound traffic.	
Personal distribution lists (PDLs)		
Creating and managing PDLs	Subscribers can create new PDLs from the Modular Messaging TUIs, from Subscriber Options, and from Web Subscriber Options. Subscribers can modify or delete existing PDLs from the Modular Messaging TUIs, from Subscriber Options, and from Web Subscriber Options.	Subscribers can create new PDLs only from the Modular Messaging TUIs. Subscribers can use Subscriber Options or Web Subscriber Options to allow a distribution list or group to be accessed as a PDL from the TUIs. Subscribers can modify or delete existing PDLs from the Modular Messaging TUIs, from Subscriber Options, and from Web Subscriber Options.
Addressing messages to PDLs	Subscribers can address messages to PDLs from the Modular Messaging TUIs, from Modular Messaging Outlook Client, from Modular Messaging Restricted Outlook Client, from Modular Messaging Lotus Notes Client, from Modular Messaging Web Client, one-X Speech client, and from any standards-based e-mail client. In Modular Messaging Restricted Outlook Client, subscribers can address messages only to PDLs created in Modular Messaging Restricted Outlook Client. However, If Modular Messaging Outlook Client was installed on a system and Modular Messaging Restricted Outlook Client was installed to replace it, the old PDLs are not deleted. Subscribers can address voice messages to these	Subscribers can address messages to PDLs from the Modular Messaging TUIs and from Modular Messaging Outlook Client.

Feature and capability	Description and benefit	
	Modular Messaging—MSS	**Modular Messaging—Exchange and Modular Messaging—Domino**
	PDLs from Modular Messaging Restricted Outlook Client.	
Message privacy		
Mark Call Answer messages as private	Administrators can configure the system to enable callers to mark Call Answer messages as private. For more information, see Creating private Call Answer messages on page 120.	
Marking and access to private messages	Subscribers can use the Modular Messaging TUIs, Modular Messaging Web Client, and one-X Speech to mark messages as private and to access private messages. With the appropriate privacy settings, subscribers can also use Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, Modular Messaging Lotus Notes Client, and standards-based clients to mark messages as private and to get access to private messages. For more information, see Creating private messages on page 118 and Gaining access to private messages on page 119. Modular Messaging Web Client provides an administrative configuration to support only dual-connect (telephone-playback only) mode. This prevents voice messages from being played locally on the computer, downloading voice messages, and caching voice messaging on the computer.	Subscribers can use the Modular Messaging TUIs and one-X Speech to mark messages as private and to access private messages. With the appropriate privacy settings, subscribers can also use Modular Messaging Outlook Client to mark messages as private and to get access to private messages. For more information, see Creating private messages on page 118 and Gaining access to private messages on page 119.
Privacy Enforcement Level (PEL) settings	Administrators can use these system-wide privacy parameters to determine which clients support access to messages and the level of privacy these clients enforce. For more information, see The Privacy Enforcement Level parameter on page 120. PEL settings of Full, Partial and Notification Only are supported.	Administrators can use these system-wide privacy parameters to determine which clients support access to messages and the level of privacy these clients enforce. For more information, see The Privacy Enforcement Level parameter on page 120. Modular Messaging—Exchange supports PEL settings of Partial

Feature and capability	Description and benefit	
	Modular Messaging—MSS	**Modular Messaging—Exchange and Modular Messaging—Domino**
		and Notification Only. Modular Messaging—Domino only supports the PEL setting Partial.
Restrict client access	Administrators can use this class of service (COS) setting to determine if clients are permitted access to messages. For more information, see The Restrict Client Access COS on page 124.	
Backup capabilities		
Backing up and restoring data to and from a DVD	This feature allows administrators to back up and restore critical Messaging Application Server (MAS) and MSS data to and from a backup media, a DVD. This backup media exists in the local DVD-RAM drive installed in the MSS.	This feature allows subscribers to back up and restore critical MAS and Exchange or Domino message store data. The customer is responsible for backing up data in a Modular Messaging—Exchange system and a Modular Messaging—Domino system.
Backing up and restoring data to and from a LAN	This feature allows administrators to back up and restore critical MAS and MSS data to and from a remote storage location on the local area network (LAN) through File Transfer Protocol (FTP) and Secure File Transfer Protocol (SFTP).	
Multiple time-zone support		
Setting multiple time zones	Modular Messaging allows time zones to be assigned to subscribers and the messaging system so that features involving time work as expected, even if the subscribers are in a different time zone to the messaging system. Administrators can set the system time zone using the Voice Mail System Configuration application, and they can assign a default time zone to each class of service. Subscribers can assign a specific time zone to their mailbox using Subscriber Options or Web Subscriber Options. The Modular Messaging TUIs present an assigned time based on the Modular Messaging server's time and the subscriber's time zone. Modular Messaging Outlook Client, Modular Messaging Restricted Outlook Client, Modular Messaging Lotus Notes Client, and standards-based clients will adjust the presentation of time based on attributes defined for the subscriber's computer.	

Feature and capability	Description and benefit	
	Modular Messaging—MSS	**Modular Messaging—Exchange and Modular Messaging—Domino**
Licensing		
WebLM licensing	The licensing implementation on the MSS will attempt to contact the license manager whenever a subscriber is being created or edited. If no license manager MAS is available then the administration task will not be allowed. For Avaya MSS storage server, the number of subscriber licenses acquired on startup will be the total number of subscribers in the VMD.	For Exchange and Domino, the Subscriber Administration interfaces directly communicate with an MAS which in turn will contact the license manager. For Microsoft Exchange or IBM Lotus Domino message stores, the number of subscriber licenses acquired on startup will be the number of voice mail enabled subscribers in the VMD.
Security Enhancements, beginning with Modular Messaging Release 3.1 (MSS) and 4.0 (MAS)		
Role-Based Access Control	Role-Based Access Control (RBAC) allows administrators to create administration security roles that are able to accomplish a subset of tasks. When you set up an administrative role, you specify which access type is available. The access type can be "read and write" or "read only". For more information, see *Role-Based Access Control* available on the *Modular Messaging documentation Library*.	
Authentication of MSS logins using a AAA server	An Authentication, Authorization, and Accounting (AAA) server is an optional, customer-provided server that can be used to authenticate the credentials of administrators logging in to the MSS. The MSS can be configured to use one or two Remote Authentication Dial-In User Service (RADIUS), Lightweight Directory Access Protocol (LDAP), or Active Directory AAA servers to authenticate logins. For RADIUS servers, administration accounts on the MSS that is authenticated by the AAA server, must also be defined on the AAA server. For more information, see *Configuring the MSS for login authentication by a AAA server* available on the *Modular Messaging documentation Library*.	

Feature and capability	Description and benefit	
	Modular Messaging—MSS	**Modular Messaging—Exchange and Modular Messaging—Domino**
Improved logging of administration activity	The MAS and the MSS generate system alarm and error logs. Each server is assigned a unique ID which helps in identifying the server that has an issue. Additionally, servers can be configured to send logging of all RBAC-controlled administration activities to an external, customer-provided server using the syslog protocol (RFC 3164). Logging information stored on the MSS can be viewed using the Web-administration interface. Logging information stored on the MAS can be viewed using the Modular Messaging Audit Log Viewer, or the MAS audit database can be stored on a customer-provided SQL server. Syslog servers are configured in the Modular Messaging VMD to receive syslog events from Modular Messaging servers. Each syslog message generated by Modular Messaging is sent to every syslog server configured. See the *Avaya Modular Messaging, Messaging Application Server administration guides* and the *Avaya Modular Messaging Documentation CD-ROM* for more information.	The MAS generates system alarm and error logs. Each server is assigned a unique ID which helps in identifying the server that has an issue. Additionally, servers can be configured to send logging of all RBAC-controlled administration activities to an external, customer-provided server using the syslog protocol (RFC 3164). Logging information stored on the MAS can be viewed using the Modular Messaging Audit Log Viewer, or the MAS audit database can be stored on a customer-provided SQL server. Syslog servers are configured in the Modular Messaging VMD to receive syslog events from Modular Messaging servers. Each syslog message generated by Modular Messaging is sent to every syslog server configured.

Appendix B: Customer Preparation and Considerations

Customer participation

Successful planning and implementation of a Modular Messaging system require cross-functional participation from a variety of disciplines from within the customer organization.

The following disciplines may be represented by single or multiple individuals or organizations:

- Telephony management
- Voice mail management
- E-mail management
- Desktop computing
- Server management
- Help desk
- IP network management
- SMTP gateway
- Data network security
- User community

System design and data collection

In preparation for a Modular Messaging implementation, customers are required to provide specific information related to their voice and data network. As part of the Modular Messaging installation, the Data Collection Tool (DCT) is used to supply information required to implement the system. DCT is a standalone application, delivered on the Modular Messaging Application Server Software DVD. It is also available from the Avaya support Web site: http://www.avaya.com/support.

During the system planning phase and prior to installation, customers are required to complete the information requested in the DCT. Consultation with a Modular Messaging Software

Specialist is highly recommended. Upon completion, the DCT output file (.mmdct) is used to configure the Modular Messaging system.

Caution:

Several requirements of the DCT must have unique designations. They include server host names, IP addresses, and the name of the private Windows Domain. If these items are duplicated anywhere in the network, errors will occur. If a change is required to the Domain Name or Server Host Name after installation, all Modular Messaging software must be reloaded on all affected servers. This may result in a loss of data or require data restoration. Ensure that unique and accurate information is provided for each Modular Messaging system.

Information customers should be prepared to provide includes:

- Unique host names for all Modular Messaging servers (see Caution above)

  Note:

  Do not use the underscore character (_) in a MSS Host Name. The Aria TUI voice mail searches fail if you use the underscore (_) character. The IMAP RFC does not allow the underscore character (_) in host names.

- Corporate IP addresses, subnet-mask and default gateway information (see Caution above)
- Corporate networks domains, DNS, NTP and SNMP information (see Caution above)
- PBX/Call server type and method of integration to Modular Messaging
- Message Networking, SMTP protocol, and Web Client information
- Desired system feature functionality, including classes of service, mailbox size, message length, time zones and telephone user interface (TUI)
- Caller Application (Auto-Attendants), Enhanced Lists / Broadcast (System Distribution Lists)

If the option to join the Modular Messaging system to the Customer Domain was purchased, the following considerations also apply:

- All MASs and MSS will join the corporate domain
- Requires Windows Domain Controller and IP address
- Create computer and user accounts for the Modular Messaging system within the corporate domain
- Login and password requirements
- Additional information and requirements specific to your network will also be required

Existing system review

If migrating or replacing an existing voice messaging system, customers should be prepared to discuss important attributes of their existing messaging and private branch exchange (PBX) systems.

Items for consideration may include:

- Automated attendant and call processing mailboxes – these can often be hosted on the PBX or voice messaging servers
- Bulletin board or announcement only mailboxes
- Desired system feature functionality, including classes of service, mailbox size, message length, time zones and telephone user interface (TUI)
- Subscriber Mailbox Profiles including assigned class of service, zero out destination, and special features (Outcalling)
- Voice mail access numbers, Message Waiting Indicators, vectors, call center agents, hunt groups, call coverage paths and auto-dial buttons

When integrating the Modular Messaging system with the host private branch exchange (PBX), planners and customers must also consider the following:

- Switch hardware and software to support required provisioning
- Features supported by a particular integration type

  For more information, see Switch integration matrix on page 182.
- Programming of translations for networked PBXs or IP gateways for centralized deployments
- Any updates that the dial plan requires, especially when Modular Messaging is to be networked with a Message Networking system

For the latest switch integration information, see the configuration notes available on the Avaya Support Web site at http://www.avaya.com/support.

E-mail management

Avaya recommends an assessment of the network bandwidth and e-mail resources to ensure optimal network performance for message transport between desktop applications and the e-mail servers. If implementing a Modular Messaging system with a Microsoft Exchange or an IBM Lotus Domino message store, customers may need to make changes to the existing e-mail infrastructure.

Security processes

Prior to the implementation of a Modular Messaging system, the customer's security staff should review and approve the Modular Messaging deployment. Customers should engage the expertise of their security staff early in the implementation process. Security staff must consider how the Modular Messaging system will be incorporated into their routine maintenance of virus protection, patches, and service packs. Customer-provided virus protection must be used for all Microsoft Windows servers. Additional information can be obtained at the Avaya Support Web site: http://www.avaya.com.

Customer responsibility for system security

No telecommunications system can be entirely free from the risk of unauthorized use. Customers have ultimate control over the configuration and use of the product and are solely responsible for ensuring the security of their systems.

Customers who administer and use the system can tailor the system to meet their unique needs. Therefore, customers are in the best position to ensure that the system is secure to the fullest extent possible. Customers are responsible for keeping themselves informed of the latest information for configuring their systems to prevent unauthorized use. Customers must regularly implement security patches, hot fixes, and anti-virus updates. System managers and administrators are also responsible for reading all recommendations, installation instructions, and system administration documents provided with the product. This information can help them understand the features that might introduce risk of toll fraud, and the steps they must take to reduce that risk.

Avaya does not guarantee that this product is immune from or will prevent unauthorized use of telecommunications services or facilities accessed through or connected to this product. Avaya is not responsible for any damages or charges that result either from unauthorized uses or from incorrect installations of the security patches that are made available periodically. To aid in combating these crimes, Avaya maintains strong relationships with its customers and supports law enforcement officials in apprehending and successfully prosecuting those responsible.

Report suspected security vulnerabilities with Avaya products to Avaya by sending e-mail to securityalerts@avaya.com. Reported vulnerabilities are prioritized and investigated. Any corrective actions resulting from the vulnerability investigation are posted at http://www.avaya.com/support. Whether immediate support is required, report all toll fraud incidents perpetrated on Avaya services to Avaya Corporate Security at securityalerts@avaya.com.

In addition to recording the incident, Avaya Corporate Security is available for consultation on:

- Product issues
- Investigation support
- Law enforcement
- Education programs

For more information about system security, see the “Modular Messaging and Security” section of the media.

Recommendations for configuring Data Execution Prevention (DEP)

Data Execution Prevention (DEP) prevents your system from viruses and other security threats that results from running malicious code. Data Execution Prevention must not be mistaken as a firewall or antivirus program as it does not prevent harmful programs from being installed on your system. Instead, DEP performs additional checks on memory, and prevents code execution from data pages.

There are two types of Data Execution Prevention, "Software Enforced" and "Hardware Enforced." Hardware-enforced DEP detects code that is running and raises an exception when execution occurs. Software-enforced DEP prevents malicious code from taking advantage of exception-handling mechanisms in Windows.

Configuration of DEP

Microsoft Windows supports the following four system-wide configurations for both hardware-enforced and software-enforced DEP.

- **OptIn**: On systems with processors that can implement hardware-enforced DEP, DEP is enabled by default for limited system binaries and programs that "opt-in." With this option, only Windows system binaries are covered by DEP by default.
- **OptOut**: DEP is enabled by default for all processes. You can manually create a list of specific programs that do not have DEP applied by using the System dialog box in Control Panel. You can also use the Application Compatibility Toolkit to "opt-out" one or more programs from DEP protection. System compatibility fixes, or shims, for DEP do take effect.
- **AlwaysOn**: This setting provides full DEP coverage for the whole system. All processes always run with DEP applied. The exceptions list to exempt specific programs from DEP protection is not available. System compatibility fixes for DEP do not take effect. Programs

that have been opted-out by using the Application Compatibility Toolkit run with DEP applied.

- **AlwaysOff**: This setting does not provide any DEP coverage for any part of the system, regardless of hardware DEP support. The processor does not run in PAE mode unless the **/PAE** option is present in the `Boot.ini` file.

The existing default settings in the MAS image must only be used to configure the DEP settings. The default DEP setting is **OptOut** with no exceptions. As there are no exceptions, all Modular Messaging services are being monitored for DEP.

If the system-wide DEP policy is set to **OptOut**, programs that have been exempted from DEP protection will be exempted from both hardware-enforced and software-enforced DEP.

The `Boot.ini` file settings are as follows:

`/noexecute=policy_level`, where, `policy_level` is defined as **AlwaysOn**, **AlwaysOff**, **OptIn**, or **OptOut**.

Existing `/noexecute` settings in the `Boot.ini` file are also not changed if a Windows operating system image is moved across computers with or without hardware-enforced DEP support.

During installation of Windows XP SP2 and Windows Server 2003 SP1 or later versions, the **OptIn** policy level is enabled by default unless a different policy level is specified in an unattended installation. If the `/noexecute=policy_level` setting is not present in the `Boot.ini` file for a version of Windows that supports DEP, the behavior is the same as if the `/noexecute=OptIn` setting was included.

Appendix C: Customer environment

Avaya support policy for third-party clients

Avaya Modular Messaging is standards based, which includes IMAP4 access to messages from user client software packages (for example, Microsoft Outlook). Avaya has conducted successful interoperability testing with Microsoft Outlook 2000, Microsoft Outlook 2002, Microsoft Outlook 2003, and Microsoft Outlook 2007.

Furthermore, Avaya acknowledges that customers have reported successful integration of GroupWise with Modular Messaging and acknowledges that our customers may integrate other IMAP4 user client software packages with Modular Messaging. Avaya, however, makes no representations, warranties, or guarantees regarding specific capabilities with specific IMAP4 clients or successful integration or interoperability thereof. Avaya's product support is limited to IMAP4 as it is implemented on Modular Messaging and does not include support for specific e-mail clients.

Site requirements for Avaya S8800, S8730, S3500, and HP DL360 G7 servers

This section describes the physical requirements for the hardware, including environmental, weight, space, and power considerations for Avaya S8800, S8730, S3500, and HP DL360 G7 servers.

Environmental requirements for S8800, S8730, S3500, and HP DL360 G7 servers

The following table lists the environmental conditions that must be maintained in the area where the Avaya S8800 server is installed.

Operating state	Temperature	Humidity (noncondensing)
Operating	+50ºF to +95ºF +10ºC to +35ºC	8% to 80% RH

Operating state	Temperature	Humidity (noncondensing)
Non-operating (in storage or being shipped)	-40ºF to +140ºF -40ºC to +60ºC	8% to 80% RH

The following table lists the environmental conditions that must be maintained in the area where the Avaya S8730 server is installed.

Operating state	Temperature	Humidity (noncondensing)
Operating	+50ºF to +95ºF +10ºC to +35ºC	10% to 90% RH
Non-operating (in storage)	-22ºF to +140ºF -30ºC to +60ºC	5% to 95% RH
Non-operating (in shipping)	-22ºF to +122ºF -30ºC to +50ºC	5% to 95% RH

The following table lists the environmental conditions that must be maintained in the area where the Avaya S3500 server is installed.

Operating state	Temperature	Humidity (noncondensing)
Operating	+50 to +95ºF +10 to +35ºC	20% to 80 RH
Non-operating (in storage or being shipped)	-4 to +122ºF -20 to +50ºC	20% to 90% RH

The following table lists the environmental conditions that must be maintained in the area where the HP DL360 G7 server is installed.

Operating state	Temperature	Humidity (noncondensing)
Operating	+50 to +95ºF +10 to +35ºC	10% to 90 RH
Non-operating (in storage or being shipped)	-40 to +158ºF -40 to +70ºC	5% to 95% RH

The following table lists the maximum heat output for S8800 server in British thermal units (BTUs).

Server model	Maximum heat output
Minimum configuration	662 BTU per hour (194 watts)
Maximum configuration	1400 BTU per hour (400 watts)

The following table lists the maximum heat output for S3500 and S8730 servers in British thermal units (BTUs).

Server model	Maximum heat output		
	S3500 server	S8730 server with 4 hard drives	S8730 server with 6 hard drives
Avaya MAS	1498 BTU per hour	1045 BTU per hour	
Avaya MSS—S	1211 BTU per hour	933 BTU per hour	
Avaya MSS—H	1573 BTU per hour	1078 BTU per hour	1136 BTU per hour

Weight and space considerations for S8800, S8730, S3500, and HP DL360 G7 servers

The following table lists the weight, height, width, and depth of the S8800 server.

Server	Weight (full)	Height	Width	Depth
S8800 server	34 lb (15.4 kg) (without port boards)	1.69 in. (43 mm)	17.3 in. (440 mm)	28 in. (711 mm)

The following table lists the weight, height, width, and depth of the MAS and MSS on S8730 servers.

Server	Weight (full)	Height	Width	Depth
Avaya MAS	47.18 lb (20.41 kg) (without port boards)	3.38 in. (8.59 cm)	17.54 in. (44.54 cm)	26. 01 in. (66.07 cm)
Avaya MSS—S	47.18 lb (20.41 kg)	3.38 in. (8.59 cm)	17.54 in. (44.54 cm)	26. 01 in. (66.07 cm)
Avaya MSS—H	60 lb (27.22 kg)	3.38 in. (8.59 cm)	17.54 in. (44.54 cm)	26. 01 in. (66.07 cm)

The following table lists the weight and spatial dimensions of the MAS and MSS on S3500 servers.

Server	Weight (full)	Height	Width	Depth
Avaya MAS	36 lb (16.3 kg) without port boards	3.5 in. (9 cm)	16.9 in. (43 cm)	26 in. (66 cm)
Avaya MSS—S	38 lb (17.2 kg)	3.5 in. (9 cm)	16.9 in. (43 cm)	26 in. (66 cm)
Avaya MSS—H	42 lb	3.5 in.	16.9 in.	26 in.

Server	Weight (full)	Height	Width	Depth
	(19.1 kg)	(9 cm)	(43 cm)	(66 cm)

The following table lists the weight, height, width, and depth of the HP DL360 G7 server.

Server	Weight (full)	Height	Width	Depth
HP DL360 G7 server	Maximum: 35.20 lb (15.97 kg) Minimum: 32 lb (14.51 kg)	1.7 in. (43.2 mm)	16.78 in. (426.2 mm)	27.38 in. (695.3 mm)

For safety considerations, at least two technicians should be on site and available to mount the units.

Customer-provided cabinet requirements for DL360 G7, S8800, S8730, and S3500 servers

Customer-provided cabinet requirements for DL360 G7

If the Avaya MAS and MSS are to be installed in a rack-mount configuration, the customer-provided cabinet must meet the following requirements:

- The cabinet must contain a four-post rack to support the weight of the server.
- The cabinet must be secured to the floor before attempting to mount any units.
- The sliding rails and extender brackets provided with each server are designed for mounting in cabinets 26.5 to 32 inches in depth.
- The cabinet height must accommodate the number of units to be mounted. It might also need to hold the MAS UPS, and optional equipment such as the KVM switch.

Customer-provided cabinet requirements for S8800

If the Avaya MAS and MSS are to be installed in a rack-mount configuration, the customer-provided cabinet must meet the following requirements:

- The cabinet must contain a standard 19 inch four-post rack to support the weight of the server.
- The cabinet must be secured to the floor before attempting to mount any units.
- Minimum depth of 70 mm (2.76 in.) between the front mounting flange and inside of the front door if the server is installed in a cabinet.
- Minimum depth of 157 mm (6.18 in.) between the rear mounting flange and inside of the rear door if the server is installed in a cabinet.

- Minimum depth of 718 mm (28.27 in.) and maximum depth of 762 mm (30 in.) between the front and rear mounting flanges to support the use of the cable-management arm.
- The rack must meet the following standards:
  - American National Standards Institute (ANSI) and Electronic Industries Association (EIA) standard ANSI/EIA-310–D-92
  - International Electrotechnical Commission (IEC) 297
  - Deutsche Industrie Norm (DIN) 41494

Customer-provided cabinet requirements for S8730

If the Avaya MAS and MSS are to be installed in a rack-mount configuration, the customer-provided cabinet must meet the following requirements:

- The cabinet must contain a four-post rack to support the weight of the server.
- The cabinet must be secured to the floor before attempting to mount any units.
- The sliding rails and extender brackets provided with each server are designed for mounting in cabinets 22.5 to 32 inches in depth.
- The cabinet height must accommodate the number of units to be mounted. It might also need to hold the MAS modems, UPS, and optional equipment such as the KVM switch.

Customer-provided cabinet requirements for S3500

If the Avaya MAS and MSS are to be installed in a rack-mount configuration, the customer-provided cabinet must meet the following requirements:

- The cabinet must contain a four-post rack to support the weight of the server.
- The cabinet must be secured to the floor before attempting to mount any units.
- A rack size of 31.5 x 35.5 inches (800 mm x 900 mm) is best, as it provides space for cables, doors, etc., but 31.5 x 31.5 inches (800 x 800 mm) will also work.
- The sliding rails provided with each server are designed for mounting in cabinets 26 to 36 inches (660 to 914 mm) in depth.
- The racks need to have post rails 25 inches (640 mm) apart to allow for the fixing brackets.
- The cabinet height must accommodate the number of units to be mounted. It might also need to hold the MAS modems, Uninterruptible power supply (UPS), and optional equipment, such as the KVM switch.

Power requirements for S8800, S8730, S3500, and HP DL360 G7 servers

The following tables lists the power requirements for the Avaya S8800, S8730, S3500, and HP DL360 G7 servers. Use these figures for equipment room planning, not for UPS sizing. The AC power supply source must be a single-phase three conductor consisting of line, neutral, and ground connections.

Warning:

The power cord set provided with this product must be used with this product only. Do not use the cord set with any other product, and do not use a different cord set with this product. Using the wrong cord set could lead to hazardous incidents such as electric shock, fire, and faulty operation.

The following table lists the power requirements for the Avaya S8800 server.

Server	Number of power supply units	Volts AC	Hertz	Maximum Amperes 120V/ 240V
S8800 MAS	1	100 to 127 (low range) 200 to 240 (high range)	47 to 63 Hz	8/4
S8800 MSS	2	100 to 127 (low range) 200 to 240 (high range)	47 to 63 Hz	8/4
S8800 Single server	2	100 to 127 (low range) 200 to 240 (high range)	47 to 63 Hz	8/4

The following table lists the power requirements for the Avaya S8730 server.

Server	Number of power supply units	Volts AC	Hertz	Maximum Amperes 120V/ 240V
Avaya MAS	1	100 – 132 VAC 200 – 240 VAC	50/60 Hz	10/5
Avaya MSS—S	2	100 – 132 VAC 200 – 240 VAC	50/60 Hz	10/5
Avaya MSS—H	2	100 – 132 VAC 200 – 240 VAC	50/60 Hz	6/3 (for each vertically stacked model of power supply) or 7/3.5 (for each side-by-side model)

The following table lists the power requirements for the Avaya S3500 server.

Server	Number of power supply units	Volts AC	Hertz	Maximum Amperes 120V/ 240V
Avaya MAS	1	90 – 264 VAC	47– 63 Hz	8.0/4.0
Avaya MSS—S	1	90 – 264 VAC	47– 63 Hz	8.0/4.0
Avaya MSS—H	2	90 – 264 VAC	47– 63 Hz	8.0/4.0

For equipment room planning, the AC power source requires a 15 A circuit breaker for 100–127 VAC installations or a 10 A circuit breaker for 200–240 VAC installations. Consider the server connection to a branch circuit with regard to overload or overcurrent protection. Verify the system ratings to ensure that, together with other equipment connected to the same branch circuit, an overcurrent or overload condition does not exist.

The following table lists the power requirements for the HP DL360 G7 server.

Server	Number of power supply units	Volts AC	Hertz	Maximum Amperes 120V/ 240V
Avaya MAS	1	100 – 132 VAC 200 – 240 VAC	50/60 Hz	10/5
Avaya MSS—H	2	100 – 132 VAC 200 – 240 VAC	50/60 Hz	10/5
Avaya Single server	2	100 – 132 VAC 200 – 240 VAC	50/60 Hz	10/5

All Modular Messaging systems must use a UPS. To size a UPS, use the maximum power dissipation figures in watts. For example, 400 watts divided by 120 VAC is about 3 amps per server.

The following table lists the maximum power dissipation for UPS sizing for the DL360 G7 server.

Server	Maximum power dissipation in watts
Multi-server configuration	
Avaya MAS	170 watts
MSS	188 watts
Single server configuration	

Server	Maximum power dissipation in watts
Single server	288 watts

The following table lists the maximum power dissipation for UPS sizing for the Avaya S8800 server.

Server	Maximum power dissipation in watts
Multi-server configuration	
Avaya MAS	216 watts
MSS	237 watts
Single server configuration	
S8800 server	376 watts

The following table lists the maximum power dissipation for UPS sizing for the Avaya S3500 and S8730 servers.

Server	Maximum power dissipation in watts		
	S3500	S8730 with 4 hard drives	S8730 with 6 hard drives
Avaya MAS with port boards	450 watts	326 watts	
Avaya MSS—S	400 watts	293 watts	
Avaya MSS—H	500 watts	360 watts	376 watts

For more information, see the *Installing the S8800* guide and the *Installing the Avaya S8730 Server for Modular Messaging* guide.

Modular Messaging and the Microsoft Windows domain infrastructure

Different versions of Modular Messaging relate differently to the Microsoft Windows domain infrastructure at the customer site.

The relationship that a Modular Messaging system shares with the Windows domain affects subscriber and administrator authentication.

All Modular Messaging servers must be in the same Windows domain and on the same LAN segment, whether provided by the customer or Avaya.

Microsoft Windows domain infrastructure for Modular Messaging —MSS

Private Microsoft Windows domain

When installing a Modular Messaging—MSS system, technicians create a private Microsoft Windows domain that does not require any interaction with a Microsoft Windows domain that the customer network might already have.

In fact, the Modular Messaging—MSS system does not require that the customer even have an existing Windows network. MAS units are added to the Microsoft Windows domain that is created for Modular Messaging. MAS administrators use logins that are configured in this Microsoft Windows domain.

The Modular Messaging Windows domain can be configured to trust one or more customer Microsoft Windows domains, allowing MAS administrators to use their normal Windows desktop login when administering the MAS.

Subscribers using graphical user interface (GUI) clients, Subscriber Options, or Web Subscriber Options must provide their mailbox numbers and passwords for authentication. This authentication is unrelated to any Microsoft Windows log-in mechanisms. User credentials of MAS administrators are authenticated against the Microsoft Windows login in the domain created during the Modular Messaging installation.

Caution:

Do not use the same Data Collection Tool (DCT) data file for multiple systems in a networked environment. The name for the private Windows domain must be unique throughout the entire messaging network, or errors will occur. If the private domain name is duplicated anywhere in the network, all Modular Messaging software must be reloaded on all affected servers to correct the problem. Ensure that a unique private domain name is used on each Modular Messaging system.

Customer’s existing Microsoft Windows domain

Alternatively, a Modular Messaging—MSS system may be installed into a customer’s existing Windows domain instead of a separate, private domain.

The customer must create both the *customer* and the *technical support* accounts in their Windows domain. This is required since specific applications (e.g., system administration) must be run using either the *customer* or *technical support* account and the account must be authenticated by the MAS. The accounts must be Active Directory (AD) accounts, as local administration accounts don’t provide sufficient access and authentication control.

The Modular Messaging—MSS web administration will allow specification of a customer’s corporate Windows domain.

Microsoft Windows domain infrastructure for Modular Messaging—Exchange and Modular Messaging—Domino

Modular Messaging—Microsoft Exchange and Modular Messaging—IBM Lotus Domino systems join an existing customer Microsoft Windows domain. MAS units function as members of the Microsoft Windows domain set up by the customer.

Subscribers and administrators authenticate against the existing Microsoft Windows domain. Such authentication is based on the security standards established by the customer for the existing Microsoft Windows domain.

Users for Web Subscriber Options need to provide their mailbox numbers and passwords for authentication.

Considerations when implementing Modular Messaging—MSS

Modular Messaging—MSS uses a dedicated server and private network to isolate critical components from reliance on the customer's IT and e-mail infrastructure. Basic voice mail features including Call Answer and telephone retrieval of messages operate completely independently of this infrastructure. However, certain features rely on and interoperate with aspects of the customer's infrastructure.

IT and e-mail infrastructure considerations when implementing Modular Messaging—MSS are:

- Administrators must add the MSS and MAS hosts to the customer's Domain Name Servers (DNSs) for:
  - Using any desktop client
  - Sending networked messages
  - Directory updating between multiple, separate Modular Messaging systems or between Modular Messaging and Message Networking systems in the customer network.

    For networking between Modular Messaging systems or Modular Messaging and Message Networking systems, administrators can also add these systems to each other's hosts files without relying on DNS.
- Modular Messaging—MSS delivers all messages sent outside its voice mail domain (VMD) with the standard SMTP/MIME e-mail protocols using the customer's IT and e-mail infrastructure. Messages sent outside the VMD include networked messages and Notify

Me messages. Depending on the MSS configuration options, these messages are sent in any of the following ways:

- Using DNS mail exchanger (MX) lookups of the recipient's *host.domain*
- Using an administered e-mail gateway, which then relays the message to its recipient

  A configuration in which networked messages are sent directly to the destination messaging system and Notify Me messages are sent to a gateway is not explicitly supported. However, this behavior can be achieved using DNS MX routing. To do this, the customer must provide a DNS server that responds to MX queries for all hosts with the host name of the gateway. In addition, customers must either administer networked computers through hosts files or have the DNS server return the actual IP address for networked Modular Messaging hosts.

• Messages sent outside a voice mail domain using SMTP/MIME carry an e-mail *from:* address that identifies the sender's Modular Messaging mailbox. This address is usually in the form *first.last@mmsystem.domain.company.com*. If these messages are sent through an e-mail gateway in the customer's network that modifies the outbound *from:* addresses, replies to these messages are redirected to an incorrect address. For example, if the e-mail gateway replaces the *host.domain* portion with a fixed string such as *company.com*.

  Many companies use *first.last@company.com* as the e-mail address for a user's Exchange mailbox. These addresses have the same e-mail handle, that is, *first.last@* part, so if the *host.domain* portion of a message sent from a user's Modular Messaging mailbox is replaced, replies will go to the user's regular e-mail mailbox. Customers must ensure that messages sent between Modular Messaging systems are not sent through such e-mail gateways. Alternatively, customers must ensure that the gateway is configured to retain the original, unmodified *from:* address of messages sent between Modular Messaging systems.

• The Notify Me feature allows notification messages to be sent to any e-mail address, including addresses outside the customer's network. Such messages must be sent through an outbound e-mail gateway in the customer's network. Consideration should be given to what the *from:* address indicates in this case. The *from:* address when sent by the Modular Messaging system identifies the subscriber’s Modular Messaging mailbox. Many companies' outbound e-mail gateways are configured to replace the *host.domain* portion of *from:* addresses with a fixed string such as *company.com*. If the *host.domain* portion of the message is replaced, replies will go to the user's regular e-mail mailbox. However, if the Modular Messaging and e-mail addresses are coordinated, this might be precisely what is wanted. Administrators can change the gateway processing rules to modify *from:* addresses for messages sent from Modular Messaging systems into a form that cannot be replied to, such as *do_not_reply@company.com*. With this approach, users would not receive indication of problems with their notification messages. Alternatively, administrators can change the gateway to modify *from:* addresses for messages sent from Modular Messaging into an administrative mailbox, for example *postmaster@company.com*. With this approach, failures related to notification messages would be delivered to the company's e-mail postmaster.

- When deploying a Modular Messaging—MSS system, the customer must choose whether the e-mail address for subscriber mailboxes specifies the actual *host.domain* of the MSS or is an e-mail host alias. This e-mail address is used for networking and when sending messages using desktop clients. The default is to use the actual host.domain name of the MSS. If an e-mail host alias is used, administrators must add this name to the customer's DNS servers or remote systems' hosts files. Multiple Modular Messaging systems within a single customer's network cannot share identical e-mail host aliases.
- The customer must choose whether to allow incoming Internet e-mail to be delivered to subscribers' Modular Messaging mailboxes. Internet e-mail includes Notify Me messages that are returned because they were sent to incorrect addresses and possibly replies to such messages. If the customer chooses to allow such messages to be delivered, the customer's external e-mail infrastructure must be able to associate an incoming address to the subscriber's Modular Messaging mailbox. One way to do this is to use an e-mail host alias, such as *mm.company.com*, and register this domain with the customer's external DNS servers. Another way is to use Modular Messaging e-mail addresses with e-mail handles distinct from those used for regular e-mail addresses. For example, a user's e-mail address might be *first.last@company.com* while the Modular Messaging mailbox might be *first.last.mm@company.com*. If the customer allows Internet e-mail into Modular Messaging mailboxes, Avaya strongly suggests that all such e-mail be filtered for spam and viruses before being delivered to the Modular Messaging system.

Considerations when implementing Modular Messaging with e-mail servers

Modular Messaging—Exchange and Modular Messaging—Domino systems fit within the existing IT infrastructure at the customer site. These systems are more sensitive to the customer environment than a Modular Messaging—MSS system is, where a dedicated server and private network are used to isolate critical operations.

Some additional considerations when implementing Modular Messaging with e-mail servers are:

- To confirm that the Microsoft Exchange and IBM Lotus Domino e-mail systems have been deployed and are being operated according to Microsoft and IBM specifications, respectively.
- To assess the impact that the Modular Messaging solution will have on the existing e-mail environment. The messaging requirements of a unified message store increase the utilization of the e-mail server, mailboxes, and system administration. Thus, the CPU utilization and memory requirements of the e-mail servers need to be able to support the additional processing requirements for the voice mail application.

Note:

Customers must keep their systems within performance operating ranges recommended by Microsoft and IBM Lotus. To support the extra load for voice messaging, Avaya requires that the CPU utilization be no more than 50%.

- To evaluate the customer's LAN environment to ensure that it can support the application. In Modular Messaging with e-mail servers, all the communications for the application run on the customer's network. Thus, the occupancy of the customer's IP network needs to be assessed to determine if it can support the additional load and to provide the responsiveness for the real-time aspects of the solution.

Note:

The customer's estimated busy-hour LAN occupancy, including the incremental traffic due to voice messaging, must be less than 25%.

- To ensure that certain factors are in harmony and meet the specifications for the solution to perform reliably. These factors include the release level of e-mail, how it is configured, operating systems, what is being used for directory authentication, and other hardware, software, and operating system elements that will be involved in the overall architecture and its topology.

The assessment of the customer environment might determine that it meets the operational specifications for a Modular Messaging system with e-mail servers. However, customers must maintain the reliability of their environment and ensure that the e-mail environment and data network are not in a constant state of flux.

Interaction of Modular Messaging—Exchange and Active Directory

As Modular Messaging—Exchange does not maintain its own store of messages or its own directory, it must interact with various other existing customer-provided and maintained servers in the environment. At a very high level these interactions will be via MAPI when communicating with Microsoft Exchange Servers and LDAP when requesting Directory information from Active Directory Controllers.

Modular Messaging Release 5.2 supports the following versions of Exchange and Active Directory Schemas:

Microsoft Exchange Release	Active Directory Schema
Microsoft Exchange Server 2003 SP2 (Schema Extension version 6870 - 6936)	Microsoft Windows Server 2003 (Schema version 30)
	Windows Server 2003 R2 (Schema version 31)

Microsoft Exchange Release	Active Directory Schema
Microsoft Exchange Server 2007 SP1 (Schema Extension version 10628 – 11116)	Microsoft Windows Server 2003 (Schema version 30)
	Microsoft Windows Server 2003 R2 (Schema version 31)
	Microsoft Windows Server 2008 (Schema version 44)
Microsoft Exchange Server 2010 SP1 or later	Microsoft Windows Server 2008 (Schema version 47)

Note:

The Active Directory Schema version is determined by the Schema level of the Active Directory Forest. The Schema level is modified by running the Microsoft adprep utility with the /forestprep switch that is included with the Windows version listed in the table. For details on how to find the current Schema versions for Active Directory and Exchange, please see the following Microsoft link, http://support.microsoft.com/default.aspx/kb/556086.

Modular Messaging—Exchange will only interact with Exchange servers that either host the mailbox for a voice mail enabled subscriber or a server that hosts a Modular Messaging created mailbox. Modular Messaging will create mailboxes on Exchange servers during installation to hold Voice Mail Domain properties (“VMD” mailbox) and also to facilitate message delivery (“External Caller” mailbox). Thereafter, an External Caller mailbox will be created on each Exchange server that hosts a Modular Messaging enabled Subscriber as and when the first Subscriber hosted on that mailbox is detected by the software. Subject to permissions, these special mailboxes are created and removed as required and they will also be used to actively monitor whether the Exchange server is available and able to service requests. Additionally a mailbox is created for the Fax Sender and also a Broadcast Distribution List is created.

With Exchange Server 2010, the External Caller mailboxes are associated with the CAS server or array regardless of where the actual subscriber mailbox resides. If there is only one CAS array, then there will only be one External Caller mailbox.

For each mailbox created, an Active Directory User account is also created. This account will be homed in the OCTEL Container of the Active Directory which by default is at the root of the directory structure but the location for this Container can be specified during the initial installation of Modular Messaging. For Exchange Server 2003 and Exchange Server 2007, the mailboxes will be created in the default Mailbox Store of the default Storage Group for the respective Exchange server, typically the first Mailbox Store in the first Storage Group created. The default Mailbox Store is the one that hosts the System Attendant Mailbox within Exchange Server, and needs to be online at the time when the mailbox creation is attempted, otherwise the mailbox cannot be created. With Exchange Server 2010, the CAS server will determine where the mailbox will be created.

For more details of Permissions, Active Directory extensions and the OCTEL container, see the Installation and Upgrades guide for the Microsoft Exchange message store.

Although there may be several Exchange and Active Directory servers in a customer's environment, Modular Messaging will identify some in a specific way:

- Each MAS will have an assigned "Peer Exchange Server". This is typically entered during installation and will initially be common across all MAS servers. The "Peer Exchange Server" can be modified later allowing each MAS to have a different Peer if desired. This Exchange server will host an External Caller mailbox that will be used to submit new Call-Answer voice messages for delivery and will also act as a mechanism to logon to mailboxes hosted on other Exchange servers. The External Caller mailbox will be named "External Caller (MAS NAME)".
- The Exchange server that hosts the VMD Mailbox is known as the "VMD Host". Only a single Exchange server may be the VMD Host and this typically will be the Peer Exchange Server of the first MAS to be installed. All MASs in the VMD must be able to reliably connect to this Exchange server on a regular basis.

  Note:

  Changing the Peer Exchange Server after installation does not directly reallocate the VMD Host.

- Exchange servers that host mailboxes of Modular Messaging subscribers are sometimes referred to as a "Non-Peer Exchange Server". Each will host an External Caller mailbox and it will be named "External Caller (EXCHANGE SERVER NAME)".

  Note:

  For Exchange 2010, the External Caller for a non-peer will be named using the name of the CAS Server or CAS array.

- Mailbox Monitor will select the Peer Exchange Server of one of the MAS servers in the Voice Mail Domain as its "Peer Mail Server". This is dynamic and if that Exchange server becomes unavailable and there is more than one option, a alternative will be automatically selected.
- During installation, an Active Directory Domain Controller is specified that will act as the "Peer Directory Server". This will be a server that is designated as a Global Catalog Server within Active Directory and will be responsible for providing directory updates to Modular Messaging.

In addition to these specific servers, Modular Messaging—Exchange has an indirect dependency on other Active Directory Domain Controllers for various functions and the allocation of these is outside of the control of the product. In smaller environments one Domain Controller may facilitate more than one of the functions listed below and in all environments, the Domain Controller may or may not be the same one identified as the Peer Directory Server above.

Function	Description
Name Service Provider Interface (NSPI)	This is primarily a protocol used by Messaging clients such as Modular Messaging to communicate with a mailbox store. An NSPI request is made to a Domain Controller

Function	Description
	during the mailbox login. The Domain Controller will always be one designated as a Global Catalog server (“GC”) and will be chosen by the Exchange server that hosts the mailbox being accessed in the form of a “referral”. The referral GC will be selected by Exchange based upon the cost associated with reaching each GC and on a round-robin basis when several local servers are available.
Authentication	All access to Exchange mailboxes require authentication. The request to access a mailbox will be routed internally by Exchange to a Domain Controller (“DC”) that should be able to authenticate the request. This does not have to be a Global Catalog server and where a Domain Controller is available at a lower cost than the GC that provides the NSPI function, that second Domain Controller will be used.

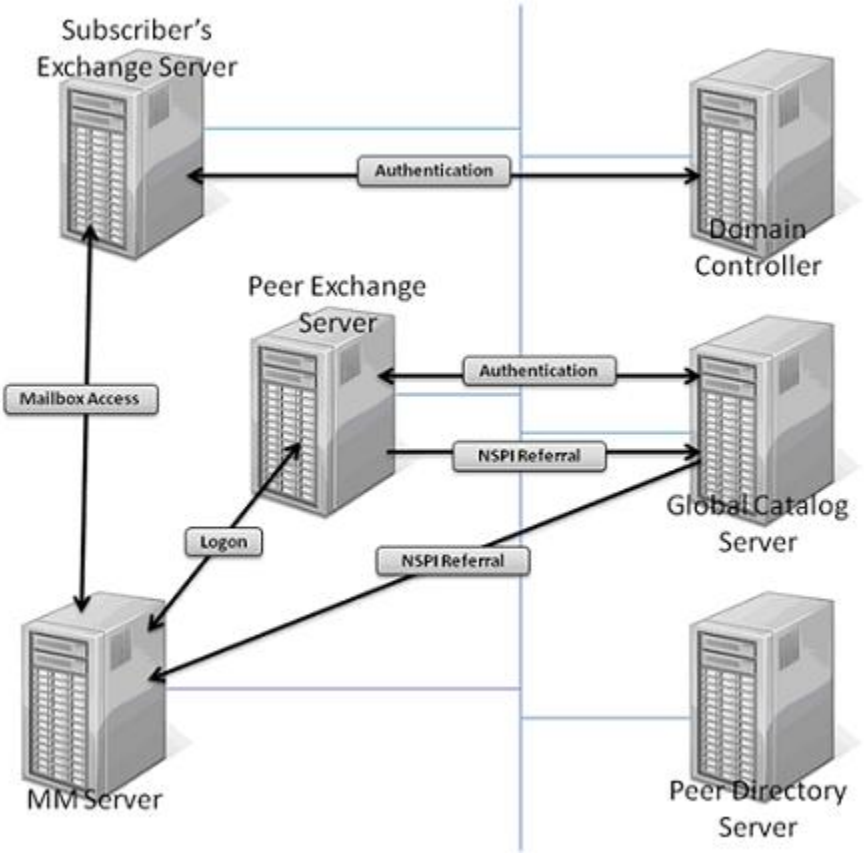
Note:

In Exchange 2007 and Exchange 2010, the Exchange Management Console can be used to identify a list of available Global Catalog Servers and Domain Controllers that Exchange will use. The top entry in the list is typically the GC or DC currently being used. These lists can be found on the **System Settings** tab of the **Server Properties** window, under **Server Configuration** | **Client Access**.

Modular Messaging activities requiring access to environment servers

The following section details the main activities when using Modular Messaging—Exchange where a significant interaction with the customer-provided environment servers is required.

The following diagram provides a high level overview of the methods described in the sections below and summarizes the interactions between the servers. In many situations the servers in this diagram are not separate physical Domain Controllers and Exchange Servers but rather a role or function of a customer’s environment server.



Directory Synchronization

Every 5 minutes, each individual MAS will request any changes to directory information from the Peer Directory Server that have occurred since the last request was made in the form of a LDAP query. Each Domain Controller maintains an Update Sequence Number ("USN") that is specific to that Domain Controller and each change to the Active Directory, whether made by that Domain Controller or replicated from another, increments the USN by 1 when the database on that Domain Controller is updated. Modular Messaging stores the highest USN included in the last LDAP query and uses this as the base for the next request. Therefore even if the MAS is taken out of service for a period of time, the directory updates will not be missed.

These directory updates are stored in the Front End Database on each individual MAS and subsequently used to validate the list of active Subscribers that may be required for example, when a call is received via the TUI by a caller wishing to leave a message. If the Peer Directory Server is not available for a period of time, Modular Messaging will continue to try every 5 minutes eventually catching up when the Peer Directory Server becomes available again. Any directory updates such as adding new Users to Active Directory will not be visible to Modular Messaging until the synchronization has occurred.

To ensure consistent results between MAS servers within the same VMD, it is strongly recommended that all MASs are assigned the same Peer Directory Server. This eliminates replication issues between Domain Controllers providing inconsistent results within the TUI or Administration applications. Furthermore, only a Global Catalog server contains directory information for all domains in an Active Directory Forest therefore it is essential that the Peer Directory Server is designated as a GC.

Subscriber Logon from the TUI

When a Subscriber attempts to logon from the Telephone User Interface, Modular Messaging must open the mailbox of the Subscriber to report on the messages that the Subscriber has in their mailbox. Although the Subscriber's mailbox could reside on any Exchange Server, the MAS will always initially open the mailbox of the Peer's External Caller mailbox. Therefore the NSPI function will be provided by a local Global Catalog server to the Peer Exchange server. Once the mailbox has been opened, the MAS then requests that instead of opening the message store of the External Caller's mailbox, that the message store of the Subscriber's mailbox is opened instead. This means that the activity moves to the Exchange server that hosts the Subscriber's mailbox. A second MAPI logon does not occur so an additional NSPI connection is not required however authentication will now be performed by the Subscriber's Exchange server and this will be against a Domain Controller local to it. Where the Peer Exchange Server and the Subscriber's Exchange server are co-located, it is most likely that Domain Controller for authentication will be the same as the Global Catalog server that provides the NSPI connection. In other situations these two servers will most likely be different.

VMD Synchronization

To ensure that each MAS in the Voice Mail Domain operates the same, any changes to the VMD properties are synchronized by each MAS every 10 minutes in addition to when the MAS service is started. The Voice Mail System Configuration utility (VMSC) is used to update the configuration of the VMD which is then stored in a special message within the VMD mailbox located on the VMD Host.

MAS servers access this mailbox by logging on to the VMD mailbox using MAPI. When logging on to a mailbox, the credentials for the Modular Messaging Service Account are used to open the mailbox for the External Caller that is associated with the Peer Exchange Server. Once the mailbox is opened, the message store for the VMD mailbox is obtained in the same way as for a Subscriber logon. The NSPI connection will be made to a Global Catalog server referred by the Peer Exchange Server and the authentication will be performed by a Domain Controller nominated by the VMD Host.

Call-Answer Message Delivery

The MAS initially caches messages locally in a Spool folder before submitting these to Exchange. All messages are submitted via the External Caller mailbox associated with the current Peer Exchange Server. If the message is from a known Subscriber, the Send-As permission is used to make the message appear as though it was sent by that subscriber . If an error occurs during sending and this relates to the sending Subscriber, then the message will be sent as though it came from an external caller.

To send a message, the MAS uses a MAPI mailbox logon with the Peer Exchange Server that has been cached since the MAS service was started. Therefore the NSPI referral was also provided by the Exchange Server at the time the MAS service was started. Authentication to access mailboxes and to send on behalf of a Subscriber is a real-time activity and a Domain Controller will be selected by Exchange at the time of submission.

For more information on the behavior when the Peer Exchange Server is not available, see Peer Failover on page 143.

Call-Answer Greeting Retrieval

During the handling of a Call-Answer call (a call that reaches Modular Messaging through a call-coverage path), Modular Messaging will attempt to obtain greetings from the Subscriber's mailbox in order to play these back to the caller. The process is the same as for the Subscriber Logon above however if either the Peer Exchange Server or the Subscriber's Exchange server is not available then a synthesized greeting will be played to the caller instead of the subscriber's greeting and the call will continue to be answered.

Active Monitoring

To help maintain a good user experience, Modular Messaging—Exchange actively monitors the availability of all the Exchange servers that host Subscriber mailboxes and additionally the Peer Exchange Server if it does not host Subscribers itself. Every 60 seconds, each MAS will "ping" each Exchange server first using a standard ICMP ping and then by using MAPI to access the External Caller's mailbox hosted on the respective Exchange server. The logon is performed directly against the specific Exchange server and not via the Peer Exchange Server, and so is different to most of the activities such as Subscriber Logon above. The NSPI function will be provided by a Global Catalog server local to the specific Exchange server and that same server is also likely to be selected to perform the authentication. The logon session is cached hence the NSPI referral is only performed once, at startup of the MAS, although if the Global Catalog server does go offline, a reconnect will be attempted after a short period of time.

Mailbox Monitor

The Mailbox Monitor Server service acts on behalf of MWI, Call Me and Notify Me. It connects directly to the Exchange Servers that host Subscriber mailboxes, creating 'Advise Sinks' that request notification from Exchange of any changes to the message count of those individual mailboxes. The Advise Sink will either be created in a temporary manner to just obtain a current list of applicable messages for Call Me or Notify Me, or a more permanent connection is made for MWI allowing Exchange to notify Modular Messaging of message count changes as and when they occur.

When the Mailbox Monitor Server service is started it will enumerate each MAS in the Voice Mail Domain returning the name of the Peer Exchange Server for each. From this list it will attempt a MAPI logon to the External Caller mailbox on one of them and if this fails it will attempt another Exchange server until a successful logon has been accomplished. If no logon is possible, Mailbox Monitoring services are suspended until an Exchange server becomes available. To add as much redundancy as possible, it is not possible to specify which Exchange server will be used as the "Peer Mail Server" for the Mailbox Monitor Server service although if all MAS servers in the VMD use the same Peer Exchange Server, then there will be only one to choose from.

The External Caller mailbox for the selected Peer Mail Server will be used to create the Advise Sinks regardless of which Exchange server the monitored Subscribers mailbox resides on hence a NSPI connection will be made with a Global Catalog server, referred by the Peer Mail Server. As ever, any authentication will be handled by a Domain Controller nominated by the Exchange server being accessed at that time.

The Mailbox Monitor Server service also monitors all the Exchange servers that host monitored Subscribers to ensure that it is aware of when problems occur. Every 10 seconds an ICMP ping is performed against each monitored Exchange server and, just like the Active Monitoring performed by MAS Service, an attempt is also made to access a mailbox hosted by the specific Exchange server. A difference here however is that no attempt is made to directly logon to that Exchange server, a separate MAPI logon to the Peer Mail Server is used for accessing each Exchange server which significantly reduces the number of MAPI sessions and resources required. Only one logon is required for each Exchange server.

Calculating the number of NSPI connections required by Modular Messaging

In Microsoft Windows Server 2008, the number of NSPI connections from an individual user was limited to 50. In Microsoft Windows 2003 and prior there was no limit.

An NSPI connection is required for each MAPI logon, and if a user's limit is reached then that logon attempt will fail. In Modular Messaging—Exchange, the "user" will always be the Modular

Messaging Service Account which is shared between all Modular Messaging related services and hence the total required will be a sum of MAPI logons performed by each of the services.

Since each Exchange server will possibly create referrals to different Global Catalog servers and that nomination could possibly change each time a referral is requested, it is not possible to specify the number of NSPI connections that will be made to each GC. However, maximums can be calculated for the whole Modular Messaging system.

The maximum number of connections will therefore be calculated based upon the following and should be set on each Global Catalog server that could be used by Exchange:

Note:

The calculation described in the section is specific to Modular Messaging Release 5.2. Previous releases of Modular Messaging have additional requirements.

- One NSPI connection per Subscriber logon via the TUI. Therefore the number will not exceed the number of telephony ports across all MAS servers. This will also include NSPI sessions for Call-Answer Greeting Retrieval since an individual port can be used only for either Subscriber logon or Call-Answer at any one time.
- One additional NSPI connection may be required when access the Subscribers profile data. Since this could theoretically occur during any use of the TUI, the maximum number equals the number of ports in the VMD.
- One NSPI connection for the VMD Synchronization per MAS.
- One NSPI connection for Call-Answer Message Delivery per MAS.
- One NSPI connection per Exchange server for Active Monitoring by each MAS Service.
- One NSPI connection per Monitored Exchange server for Mailbox Monitor.
- Each MAS can handle requests for Subscriber profile data from external sources such as Subscriber Options. The MAS can pool up to 12 NSPI connections for this.
- Additional NSPI connections for unspecified mailbox access per MAS

Therefore the calculation is:

NSPI = ({MM Services} x {Exchange servers}) + (2 x {VMD Ports}) + (25 x {MAS Services})

where, {MM Services} is the number of instances of a running MAS service plus an instance of a running Mailbox Monitor Server service.

Note:

The number ‘25’ includes the single connections, the profile pool and additional connections required for other MAS activities that are not specifically identified.

Note:

Although this calculation could allow for a smaller number, Avaya suggests a value of no less than 280 connections per Modular Messaging Server (MAS or supplementary server).

For more details regarding NSPI connections and how to set the connection limit see the Microsoft Knowledge Base article, http://support.microsoft.com/kb/949469.

Minimum hardware requirements and supported software (MSS)

This section provides information about the minimum hardware requirements and supported software for Modular Messaging—MSS.

MAS specifications with Modular Messaging—MSS

Modular Messaging—MSS uses either Avaya-provided MAS units for which Avaya provides the Modular Messaging software and the hardware or, with the availability of Release 5.1, and later, Avaya also supports Customer provided equipment for which Avaya only provides the Modular Messaging software.

For upgrades from previous releases of Modular Messaging, the Avaya S3500, S8730, S8800, and HP DL360 G7 server is supported. For new installations, the Avaya S8800 or HP DL360 G7 server is available or customers can supply their own MAS hardware if it meets or exceeds the specification set out below. However, the Avaya S3400 Server is no longer supported.

Note:

When using Modular Messaging in the corporate domain, only Windows Server 2003 is supported on the S8800, S8730, S3500, and HP DL360 G7 servers.

Specifications of an S8800 MAS

The following table provides the hardware specifications of an Avaya S8800 MAS.

Clock speed	RAM
Single Intel E5520 Quad-Core 2.26 GHZ Processor	4GB (multi-server)
Dual Intel E5520 Quad-Core 2.26 GHZ Processor	12GB (single-server)

Avaya S8800 MAS does not support Dialogic voice cards.

Also provided are:

- DVD-R/W SATA slimline
- Six 2.5-inch hot-swap SAS hard disk drive bays

- Two 146 GB SAS 2.5" 10K RPM hard drives configured as RAID 1 (multi-server configuration)
- Five 146GB 2.5" 10K RPM hard drives configured as RAID 5 (single-server configuration)
- Two PCI Express x16 Gen 2 slots

The following table provides the software specifications of an S8800 MAS.

Supported software	Version
Microsoft Windows	• Microsoft Windows Server 2003 R2 SAK SP2[34]
Internet browser	• Microsoft Internet Explorer 9.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 6.0

Tip:

All Microsoft Windows servers must have a customer-provided virus protection.

Specifications of an S8730 MAS

The following table provides the hardware specifications of an Avaya S8730 MAS.

Clock speed	RAM
Quad-Core AMD Opteron™ Processor 2352	4GB

The following table lists the recommended voice cards for an Avaya S8730 MAS.

Protocol	Voice card	Maximum cards per MAS	Maximum ports per MAS
SIP[35]	—	—	96
H.323 integration[35]	—	—	30
T1 QSIG	Dialogic D/480JCT-1T1-EW	3	69
E1 QSIG	Dialogic D/600JCT-1E1-120-EW	3	90
DSE	Dialogic D/82JCT-EW	3	24
Analog	Dialogic D/120JCT-LS-EW (12 port card)	3	36

[34] IIS 6.0 is required and is included with Microsoft Windows Server 2003 R2 SAK SP2.
[35] SIP and H.323 integration transmit voice as IP packets over the LAN cards; thus separate port cards are not required.

Protocol	Voice card	Maximum cards per MAS	Maximum ports per MAS
	Dialogic D/41JCT-LS-EW (4 port card)	3	12

Also provided are:

- Double layer DVD-ROM
- Dual on-board Gigabit LAN ports
- Two 146GB hard drives configured as RAID 1
- PCIe slots for Dialogic telephony cards

The following table provides the software specifications of an S8730 MAS.

Supported software	Version
Microsoft Windows	• Microsoft Windows Server 2003 R2 SAK SP2[36]
Internet browser	• Microsoft Internet Explorer 9.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 6.0

Tip:

All Microsoft Windows servers must have a customer-provided virus protection.

Specifications of an S3500 MAS

The following table provides the hardware specifications of an Avaya-provided S3500 MAS.

Clock speed	RAM
Intel Pentium IV 3.4-GHz processor	2GB

The following table lists the supported voice cards for an S3500 MAS with Modular Messaging —MSS.

Protocol	Voice card	Maximum cards per MAS, any TUI	Maximum ports per MAS, any TUI
SIP[37]	—	—	48

[36] IIS 6.0 is required and is included with Microsoft Windows Server 2003 R2 SAK SP2.
[37] SIP and H.323 transmit voice as IP packets over the LAN cards; thus separate port cards are not required.

Protocol	Voice card	Maximum cards per MAS, any TUI	Maximum ports per MAS, any TUI
H.323 integration[37]	—	—	30
T1 QSIG	Dialogic D/480JCT-1T1	2	46
E1 QSIG	Dialogic D/600JCT-1E1-120	2	60
Digital Set Emulation (DSE)	Dialogic D/82JCT/U (5v card) Dialogic D82JCTPCIUNIV (3.3v & 5v universal card)	2	16
Analog	Dialogic D/120JCT (12 port card)	2	24
	Dialogic D/41JCT-LS (4 port card)	2	8

Also provided are:

- DVD-ROM is included
- Dual on board Gigabit LAN ports
- Single 80GB or 160GB disk drive
- Two PCI-X slots for Dialogic telephony cards

The following table provides the software specifications of an S3500 MAS.

Supported software	Version
Microsoft Windows	• Microsoft Windows Server 2003 Server Appliance Kit (SAK) SP1[38] or SP2[39]
Internet browser	• Microsoft Internet Explorer 9.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 6.0[40]
Dialogic drivers	• 6.0 SU 216

Note:

Avaya-provided S3500 hardware is installed from an image, which installs Microsoft Windows 2003 Server SP2 and hotfixes.

[38] Internet Information Services (IIS) 6.0 is required and is included with Microsoft Windows Server 2003.

[39] The software image supplied with Modular Messaging Release 5.0, and later and used as part of a disaster recovery process will be SP2 only

[40] With Windows Server 2003 SAK SP1 only

Tip:
All Microsoft Windows servers must have a customer-provided virus protection.

Specifications of HP DL360 G7 MAS

The following table provides the hardware specifications of a HP DL360 G7 MAS.

Base unit	Baseline
DL360 G7	1U chassis, dual socket
Processor	Single Intel E5620 Quad Core /2.4 GHz (Westmere) (multi-server configuration) Dual Intel E5620 Quad Core /2.4 GHz (Westmere) (single-server configuration)
Memory	4 GB DDR3 RDIMMs (1333 MHz) (multi-server configuration) 12 GB DDR3 RDIMMs (1333 MHz) (single-server configuration)
HW RAID	P410i RAID controller with 256MB cache and battery backup. Optioned as RAID 1 (multi-server configuration) or RAID 5 (single-server configuration).
Hot-Plug disk drive cage	4 Small Form Factor 2.5” hot-plug hard drives bays are available.
Disk drive	146GB SAS 2.5" 10K RPM 6G DP Hard Drive. Two base configurations: • 136GB total: RAID 1, 2 x 146GB 10K HDDs (multi-server configuration) • 593GB total: RAID 5, 3x300GB 10K HDDs (single-server configuration)
NICs	4 integrated ENET Gigabit NIC ports with TCP offload engine (included on motherboard)
PCI slots	Two PCI-Express Gen 2 expansion slots: (1) full-length, full-height slot and (1) low-profile slot (1-FL/FH x 16 PCIe & 1-LP x 8 PCIe Riser
Removable media	Slim line SATA DVD-RW optical drive (used in all Avaya configurations)
Power Supply	Qty = 1 460W (multi-server configuration) Qty = 2 460W (single-server configuration)
Fans	3 fan modules (fan redundancy) (multi-server configuration) 4 fan modules (fan redundancy) (single-server configuration)
Additional items	1 front USB, 2 back USB, 1 internal USB

The following table provides the software specifications of a HP DL360 G7 MAS.

Supported software	Version
Microsoft Windows	• Microsoft Windows Server 2003 R2 SAK SP2[41]
Internet browser	• Microsoft Internet Explorer 9.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 6.0

Tip:

All Microsoft Windows servers must have a customer-provided virus protection.

Specifications of a CPE MAS

The specification of customer-provided equipment (CPE) should be equal to or greater than the Avaya supplied hardware in terms of memory, disk, and CPU power. For new installations, the hardware must be equivalent to a S8800 server. For upgrades of existing systems, the specification of the CPE hardware should be equivalent to the Avaya S8800, S8730, S3500, or HP DL360 G7 server in terms of memory, disk, and CPU power. The capacity of the system will be dictated by specification of hardware used. CPE can contain an Intel or an AMD processors.

Server	Processor	RAM
Avaya S3500	Intel Pentium IV 3.4-GHz Processor	2GB
Avaya S8730	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800	Single Intel E5520 Quad-Core 2.26 GHz Processor (multi-server configuration) Dual Intel E5520 Quad-Core 2.26 GHz Processor (single-server configuration)	4GB (multi-server configuration) 12GB (single-server configuration)
HP DL360 G7	Single Intel E5620 Quad-Core 2.4 GHz (Westmere) (multi-server configuration) Dual Intel E5620 Quad-Core 2.4 GHz Processor (Westmere) (single-server configuration)	4GB (multi-server configuration) 12GB (single-server configuration)

The following table lists the recommended voice cards for a CPE MAS.

Note:

New installations of Modular Messaging Release 5.2 support only SIP integration although other forms of integration are available via a gateway device.

[41] IIS 6.0 is required and is included with Microsoft Windows Server 2003 R2 SAK SP2.

Protocol	Voice card	Maximum cards per MAS	Maximum ports per MAS
SIP[42]	—	—	96
H.323 integration[42]	—	—	30
T1 QSIG	Dialogic D/480JCT-1T1-EW	3	69
E1 QSIG	Dialogic D/600JCT-1E1-120-EW	3	90
DSE	Dialogic D/82JCT-EW	3	24
Analog	Dialogic D/120JCT-LS-EW (12 port card)	3	36
	Dialogic D/41JCT-LS-EW (4 port card)	3	12

Also required are:

- Double layer DVD-ROM
- Dual on-board Gigabit LAN ports
- Two 146GB hard drives configured as RAID 1
- PCIe slots for Dialogic telephony cards

The following table provides the software specifications of a CPE MAS.

Supported software	Version
Microsoft Windows	• Microsoft Windows Server 2003 Standard or Enterprise Edition SP2 • Microsoft Windows Server 2003 R2 Standard or Enterprise Edition SP2
Internet browser	• Microsoft Internet Explorer 9.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 6.0

The following software is also required:

- Microsoft .NET Framework 1.1, Microsoft .NET Framework 2.0, Microsoft .NET Framework 3.5
- Microsoft ASP .NET 1.1 and Microsoft ASP .NET 2.0
- Virus protection software with the latest updates (recommended)

[42] SIP and H.323 integration transmit voice as IP packets over the LAN cards; thus separate port cards are not required.

Message Storage Server (MSS) specifications

Modular Messaging Release 5.2 supports S8800 server. Modular Messaging continues to support Avaya S8730 and S3500 servers for systems that have upgraded from earlier versions of Modular Messaging.

Specifications of Modular Messaging—MSS for HP DL360 G7

The following table lists the hardware specifications of a Modular Messaging—MSS for HP DL360 G7.

Base unit	Baseline
DL360 G7	1U chassis, dual socket
Processor	Single Intel E5620 Quad Core /2.4 GHz (Westmere) (multi-server configuration) Dual Intel E5620 Quad Core /2.4 GHz (Westmere) (single-server configuration)
Memory	12GB DDR3 RDIMMs (1333 MHz)
HW RAID	P410i RAID controller with 256MB cache and battery backup. Optioned as RAID 5.
Hot-Plug disk drive cage	4 Small Form Factor 2.5” hot-plug hard drives bays are available.
Disk drive	Qty = 3 or 4 146GB SAS 2.5" 15K RPM 6G DP Hard Drive (number of HDDs determined by capacity requirement) (multi-server configuration) Qty = 3 300GB SAS 2.5" 10K RPM 6G DP Hard Drive (number of HDDs determined by capacity requirement) (multi-server configuration)
NICs	4 integrated ENET Gigabit NIC ports with TCP offload engine (included on motherboard)
PCI slots	Two PCI-Express Gen 2 expansion slots: (1) full-length, full-height slot and (1) low-profile slot (1-FL/FH x 16 PCIe & 1-LP x 8 PCIe Riser
Removable media	Slim line SATA DVD-RW optical drive (used in all Avaya configurations)
Power Supply	Qty = 2 460W (single-server configuration)
Fans	3 fan modules (fan redundancy) (multi-server configuration) 4 fan modules (fan redundancy) (single-server configuration)
Additional items	1 front USB, 2 back USB, 1 internal USB

Specifications of Modular Messaging—MSS for S8800

The following table lists the hardware specifications of an Modular Messaging—MSS for S8800.

Clock speed	RAM
Intel E5520 Quad-Core 2.26 GHZ Processor	4GB

Also provided are:

- DVD-R/W SATA slimline
- LAN connectivity
- Three or four 146 GB SAS 2.5" 15K RPM hard drives (multi-server configuration)
- Five 146 GB SAS 2.5" 10K RPM hard drives (single server configuration)
- Six 2.5-inch hot-swap SAS hard disk drive bays
- ServeRAID-MR10i RAID SAS adapter (configured as RAID 5)

Specifications of Modular Messaging—MSS for S8730

The following table lists the hardware specifications of an Modular Messaging—MSS Standard availability (MSS—S) and Modular Messaging—MSS High availability (MSS—H) for S8730.

Clock speed	RAM
Quad-Core AMD Opteron™ Processor 2352	4GB

Also provided are:

- DVD-ROM access
- LAN connectivity
- Two 146 GB hot-plug hard drives 10K RPM SAS (for MSS—S)
- Four or Six 72 GB hot-plug hard drives 15K RPM SAS (for MSS—H) (number of HDDs determined by capacity requirement)

Specifications of Modular Messaging—MSS for S3500

The following table lists the hardware specifications of an Modular Messaging—MSS Standard availability (MSS—S) and Modular Messaging—MSS High availability (MSS—H) for S3500.

Clock speed	RAM
Intel Pentium IV 3.4-GHz processor	2GB

Also provided are:

- DVD-ROM access
- LAN connectivity

- Dual 160GB IDE (for MSS—S)
- Four 72GB hot swappable 15K RPM SCSI (for MSS—H)

Software specifications of Modular Messaging—MSS

The table the software specifications of Modular Messaging—MSS Standard and High Availability for S8800, S8730, S3500, and HP DL360 G7.

Supported software	Version
Linux®	Operating system based on release 4.7 of Red Hat Inc. version of Linux®

Modular Messaging Outlook Client requirements for MSS

This section provides the system requirements for Modular Messaging Outlook Client with Modular Messaging—MSS.

The hardware specifications for Modular Messaging Outlook Client with Modular Messaging —MSS are:

- Processor speed: As per standard Microsoft recommendations
- 512 MB of RAM
- 200 MB of free disk space (minimum)

The following table lists the software specifications for Modular Messaging Outlook Client.

Supported software	Version
Microsoft Windows	• Microsoft Windows Vista SP2 • Microsoft Windows XP SP3 • Microsoft Windows 7 32bit (Professional or Enterprise edition) • Microsoft Windows 7 64bit (Professional or Enterprise edition)[43]
Microsoft Outlook	• Microsoft Outlook 2010[44][45] • Microsoft Outlook 2007 SP2 • Microsoft Outlook 2003 SP3

[43] Microsoft Outlook must be 32–bit version.

[44] Microsoft Outlook 2010 is supported on Microsoft XP SP3 and Microsoft Windows 7.

[45] Modular Messaging Release 5.2 does not support the Conversation View option in Microsoft Outlook 2010. Users with Conversation View option enabled will have to disable it to view the voice messages.

Note:

With Modular Messaging—MSS, Microsoft Outlook must already be installed and the mail profile must be configured before the Voice Form component is installed. Neither the Outlook Client nor Restricted Outlook Client should be installed on any MAS server.

Modular Messaging Restricted Outlook Client requirements

This section provides the system requirements for Modular Messaging Restricted Outlook Client.

The hardware specifications for Modular Messaging Restricted Outlook Client are:

- Processor speed: As per standard Microsoft recommendations
- 512 MB of RAM
- 200 MB of free disk space (minimum)

The following table lists the software specifications for Modular Messaging Restricted Outlook Client.

Supported software	Version
Microsoft Windows	• Microsoft Windows Vista SP2 • Microsoft Windows XP SP3 • Microsoft Windows 7 32bit (Professional or Enterprise edition) • Microsoft Windows 7 64bit (Professional or Enterprise edition)[46]
Microsoft Outlook	• Microsoft Outlook 2010[47][48] • Microsoft Outlook 2007 SP2 • Microsoft Outlook 2003 SP3

Note:

Microsoft Outlook must already be installed and the mail profile must be configured before the Voice Form component is installed.

[46] Microsoft Outlook must be 32–bit version.

[47] Microsoft Outlook 2010 is supported on Microsoft XP SP3 and Microsoft Windows 7.

[48] Modular Messaging Release 5.2 does not support the Conversation View option in Microsoft Outlook 2010. Users with Conversation View option enabled will have to disable it to view the voice messages.

Modular Messaging Lotus Notes Client requirements

This section provides information about the system requirements for Modular Messaging Lotus Notes Client with Modular Messaging—MSS.

Microsoft recommendations for the operating system apply.

The following table lists the software specifications for Modular Messaging Lotus Notes Client.

Supported software	Version
Microsoft Windows	• Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition) • Microsoft Windows XP Professional N SP3 • Microsoft Windows XP Professional SP3 • Microsoft Windows 2000 Professional SP4 • Microsoft Windows 2003 SP2 • Microsoft Windows 7 32bit (Professional or Enterprise edition) • Microsoft Windows 7 64bit (Professional or Enterprise edition)[49]
Lotus Notes	• Lotus Notes 8.0.x • Lotus Notes 8.5.x • Lotus Notes 7.0.3

Modular Messaging Web Client requirements

Avaya support policy for Modular Messaging Web Client:

Modular Messaging Web Client is standards based, which includes IMAP4 access to messages stored on the Avaya MSS. Modular Messaging Web Client can also be used to access messages stored on an IMAP4 compatible e-mail system. Avaya has conducted successful interoperability testing with Microsoft Exchange. Customers may integrate other IMAP4 e-mail systems with Modular Messaging Web Client. However, Avaya makes no representations, warranties, or guarantees regarding specific capabilities with specific IMAP4 e-mail systems or successful integration or interoperability thereof. Avaya's product support is limited to IMAP4 as it is implemented on Modular Messaging and Avaya Modular Messaging Web Client and does not include support for specific e-mail systems.

[49] Lotus Notes Client must be 32–bit version.

Web Client user requirements

Microsoft recommendations for the operating system apply.

The following table lists the supported software for using Modular Messaging Web Client.

Supported software	Version
Microsoft Windows	• Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition) • Microsoft Windows XP Professional N SP3 • Microsoft Windows XP Professional SP3 • Microsoft Windows 2000 Professional SP4 • Microsoft Windows 7 32bit (Professional or Enterprise edition) • Microsoft Windows 7 64bit (Professional or Enterprise edition)
Internet browser	• Microsoft Internet Explorer 6.0 SP2[50] • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0

Web server requirements for Modular Messaging Web Client

The Web server for Modular Messaging Web Client can be installed on a customer-provided computer.

Note:

The Web server for Modular Messaging Web Client cannot reside on an MAS or with other MAS applications or services, such as Tracing Service.

The following table lists the minimum recommended hardware requirements for installing the Web server on a customer-provided computer.

Server	Processor	RAM
Avaya S3500	Intel Pentium IV 3.4-GHz Processor	2GB
Avaya S8730	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

[50] Microsoft Internet Explorer 6.0 is not supported with Microsoft Windows Vista.

Also provided are:

- DVD-ROM drive to install the software
- Network interface card (NIC) to connect to the corporate LAN
- LAN connectivity of 100 mbps speed
- 160 GB of free disk space

The following table lists the supported software for installing the Web server for Modular Messaging Web Client.

Supported software	Version
For Avaya S3500	
Microsoft Windows	• Microsoft Windows Server 2003 Server Appliance Kit (SAK) SP2[51]
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0
For Avaya S8800, S8730, or a customer-provided server	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2 • Microsoft Windows Server 2003 R2 SAK SP2
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0

The following software is also required:

- Microsoft .NET Framework 1.1, Microsoft .NET Framework 2.0, Microsoft .NET Framework 3.5
- Microsoft ASP .NET 1.1 and Microsoft ASP .NET 2.0
- Virus protection software with the latest updates (recommended)

Note:

If remote access is required, PC Anywhere must be installed.

For more information, see *Modular Messaging Web Client Server Installation and Upgrades* available on the Modular Messaging Web Client software CD.

[51] Internet Information Services (IIS) 6.0 is required and is included with Microsoft Windows Server 2003.

Subscriber Options requirements for MSS

Modular Messaging subscribers who do not use Microsoft Outlook as an e-mail client can install Subscriber Options as a standalone component. Subscriber Options is automatically installed on each MAS.

Following versions of the Microsoft Windows operating system are supported for installing Subscriber Options:

- Microsoft Windows Server 2003 SAK SP2
- Microsoft Windows Server 2003 R2 SAK SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)

Web Subscriber Options requirements for MSS

Web Subscriber Options client requirements

Microsoft recommendations for the operating system apply.

The following table lists the supported software for using the Web Subscriber Options application.

Supported software	Version
Operating System	• Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition) • Microsoft Windows XP Professional N SP3 • Microsoft Windows XP Professional SP3 • Microsoft Windows 2000 Professional SP4 • Microsoft Windows 2003 SP2 • Microsoft Windows 7 32bit (Professional or Enterprise edition) • Microsoft Windows 7 64bit (Professional or Enterprise edition) • Microsoft Windows Server 2003 SAK SP2 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition • Microsoft Windows Server 2003 R2 SAK SP2 • Microsoft Windows Server 2003 R2 Standard Edition

Supported software	Version
	• Microsoft Windows Server 2003 R2 Enterprise Edition SP2 • Apple Mac OS X 10.5
Internet browser	• Microsoft Internet Explorer 6.0 SP2[52] • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0 • Safari 3.x

Web Subscriber Options server requirements

The following table lists the minimum recommended hardware requirements for installing the Web server for Web Subscriber Options on either of the following computers:

- Avaya S8800, S8730, S3500, or HP DL360 G7 MAS
- Customer-provided server

Clock speed	RAM
Intel Pentium IV 3.4-GHz processor	2GB

Also provided are:

- DVD-ROM drive to install the software
- LAN connectivity of 100 mbps speed
- 160GB of available space on the hard disk drive. This space must be in Windows NT File System format

The following table lists the supported software for installing the Web server for Web Subscriber Options.

Supported software	Version
For Avaya S3500	
Microsoft Windows	• Microsoft Windows Server 2003 Server Appliance Kit (SAK) SP1[53] or SP2[54]
Internet browser	• Microsoft Internet Explorer 6.0 SP2[55] • Microsoft Internet Explorer 7.0

[52] Microsoft Internet Explorer 6.0 is not supported with Microsoft Windows Vista.
[53] Internet Information Services (IIS) 6.0 is required and is included with Microsoft Windows Server 2003.
[54] The software image supplied with Modular Messaging Release 5.1, and later and used as part of a disaster recovery process will be SP2 only
[55] With Windows Server 2003 SAK SP1 only

Supported software	Version
	• Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0
For Avaya S8800, S8730, HP DL360 G7, or a customer-provided server	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2[56] • Microsoft Windows Server 2003 R2 SAK SP2
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0

The following software is also required:

- Microsoft .NET Framework 1.1, Microsoft .NET Framework 2.0, Microsoft .NET Framework 3.5
- Microsoft ASP .NET 1.1 and Microsoft ASP .NET 2.0
- Virus protection software with the latest updates (recommended)

Note:

The MAS must be configured for Web Subscriber Options to work. See *Web Subscriber Options Server Installation* for more information on configuring the MAS to work with Web Subscriber Options.

Supplementary Server requirements for MSS

For systems of large configurations, Avaya recommends that Tracing Service be installed on a separate system, known as a Supplementary Server. The separate system for hosting Tracing Service can be either of the following:

- Avaya-provided S8800, S8730, S3500, or HP DL360 G7 system that customers must purchase
- Auto-configured Avaya Store Supplementary Server that customers can purchase
- Customer-provided server

If Tracing Service is installed on the Supplementary Server, Offline Call Answer Store and Modular Messaging Administration Clients also be located on the Supplementary Server. Services such as MWI Service, Call Me Service, and Fax Sender Service, if applicable, can also reside on the Supplementary Server. However, system performance may be improved by

[56] If users select a multibyte display language on the client machines, you must install the Windows East Asian language pack on the server.

placing only the Tracing Service on the Supplemental Server and then enabling the other services (MWI Service, Call Me Service, and Fax Sender Service) on the MAS with the smallest number of ports.

The Supplementary Server must not have any port cards. The MAS service is installed and running on a newly installed Supplementary Server. On an upgraded MAS, the MAS service will not be running by default.

If a customer purchases an auto-configured Avaya Store Supplementary Server, only the Tracing Service is enabled on the system. However, for load balancing the customer can enable other Modular Messaging services on the system, as the services are already installed but disabled on the system.

The MAS services can be hosted on the Supplementary server. However, for an upgraded Modular Messaging system, the MAS services cannot be enabled on the Avaya Store Supplementary Server system. Similarly, Modular Messaging Performance Monitor Service and Modular Messaging Process Monitor Service cannot be enabled on the Avaya Store Supplementary Server system as these services require the MAS services. For information on the MAS services, see MAS services and functionality on page 34.

If alarming function is required along with Tracing Service, enable the alarming services, Modular Messaging Event Monitor Service and Modular Messaging Alarming Service, on the system.

Use the Data Collection Tool to install the Avaya Store Supplementary Server.

The following table provides the hardware requirements for a Supplementary Server.

Server	Processor	RAM
Avaya S3500	Intel Pentium IV 3.4-GHz Processor	2GB
Avaya S8730	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere)	12GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

Also provided are:

- DVD-ROM drive to install the software
- LAN connectivity of 100 mbps speed
- 160GB of free disk space

The following table lists the supported software for a Supplementary Server.

Supported software	Version
For Avaya S3500	
Microsoft Windows	• Microsoft Windows Server 2003 Server Appliance Kit (SAK) SP1[57] or SP2[58]
Internet browser	• Microsoft Internet Explorer 6.0 SP2[59] • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0
For Avaya S8800, S8730, HP DL360 G7, or a customer-provided server	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2[60] • Microsoft Windows Server 2003 R2 SAK SP2
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0

Consider the following:

- Available disk space requirements will vary, depending on the expected size of the Tracing Service databases and Offline Call Answer Store.
- The Supplementary Server must be in the same Microsoft Windows domain as all MAS units.
- The Supplementary Server must be on the private LAN that connects the MAS units and the MSS.

Tip:

All Microsoft Windows servers must have a customer-provided virus protection.

[57] Internet Information Services (IIS) 6.0 is required and is included with Microsoft Windows Server 2003.
[58] The software image supplied with Modular Messaging Release 5.1, and later and used as part of a disaster recovery process will be SP2 only
[59] With Windows Server 2003 SAK SP1 only
[60] If users select a multibyte display language on the client machines, you must install the Windows East Asian language pack on the server.

Administration Client requirements for MSS

Administration Clients include the Voice Mail Configurator, Voice Editor, Port Monitor, Reporting Tool, Operation History Viewer, and Caller Applications Editor.

Minimum hardware requirements follow the Microsoft recommendations for the Windows operating system. With Modular Messaging—MSS, Modular Messaging Administration Clients supports following versions of the Microsoft Windows operating system:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3
- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2
- Microsoft Windows 2003 SAK SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)

  Note:

  Port Monitor, Audit Log Viewer, and Language Selection supports Microsoft Windows 7 32bit (Professional or Enterprise edition).

- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows 2003 R2 SAK SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Note:

If customers purchase a Supplementary Server for Tracing Service, Administration Clients must be installed on the same server due to their intensive resource requirements. For more information, see Supplementary Server requirements on page 348.

Caller Applications Editor requirements for MSS

Caller Applications Editor can be installed as a separate component.

Minimum hardware requirements follow the Microsoft recommendations for the Windows operating system. With Modular Messaging—MSS, Caller Applications Editor supports following versions of the Microsoft Windows operating system:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3
- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2
- Microsoft Windows 2003 SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)
- Microsoft Windows Server 2003 SAK SP2
- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows Server 2003 R2 SAK SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Data Collection Tool requirements for MSS

The following table lists the minimum recommended hardware requirements for the Data Collection Tool.

Server	Processor	RAM
Avaya S3500 server	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730 server	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800 server	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere)	4GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

Following versions of the Microsoft Windows operating system are supported for creating the Data Collection Tool on an MAS:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3

- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2
- Microsoft Windows 2003 SAK SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)
- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows 2003 R2 SAK SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Tip:
All Microsoft Windows servers must have a customer-provided virus protection.

Requirements for the MSS administration interface

The following table lists the supported software for the MSS administration interface.

Supported software	Version
Microsoft Windows	• Microsoft Windows 2000 Professional SP4 • Microsoft Windows XP Professional SP3 • Microsoft Windows XP Professional N SP3 • Microsoft Windows Vista Business Edition 32bit SP2 • Microsoft Windows Vista Enterprise Edition 32bit SP2 • Microsoft Windows 2003 SP2 • Microsoft Windows 7 32bit (Professional or Enterprise edition) • Microsoft Windows 7 64bit (Professional or Enterprise edition) • Microsoft Windows Server 2003 SAK SP2 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2 • Microsoft Windows Server 2003 R2 SAK SP2

Supported software	Version
	• Microsoft Windows Server 2003 R2 Standard Edition SP2 • Microsoft Windows Server 2003 R2 Enterprise Edition SP2
Internet browser	• Microsoft Internet Explorer 6.0 SP2[61] • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0 • Mozilla Firefox-1.5.0.12-0.3.el4[62]
Java Runtime Environment (JRE) for Windows	• Java Runtime Version 1.4

Compatibility with Avaya Integrated Management

- Avaya Site Administration Release 2 or later
- Avaya Multi-Site Administration Release 2.1 or later
- Avaya Fault and Performance Manager Release 2 or later with use of either Secure Services Gateway (SSG) or Avaya Proxy Agent

Note:

Avaya Fault and Performance Manager Release 3 or later supports trap reception directly from Modular Messaging—MSS.

Avaya Fault and Performance Manager Release 3 or later does not require either SSG or Avaya Proxy Agent for trap reception from Modular Messaging—MSS.

Minimum hardware requirements and supported software (Exchange)

This section provides the minimum hardware requirements and supported software for Modular Messaging—Exchange.

[61] Microsoft Internet Explorer 6.0 is not supported with Microsoft Windows Vista.
[62] Mozilla Firefox is supported when running MSS Web Admin on the MSS only.

Messaging Application Server requirements

With Modular Messaging—Microsoft Exchange, Release 5.0 and later, the customer can purchase software and S8800, S8730, S3500, or HP DL360 G7 servers from Avaya or can choose to provide a computer that will serve as the MAS. In such cases, Avaya provides the Modular Messaging software that must be installed on such customer-provided MAS units.

A customer-provided server must meet certain minimum hardware and software requirements for successful installation of the Modular Messaging software.

Modular Messaging continues to provide support to Avaya S3500 servers when customers are upgrading from earlier versions of Modular Messaging.

Minimum hardware requirements for an MAS

Minimum system requirements for the MAS

The following lists the minimum recommended hardware requirements for installing the MAS software on an Avaya server or on a customer-provided MAS.

Server	Clock speed	RAM
Avaya S3500	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere) Optional: Intel X5670 six Core 2.93 GHz (Westmere)	4GB
Customer-provided MAS	Quad-Core AMD/Intel Processor	4GB

Also provided are:

- DVD-ROM drive to install the software
- LAN connectivity of 100 mbps speed

  Note:

  With Modular Messaging—Exchange, an MAS must be located on the same LAN as the e-mail server.

- 80 GB of free disk space
- Dialogic drivers: SR 6.0 SU95

- Two PCI-X slots for Dialogic telephony cards (S3500)
- Two 146GB hard drives configured as RAID 1 (S8730)
- Five 146GB hard drives
- 146GB SAS 2.5" 10K RPM 6G DP Hard Drive (HP DL360 G7)

Note:

The S8800 and HP DL360 G7 servers do not support voice cards. SIP and H.323 transmit voice as IP packets over the LAN cards; thus separate port cards are not required.

Recommended voice cards for an S8730 MAS and Customer-provided MAS

The following table lists the recommended voice cards for an Avaya S8730 MAS and Customer-provided MAS.

Protocol	Voice card	Maximum cards per MAS	Maximum ports2 per MAS
SIP1	—	—	96
H.323 integration1	—	—	30
T1 QSIG	Dialogic D/480JCT-1T1-EW	3	69
E1 QSIG	Dialogic D/600JCT-1E1-120-EW	3	90
DSE	Dialogic D/82JCT-EW	3	24
Analog	Dialogic D/120JCT-LS-EW (12 port card)	3	36
	Dialogic D/41JCT-LS-EW (4 port card)	3	12

Recommended voice cards for an S3500 server

The following table lists the recommended voice cards for an Avaya S3500 MAS.

Protocol	Voice card	Maximum cards per MAS	Maximum ports2 per MAS
SIP1	—	—	48
H.3231 integration	—	—	30
T1 QSIG	Dialogic D/480JCT-1T1	2	46
E1 QSIG	Dialogic D/ 600JCT-1E1-120	2	60
DSE	Dialogic D/82JCT/U (5v card) Dialogic D82JCTPCIUNIV (3.3v & 5v universal card)	2	16
Analog	Dialogic D/120JCT (12 port card)	2	24

Protocol	Voice card	Maximum cards per MAS	Maximum ports2 per MAS
	Dialogic D/41JCT-LS (4 port card)	2	8

Software requirements

The following table lists the software requirements for an Avaya S8800, S8730, S3500, HP DL360 G7, and customer-provided MAS.

Supported software	Version
Microsoft Windows	• Microsoft Windows 2003 Server SAK SP2 • Microsoft Windows 2003 Server R2 SAK SP2
System Management tools	• Microsoft Exchange 2003 SP2 System Management Tools for Exchange 2003 servers. • Microsoft Exchange 2007 SP1 or later System Management Tools for Exchange 2007 servers. This software is provided by the customer.

Note:

All Microsoft Windows servers must have a customer-provided virus protection.

Exchange 2010 systems also require:

- MAPI Client (v6.5.8190 or later)
- Microsoft Management Console 3.0
- .NET 3.5 SP1
- PowerShell 2.0

Also required are: ASP.NET services with the following properties:

Windows Components

- Application Server
- Application Server console
- ASP.NET
- Enable COM+ access
- IIS
  - Common Files
  - IIS Manager

- NNTP
- SMTP
- WW Web Services

• Management and Monitoring tools

• Simple Network Management Protocol

Modular Messaging Outlook Client requirements for Exchange

This section provides the system requirements for Modular Messaging Outlook Client with Modular Messaging—Exchange.

The hardware specifications for Modular Messaging Outlook Client with Modular Messaging —Exchange are:

• Processor speed: As per standard Microsoft recommendations

• 512 MB of RAM

• 200 MB of free disk space (minimum)

The following table lists the software specifications for Modular Messaging Outlook Client.

Supported software	Version
Microsoft Windows	• Microsoft Windows Vista SP2 • Microsoft Windows XP SP3 • Microsoft Windows 7 32bit (Professional or Enterprise edition) • Microsoft Windows 7 64bit (Professional or Enterprise edition)[63]
Microsoft Outlook	• Microsoft Outlook 2010[64][65] • Microsoft Outlook 2007 SP2 • Microsoft Outlook 2003 SP3

[63] Microsoft Outlook must be 32–bit version.

[64] Microsoft Outlook 2010 is supported on Microsoft XP SP3 and Microsoft Windows 7.

[65] Modular Messaging Release 5.2 does not support the Conversation View option in Microsoft Outlook 2010. Users with Conversation View option enabled will have to disable it to view the voice messages.

With Modular Messaging—Exchange consider the following:

- With Microsoft Windows XP, clients must log in to a Microsoft Windows domain to which the Modular Messaging system belongs.

Subscriber Options requirements for Exchange

Modular Messaging subscribers that do not use Microsoft Outlook as an e-mail client can install Subscriber Options as a standalone component.

Following versions of the Microsoft Windows operating system are supported for installing Subscriber Options:

- Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition)
- Microsoft Windows XP Professional N SP3
- Microsoft Windows XP Professional SP3
- Microsoft Windows 2000 Professional SP4
- Microsoft Windows 2003 SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)

For Modular Messaging—Exchange, minimum hardware requirements follow the Microsoft recommendations for the operating system.

Web Subscriber Options requirements for Exchange

Web Subscriber Options client requirements

Microsoft recommendations for the operating system apply.

The following table lists the supported software for using the Web Subscriber Options application.

Supported software	Version
Operating System	• Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition) • Microsoft Windows XP Professional N SP3 • Microsoft Windows XP Professional SP3 • Microsoft Windows 2000 Professional SP4 • Microsoft Windows 2003 SP2 • Microsoft Windows 7 32bit (Professional or Enterprise edition)

Supported software	Version
	• Microsoft Windows 7 64bit (Professional or Enterprise edition) • Microsoft Windows 2000 server SP4 • Microsoft Windows Server 2003 SAK SP2 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2 • Microsoft Windows Server 2003 R2 SAK SP2 • Microsoft Windows Server 2003 R2 Standard Edition SP2 • Microsoft Windows Server 2003 R2 Enterprise Edition SP2 • Apple Mac OS X 10.5
Internet browser	• Microsoft Internet Explorer 6.0 SP2[66] • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0 • Safari 3.x

Web Subscriber Options server requirements

The following table lists the minimum recommended hardware requirements for installing the Web server for Web Subscriber Options on either of the following computers:

- Avaya S8800, S8730, S3500, or HP DL360 G7 MAS
- Customer-provided server

Server	Processor	RAM
Avaya S3500 MAS	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730 MAS	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800 MAS	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere)	4GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

[66] Microsoft Internet Explorer 6.0 is not supported with Microsoft Windows Vista.

Also provided are:

- DVD-ROM drive to install the software
- LAN connectivity of 100 mbps speed
- 160GB of available space on the hard disk drive. This space must be in Windows NT File System format

The following table lists the supported software for installing the Web server for Web Subscriber Options.

Supported software	Version
For Avaya S3500	
Microsoft Windows	• Microsoft Windows Server 2003 Server Appliance Kit (SAK) SP1[67] or SP2[68]
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0
For Avaya S8800, S8730, HP DL360 G7, or a customer-provided server	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2[69] • Microsoft Windows Server 2003 R2 SAK SP2
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0

The following software is also required:

- Microsoft .NET Framework 1.1, Microsoft .NET Framework 2.0, Microsoft .NET Framework 3.5
- Microsoft ASP .NET 1.1 and Microsoft ASP .NET 2.0
- Virus protection software with the latest updates (recommended)

[67] Internet Information Services (IIS) 6.0 is required and is included with Microsoft Windows Server 2003.

[68] The software image supplied with Modular Messaging Release 5.1, and later and used as part of a disaster recovery process will be SP2 only

[69] If users select a multibyte display language on the client machines, you must install the Windows East Asian language pack on the server.

Note:

The MAS must be configured for Web Subscriber Options to work. See *Web Subscriber Options Server Installation* for more information on configuring the MAS to work with Web Subscriber Options.

Supplementary Server requirements for Exchange

For systems of large configurations, Avaya recommends that Tracing Service be installed on a separate system, known as the Supplementary Server. The separate system for hosting Tracing Service can be either of the following:

- Avaya-provided S8800, S8730, S3500, or HP DL360 G7 server that customers must purchase
- Auto-configured Exchange Supplementary Server that customers must purchase
- Customer-provided server

If Tracing Service is installed on the Supplementary Server, Offline Call Answer Store and Modular Messaging Administration Clients also be located on the Supplementary Server. For Modular Messaging Release 3 and later, services such as MWI Service and Call Me Service also reside on the Supplementary Server.

The Supplementary Server must not provide telephony or must not have any port cards or the MAS service installed on it.

If customers purchase an auto-configured Exchange Supplementary Server, only the Tracing Service is enabled on the system. However, for load balancing the customer can enable other Modular Messaging services on the system, as the services are already installed but disabled on the system.

The MAS services cannot be enabled on the Exchange Supplementary Server system. Similarly, Modular Messaging Performance Monitor Service and Modular Messaging Process Monitor Service cannot be enabled on the Exchange Supplementary Server system as these services require the MAS services. For information on the MAS services, see MAS services and functionality on page 34.

If alarming function is required along with Tracing Service, enable the alarming services, Modular Messaging Event Monitor Service and Modular Messaging Alarming Service, on the system.

Use the Data Collection Tool to install the Exchange Supplementary Server.

The following table provides the hardware requirements for a Supplementary Server.

Server	Processor	RAM
Avaya S3500	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730	Quad-Core AMD Opteron™ Processor 2352	4GB

Server	Processor	RAM
Avaya S8800	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere)	12GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

Also provided are:

- DVD-ROM drive to install the software
- LAN connectivity of 100 mbps speed
- 160GB of free disk space

The following table lists the supported software for a Supplementary Server.

Supported software	Version
For Avaya S3500	
Microsoft Windows	• Microsoft Windows Server 2003 Server Appliance Kit (SAK) SP1[70] or SP2[71]
Internet browser	• Microsoft Internet Explorer 6.0 SP2[72] • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0
For Avaya S8800, S8730, HP DL360 G7, or a customer-provided computer	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2[73] • Microsoft Windows Server 2003 R2 SAK SP2
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0

[70] Internet Information Services (IIS) 6.0 is required and is included with Microsoft Windows Server 2003.
[71] The software image supplied with Modular Messaging Release 5.1, and later and used as part of a disaster recovery process will be SP2 only
[72] With Windows Server 2003 SAK SP1 only
[73] If users select a multibyte display language on the client machines, you must install the Windows East Asian language pack on the server.

Note:

The Supplementary Server must also have Microsoft Exchange 2003 SP2 System Management Tools installed on it. This software is provided by the customer.

Consider the following:

- Available disk space requirements will vary, depending on the expected size of the Tracing Service databases and the Offline Access Remote Store.
- The Supplementary Server must be in the same Windows domain as all MAS units.
- The Supplementary Server must be on the same LAN segment as all MAS units.

Tip:

All Microsoft Windows servers must have a customer-provided virus protection.

Administration Client requirements for Exchange

Administration Clients include the Voice Mail Configurator, Voice Editor, Port Monitor, Reporting Tool, Operation History Viewer, and Caller Applications Editor.

Minimum hardware requirements follow the Microsoft recommendations for the Windows operating system. With Modular Messaging—Exchange, Modular Messaging Administration Clients supports following versions of the Microsoft Windows operating system:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3
- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2
- Microsoft Windows 2003 SAK SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)

Note:

Port Monitor, Audit Log Viewer, and Language Selection supports Microsoft Windows 7 32bit (Professional or Enterprise edition).

- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows 2003 R2 SAK SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Note:

If customers purchase a Supplementary Server for Tracing Service, Avaya recommends installing Administration Clients on that same server due to their intensive resource requirements. For more information, see Supplementary Server requirements on page 348.

Caller Applications Editor requirements for Exchange

Caller Applications Editor can be installed as a separate component.

Minimum hardware requirements follow the Microsoft recommendations for the Windows operating system. With Modular Messaging—Exchange, Caller Applications Editor supports following versions of the Microsoft Windows operating system:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3
- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2
- Microsoft Windows 2003 SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)
- Microsoft Windows Server 2003 SAK SP2
- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows Server 2003 R2 SAK SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Data Collection Tool requirements for Exchange

The following table lists the minimum recommended hardware requirements for the Data Collection Tool for Modular Messaging—Exchange.

Server	Processor	RAM
Avaya S3500 server	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730 server	Quad-Core AMD Opteron™ Processor 2352	4GB

Server	Processor	RAM
Avaya S8800 server	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere)	4GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

Following versions of the Microsoft Windows operating system are supported for creating the Data Collection Tool on an MAS:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3
- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2
- Microsoft Windows 2003 SAK SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)
- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows 2003 R2 SAK SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Tip:

All Microsoft Windows servers must have a customer-provided virus protection.

Subscriber Administration Extension requirements

For hardware requirements for Microsoft Exchange Subscriber Administration Extension to Exchange System Management Tools, use Microsoft recommendations for the Microsoft Exchange Administrator program.

Also required is 50 MB of free disk space for Microsoft Exchange 2003 or Microsoft Exchange 2007.

The following table lists the supported software for installing Microsoft Exchange Subscriber Administration Extension to Exchange System Management Tools.

Supported software	Version
For Microsoft Exchange 2007	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2 • Microsoft Windows Server 2003 R2 SAK SP2 • Microsoft Windows Server 2003 R2 Standard Edition SP2 • Microsoft Windows Server 2003 R2 Enterprise Edition SP2
Microsoft Exchange System Management tools	• Exchange 2007 SP1 or later System Management Tools 32bit version
For Microsoft Exchange 2003	
Microsoft Windows	• Microsoft Windows 2000 Server SP4 • Microsoft Windows 2000 Advanced Server SP4 • Microsoft Windows Server 2003 SAK SP2 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2 • Microsoft Windows Server 2003 R2 SAK SP2 • Microsoft Windows Server 2003 R2 Standard Edition SP2
Microsoft Exchange System Management tools	• Exchange 2003 SP2 System Management Tools

Note:

You cannot install the Modular Messaging Microsoft Exchange Subscriber Administration extensions on the Exchange 2010 server.

Note:

Modular Messaging extensions to Microsoft Exchange Administrator work only when Microsoft Exchange Administrator is installed on Intel-based computers.

Peer Exchange Server requirements

For hardware requirements, use Microsoft recommendations for Microsoft Exchange Server.

The following table lists the supported software for a peer Microsoft Exchange server.

Supported software	Version
Modular Messaging for Microsoft Exchange 2003 with Active Directory 2003	
Microsoft Windows	• Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2
Microsoft Exchange Server	• Microsoft Exchange Server 2003 SP2
Modular Messaging for Microsoft Exchange 2007 with Active Directory 2003	
Microsoft Windows	• Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2
Microsoft Exchange Server	• Microsoft Exchange Server 2007 SP1
Modular Messaging for Microsoft Exchange 2007 SP1 or later with Active Directory 2008[74]	
Microsoft Windows	• Microsoft Windows Server 2008 Enterprise Edition
Microsoft Exchange Server	• Microsoft Exchange Server 2007 SP1
Modular Messaging for Microsoft Exchange 2010 SP1 or later with Active Directory 2003 or Active Directory 2008	
Microsoft Windows	• Microsoft Windows Server 2008 Enterprise Edition
Microsoft Exchange Server	• Microsoft Exchange Server 2010 SP1 or later

Note:

Customers must keep their systems within performance operating ranges recommended by Microsoft. In order to support the extra load for voice messaging, Avaya recommends that the CPU utilization is no more than 50%.

[74] MAS cannot be installed on Microsoft Windows Server 2008.

Minimum hardware requirements and supported software (Domino)

This section provides information about the minimum hardware requirements and supported software for Modular Messaging—Domino.

Messaging Application Server requirements for Domino

With Modular Messaging—Domino, Release 5.1, and later, the customer can purchase software and S8800, S8730, S3500, or HP DL360 G7 servers from Avaya or can choose to provide a computer that will serve as the MAS. In such cases, Avaya provides the Modular Messaging software that must be installed on these customer-provided MAS units.

A customer-provided server must meet certain minimum hardware and software requirements for successful installation of the Modular Messaging software.

Minimum hardware requirements

The following table lists the minimum recommended hardware requirements for installing the MAS software.

Server	Clock speed	RAM
Avaya S3500 MAS	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere) Optional: Intel X5670 six Core 2.93 GHz (Westmere)	4GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

Also provided are:

- DVD-ROM drive to install the software
- LAN connectivity of 100 mbps speed

Note:

With Modular Messaging—Domino, an MAS must be located on the same LAN as the e-mail server.

- Single 80GB or 160GB disk drive (S3500)
- Two 146GB SAS hot swappable hard drives configured as RAID 1 (S8730 and CPE server)
- PCI-X slots for the Dialogic telephony cards

The following table lists the recommended voice cards for an Avaya S8730 and customer-provided MAS units.

Protocol	Voice card	Maximum cards per MAS	Maximum ports per MAS
SIPintegration[76]	—	—	96
H.323 integration[76]	—	—	30
T1 QSIG	Dialogic D/480JCT-1T1-EW	3	69
E1 QSIG	Dialogic D/600JCT-1E1-120- EW	3	90
DSE	Dialogic D/82JCT-EW	3	24
Analog	Dialogic D/120JCT-LS-EW (12 port card)	3	36
	Dialogic D/41JCT-LS-EW (4 port card)	3	12
Brooktrout Analog[75] (Drivers V2.38)	8-port PCI card (US and Canada) 8-port PCI international card (EMEA) 8-port PCI APAC card (APAC)	3	32

The following table lists the recommended voice cards for an Avaya S3500 MAS.

Protocol	Voice card	Maximum cards per MAS	Maximum ports per MAS
SIP integration[76]	—	—	48
H.323 integration[76]	—	—	30
T1 QSIG	Dialogic D/480JCT-1T1	2	46
E1 QSIG	Dialogic D/ 600JCT-1E1-120	2	60

[75] Brooktrout analog cards are supported only for systems being upgraded. All new installations will support only Dialogic cards.

[76] SIP and H.323 transmit voice as IP packets over the LAN cards; thus separate port cards are not required.

Protocol	Voice card	Maximum cards per MAS	Maximum ports per MAS
DSE	Dialogic D/82JCT/U (5v card) Dialogic D82JCTPCIUNIV (3.3v & 5v universal card)	2	16
Analog	Dialogic D/120JCT (12 port card)	2	24
	Dialogic D/41JCT-LS (4 port card)	2	8

Important:

Install Dialogic drivers from the Modular Messaging application software media that Avaya provides.

Software requirements for Domino

The following table lists the software requirements for an Avaya S8800, S8730, S3500, HP DL360 G7, and customer-provided MAS.

Supported software	Version
Modular Messaging for Domino 7.0.3	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2 • Microsoft Windows Server 2003 R2 SAK SP2
Lotus Notes Client	• Lotus Notes Client 7.0.3
Modular Messaging for Domino 8.0.x	
Microsoft Windows	• Windows Server 2003 SAK SP2 • Windows Server 2003 R2 SAK SP2
Lotus Notes Client	• Lotus Notes Client 8.0.x
Modular Messaging for Domino 8.5.2	
Microsoft Windows	• Windows Server 2003 SAK SP2 • Windows Server 2003 R2 SAK SP2
Lotus Notes Client	• Lotus Notes Client 8.5.2

Note:

All Microsoft Windows servers must have a customer-provided virus protection.

Modular Messaging DUC 1.2.5 Client requirements

This section provides the software requirements for installing Modular Messaging DUC 1.2.5 Client with Modular Messaging—Domino.

The hardware specifications for Modular Messaging DUC 1.2.5 Client with Modular Messaging —Domino are:

- Processor speed: As per standard IBM Lotus recommendations
- 512 MB of RAM
- 200 MB of free disk space (minimum)

The following table lists the supported software for installing Modular Messaging DUC 1.2.5 Client with Modular Messaging—Domino.

Supported software	Version
Microsoft Windows	• Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition) • Microsoft Windows XP Professional N SP3 • Microsoft Windows XP Professional SP3 • Microsoft Windows 2000 Professional SP4 • Microsoft Windows 2003 SP2
Microsoft DUC 1.2.5 e-mail client	• iNotes • Lotus Notes 7.0.3 • Lotus Notes 8.0 • Lotus Notes 8.5.x

Note:

Customers using iNotes to view messages may use Web Subscriber Options to Subscriber Options to configure Modular Messaging mailboxes, however, they will not be able to use Subscriber Options to configure mailboxes.

Consider the following:

- With Microsoft Windows XP, clients must log in to a Microsoft Windows domain to which the Modular Messaging system belongs.

Subscriber Options requirements for Domino

With Modular Messaging—Domino, the installation of Domino Unified Communications (DUC) automatically installs Subscriber Options Release 1.1. After installation of DUC and Subscriber

Options Release 1.1 are complete, update Subscriber Options by installing the most recent release.

Minimum hardware requirements follow the IBM Lotus Domino recommendations for the operating system.

Following versions of the Microsoft Windows operating system are supported for installing IBM Lotus Domino Subscriber Options:

- Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition)
- Microsoft Windows XP Professional N SP3
- Microsoft Windows XP Professional SP3
- Microsoft Windows 2000 Professional SP4
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)
- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Note:

DUC 1.2.5 must be installed for Modular Messaging—Domino. Avaya provides the DUC 1.2.5. For full information about DUC 1.2.5, see the *Domino Unified Communications 1.2.5 Administration Help for Avaya*.

For subscribers who do not use Lotus Notes

Modular Messaging subscribers who do not use Lotus Notes as an e-mail client can install Subscriber Options as a standalone component.

Following versions of the Microsoft Windows operating system are supported for installing Subscriber Options:

- Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition)
- Microsoft Windows XP Professional N SP3
- Microsoft Windows XP Professional SP3
- Microsoft Windows 2000 Professional SP4
- Microsoft Windows 2003 SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)

Web Subscriber Options requirements for Domino

Web Subscriber Options client requirements

Microsoft recommendations for the operating system apply.

The following table lists the supported software for using the Web Subscriber Options application.

Supported software	Version
Operating System	• Microsoft Windows Vista 32bit SP2 (Business or Enterprise edition) • Microsoft Windows XP Professional N SP3 • Microsoft Windows XP Professional SP3 • Microsoft Windows 2000 Professional SP4 • Microsoft Windows 7 32bit (Professional or Enterprise edition) • Microsoft Windows 7 64bit (Professional or Enterprise edition) • Microsoft Windows Server 2003 SAK SP2 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2 • Microsoft Windows Server 2003 R2 SAK SP2 • Microsoft Windows Server 2003 R2 Standard Edition SP2 • Microsoft Windows Server 2003 R2 Enterprise Edition SP2 • Apple Mac OS X 10.5
Internet browser	• Microsoft Internet Explorer 6.0 SP2[77] • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0 • Safari 3.x

[77] Microsoft Internet Explorer 6.0 is not supported with Microsoft Windows Vista.

Web Subscriber Options server requirements

The following table lists the minimum recommended hardware requirements for installing the Web server for Web Subscriber Options on either of the following computers:

- Avaya S8800, S8730, S3500, or HP DL360 G7 MAS
- Customer-provided server

Server	Processor	RAM
Avaya S3500 MAS	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730 MAS	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800 MAS	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere)	4GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

Also provided are:

- DVD-ROM drive to install the software
- LAN connectivity of 100 mbps speed
- 160GB of available space on the hard disk drive. This space must be in Windows NT File System format

The following table lists the supported software for installing the Web server for Web Subscriber Options.

Supported software	Version
For Avaya S3500	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP1[78] or SP2[79]
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0
For Avaya S8800, S8730, HP DL360 G7, or a customer-provided server	

[78] Internet Information Services (IIS) 6.0 is required and is included with Microsoft Windows Server 2003.

[79] The software image supplied with Modular Messaging Release 5.1, and later and used as part of a disaster recovery process will be SP2 only

Supported software	Version
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2[80] • Microsoft Windows Server 2003 R2 SAK SP2
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0

The following software is also required:

- Microsoft .NET Framework 1.1, Microsoft .NET Framework 2.0, Microsoft .NET Framework 3.5
- Microsoft ASP .NET 1.1 and Microsoft ASP .NET 2.0
- Virus protection software with the latest updates (recommended)

Note:

The MAS must be configured for Web Subscriber Options to work. See *Web Subscriber Options Server Installation* for more information on configuring the MAS to work with Web Subscriber Options.

Supplementary Server requirements for Domino

For systems of large configurations, Avaya recommends that Tracing Service be installed on a separate system, known as a Supplementary Server. The separate system for hosting Tracing Service can be either of the following:

- Avaya-provided S8800, S8730, S3500, or HP DL360 G7 system that customers must purchase
- Customer-provided server

If Tracing Service is installed on a Supplementary Server, Offline Call Answer Store and Modular Messaging Administration Clients also be located on the Supplementary Server. For Modular Messaging 3.0 and later, services such as MWI Service and Call Me Service also reside on the Supplementary Server.

The Supplementary Server must not provide telephony service. Additionally, it must not have any port cards or the MAS service installed on it.

Note:

The MAS services cannot be enabled on the Supplementary Server system. Similarly, Modular Messaging Performance Monitor Service and Modular Messaging Process Monitor

[80] If users select a multibyte display language on the client machines, you must install the Windows East Asian language pack on the server.

Service cannot be enabled on the Supplementary Server system as these services require the MAS services. For information on the MAS services, see MAS services and functionality on page 34.

If alarming function is required along with Tracing Service, enable the alarming services, Modular Messaging Event Monitor Service and Modular Messaging Alarming Service, on the system.

Use the Data Collection Tool to install the Supplementary Server.

The following table lists the minimum recommended hardware requirements for the Supplementary Server.

Server	Processor	RAM
Avaya S3500	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere)	12GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

Also provided are:

- DVD-ROM drive to install the software
- 80 GB of free disk space
- LAN connectivity of 100 Mbps speed

The following table lists the supported software for the Supplementary Server

Supported software	Version
For Avaya S3500	
Microsoft Windows	• Microsoft Windows Server 2003 Server Appliance Kit (SAK) SP1[81] or SP2[82]
Internet browser	• Microsoft Internet Explorer 6.0 SP2[83] • Microsoft Internet Explorer 7.0

[81] Internet Information Services (IIS) 6.0 is required and is included with Microsoft Windows Server 2003.
[82] The software image supplied with Modular Messaging Release 5.1, and later and used as part of a disaster recovery process will be SP2 only
[83] With Windows Server 2003 SAK SP1 only

Supported software	Version
	• Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0
For Avaya S8800, S8730, HP DL360 G7, or a customer-provided server	
Microsoft Windows	• Microsoft Windows Server 2003 SAK SP2[84] • Microsoft Windows Server 2003 R2 SAK SP2
Internet browser	• Microsoft Internet Explorer 6.0 SP2 • Microsoft Internet Explorer 7.0 • Microsoft Internet Explorer 8.0 • Microsoft Internet Explorer 9.0

Consider the following:

- Available disk space requirements will vary depending on the expected size of the Tracing Service databases and Offline Access Remote Store.
- The Supplementary Server must be running on the same operating system as the MAS units in the VMD.
- The Supplementary Server must be in the same Windows domain as all MAS units.
- The Supplementary Server must be on the same LAN segment as all MAS units.

Tip:

All Microsoft Windows servers must have a customer-provided virus protection.

Administration Client requirement for Domino

Administration Clients include the Voice Mail Configurator, Voice Editor, Port Monitor, Reporting Tool, Operation History Viewer, and Caller Applications Editor.

Minimum hardware requirements follow the Microsoft recommendations for the Windows operating system. With Modular Messaging—Domino, Modular Messaging Administration Clients supports following versions of the Microsoft Windows operating system:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3
- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2

[84] If users select a multibyte display language on the client machines, you must install the Windows East Asian language pack on the server.

- Microsoft Windows 2003 SAK SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)

Note:

Port Monitor, Audit Log Viewer, and Language Selection supports Microsoft Windows 7 32bit (Professional or Enterprise edition).

- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows 2003 R2 SAK SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Note:

If customers purchase a Supplementary Server for Tracing Service, Administration Clients must be installed on the same server due to their intensive resource requirements. For more information, see Supplementary Server requirements on page 348.

Caller Applications Editor requirements for Domino

Caller Applications Editor can be installed as a separate component.

Minimum hardware requirements follow the Microsoft recommendations for the Windows operating system. With Modular Messaging—Domino, Caller Applications Editor supports following versions of the Microsoft Windows operating system:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3
- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2
- Microsoft Windows 2003 SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)
- Microsoft Windows Server 2003 SAK SP2
- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows Server 2003 R2 SAK SP2

- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Peer Domino Server requirements

For minimum hardware requirements, use IBM Lotus recommendations for Domino Server.

The following table lists the supported software for a peer IBM Lotus Domino server.

Supported software	Version
Modular Messaging for Domino 7.0.3	
Microsoft Windows	• Microsoft Windows 2000 Server SP4 • Microsoft Windows 2000 Advanced Server SP4 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2
IBM Lotus Domino Server	• IBM Lotus Domino Server 7.0.3
Modular Messaging for Domino 8.0	
Microsoft Windows	• Microsoft Windows 2000 Server SP4 • Microsoft Windows 2000 Advanced Server SP4 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2
IBM Lotus Domino Server	• IBM Lotus Domino Server 8.0
Modular Messaging for Domino 8.5.x	
Microsoft Windows	• Microsoft Windows 2000 Server SP4 • Microsoft Windows 2000 Advanced Server SP4 • Microsoft Windows Server 2003 Standard Edition SP2 • Microsoft Windows Server 2003 Enterprise Edition SP2

Supported software	Version
IBM Lotus Domino Server	• IBM Lotus Domino Server 8.5.x

Note:

DUC 1.2.5 must be installed for Modular Messaging—Domino. Avaya provides DUC. For full information about DUC 1.2.5, see the *Domino Unified Communications 1.2.5 Administration Help for Avaya*.

Note:

Customers must keep their systems within performance operating ranges recommended by IBM Lotus. To support the extra load for voice messaging, Avaya requires that the CPU utilization be no more than 50%.

Data Collection Tool requirements for Domino

The following table lists the minimum recommended hardware requirements for the Data Collection Tool for Modular Messaging—Domino.

Server	Processor	RAM
Avaya S3500 server	Intel Pentium IV 3.4-GHz processor	2GB
Avaya S8730 server	Quad-Core AMD Opteron™ Processor 2352	4GB
Avaya S8800 server	Intel E5520 Quad-Core 2.26 GHZ Processor	4GB
HP DL360 G7	Intel E5620 Quad-Core 2.4 GHz (Westmere)	4GB
Customer-provided server	Quad-Core AMD/Intel Processor	4GB

Following versions of the Microsoft Windows operating system are supported for creating the Data Collection Tool on an MAS:

- Microsoft Windows 2000 Professional SP4
- Microsoft Windows XP Professional SP3
- Microsoft Windows XP Professional N SP3
- Microsoft Windows Vista Business Edition 32bit SP2
- Microsoft Windows Vista Enterprise Edition 32bit SP2
- Microsoft Windows 2003 SAK SP2
- Microsoft Windows 7 32bit (Professional or Enterprise edition)
- Microsoft Windows 7 64bit (Professional or Enterprise edition)

- Microsoft Windows Server 2003 Standard Edition SP2
- Microsoft Windows Server 2003 Enterprise Edition SP2
- Microsoft Windows 2003 R2 SAK SP2
- Microsoft Windows Server 2003 R2 Standard Edition SP2
- Microsoft Windows Server 2003 R2 Enterprise Edition SP2

Tip:

All Microsoft Windows servers must have a customer-provided virus protection.

Other hardware and software considerations

Other hardware and software considerations include:

- Virus protection software
- Domino Unified Communications (DUC) software for Modular Messaging—Domino

  Avaya provides DUC with Modular Messaging—Domino. DUC needs to be installed according to IBM documentation.
- Extended Battery Modules and Bypass Distribution Module for backup power management

  Avaya requires that customers use a UPS regardless of the Modular Messaging version. Customers can purchase the UPS from Avaya, or they can purchase it elsewhere. For more information, see Power requirements for S8800, S8730, S3500, and HP DL360 G7 servers on page 315.
- Server administration: monitors, keyboards, KVM switch, rack
- Customer-provided fax server, for Modular Messaging—Exchange and Modular Messaging—Domino

  For information about the hardware and software support and telephony boards for third-party fax servers, see Providing interoperability with third-party fax servers on page 168.
- one-X Speech hardware and software requirements

  For more information, see http://www.avaya.com/support.
- Networking by means of a Message Networking server
- Remote access to all servers

  Beginning with Modular Messaging Release 5.2 single server configuration, all systems are installed with Secure Access Link (SAL), which provides remote serviceability using IP access. Modular Messaging systems upgraded to Modular Messaging Release 5.2 systems multi-server configuration can use a stand alone SAL server to run SAL or use

the SPIRIT software to provide remote serviceability using IP access. Avaya also offers SAC (Secure Access and Control)-Lite and SAC-Premium, which provide serviceability access using VPN. More information on SAL, SPIRIT, and SAC is available at http://www.avaya.com/support.

For more information about remote access to the Modular Messaging system, see *Modular Messaging for the Avaya Message Storage Server (MSS) Configuration Installation and Upgrades*.

Appendix D: Grade of service

Grade of service

This appendix provides information about the average number of ports in use during the busy hour.

The Erlang B and Erlang C models provide information about the port capacity in Erlangs, for each grade of service (GOS).

Note:

Erlangs, Centum Call Seconds (CCSs), and minutes are three different measures of traffic. Sixty minutes = 1 Erlang = 36 CCSs.

The Erlang B model:

The Erlang B model represents a scenario in which incoming calls are not queued on the switch. If a caller calls when all ports are busy, the caller hears a busy tone and the call is blocked.

GOS with Erlang B = probability of being blocked and thus busy tone.

The Erlang C model:

The Erlang C model represents a scenario in which incoming calls are queued on the switch. The caller hears multiple rings if all ports are in use, and the call is significantly delayed. The call is eventually answered if the caller does not hang up.

GOS with Erlang C = probability of encountering a delay and thus ring back. If there is a delay, the probability of delay is more than 10% of the average hold time (AHT).

Communication Manager with Q-Signaling (QSIG) integration does not support queuing of calls when all ports are busy.

The following table lists the average number of ports in use during the busy hour using Erlang B Model.

Ports	P.01	P.02	P.03	P.04	P.05
4	0.87	1.09	1.26	1.40	1.52
8	3.13	3.63	3.99	4.28	4.54

Ports	P.01	P.02	P.03	P.04	P.05
12	5.88	6.61	7.14	7.57	7.95
16	8.88	9.83	10.51	11.06	11.54
20	12.03	13.18	14.00	14.66	15.25
23	14.47	15.76	16.68	17.42	18.08
24	15.30	16.63	17.58	18.35	19.03
30	20.34	21.93	23.06	23.99	24.80
32	22.05	23.73	24.92	25.89	26.75
36	25.51	27.34	28.65	29.72	30.66
40	29.01	31.00	32.41	33.58	34.60
46	34.32	36.53	38.11	39.40	40.54
48	36.11	38.39	40.02	41.36	42.54
56	43.31	45.87	47.70	49.21	50.54
60	46.95	49.65	51.57	53.16	54.57
64	50.60	53.43	55.45	57.12	58.60
69	55.19	58.18	60.31	62.09	63.65
72	57.96	61.03	63.24	65.08	66.69
80	65.36	68.69	71.08	73.06	74.82
84	69.08	72.53	75.00	77.07	78.89
88	72.81	76.38	78.94	81.08	82.97
90	74.68	78.31	80.92	83.09	85.01
92	76.56	80.23	82.89	85.10	87.06
96	80.31	84.10	86.84	89.12	91.15
100	84.07	87.97	90.79	93.15	95.24
104	87.83	91.85	94.75	97.18	99.34
108	91.60	95.74	98.72	101.22	103.44
112	95.39	99.62	102.69	105.26	107.55
115	98.22	102.54	105.68	108.29	110.63
120	102.96	107.42	110.65	113.35	115.77
128	110.57	115.23	118.62	121.46	124.00
132	114.38	119.15	122.62	125.53	128.13
136	118.19	123.06	126.61	129.59	132.25

Ports	P.01	P.02	P.03	P.04	P.05
138	120.10	125.02	128.61	131.62	134.32
140	122.01	126.98	130.60	133.66	136.38
144	125.83	130.91	134.61	137.72	140.51
150	131.58	136.80	140.62	143.82	146.71
152	133.50	138.77	142.63	145.86	148.78
156	137.32	142.70	146.64	149.94	152.91
160	141.17	146.65	150.64	154.02	157.05
161	142.13	147.63	151.65	155.04	158.08
168	148.86	154.52	158.67	162.18	165.33
176	156.56	162.42	166.71	170.34	173.61
180	160.42	166.37	170.74	174.44	177.75
184	164.27	170.33	174.76	178.53	181.91
192	172.00	178.24	182.82	186.71	190.20
200	179.74	186.16	190.89	194.89	198.50
204	183.61	190.12	194.92	198.99	202.66
207	186.51	193.10	197.95	202.07	205.78
208	187.49	194.09	198.95	203.08	206.81
210	189.42	196.07	200.97	205.14	208.89
216	195.24	202.02	207.03	211.29	215.12
224	203.01	209.97	215.12	219.50	223.45
228	206.90	213.94	219.16	223.60	227.60
230	208.84	215.93	221.18	225.64	229.68
232	210.78	217.92	223.20	227.70	231.77
240	218.56	225.87	231.29	235.91	240.10
248	226.35	233.84	239.39	244.12	248.42
252	230.24	237.81	243.44	248.24	252.58
253	231.22	238.82	244.45	249.26	253.63
256	234.15	241.80	247.49	252.35	256.74
264	241.95	249.78	255.60	260.56	265.09
270	247.79	255.75	261.67	266.75	271.33
272	249.75	257.75	263.71	268.79	273.42

Ports	P.01	P.02	P.03	P.04	P.05
276	253.65	261.74	267.75	272.91	277.59
280	257.57	265.74	271.82	277.02	281.75
288	265.39	273.72	279.94	285.25	290.10

The following table lists the average number of ports in use during the busy hour using Erlang C Model.

Ports	P.01	P.02	P.03	P.04	P.05
4	0.89	1.09	1.23	1.34	1.43
8	3.13	3.53	3.80	4.01	4.18
12	5.84	6.40	6.77	7.05	7.28
16	8.79	9.49	9.94	10.29	10.56
20	11.91	12.72	13.25	13.64	13.96
23	14.32	15.21	15.78	16.21	16.56
24	15.14	16.05	16.64	17.08	17.44
30	20.12	21.18	21.85	22.35	22.76
32	21.82	22.92	23.61	24.13	24.55
36	25.25	26.42	27.17	27.72	28.17
40	28.72	29.97	30.76	31.34	31.82
46	33.99	35.35	36.20	36.83	37.33
48	35.77	37.16	38.02	38.67	39.19
56	42.93	44.44	45.38	46.08	46.64
60	46.54	48.11	49.09	49.81	50.38
64	50.18	51.79	52.80	53.55	54.14
69	54.75	56.43	57.48	58.25	58.86
72	57.50	59.22	60.29	61.07	61.70
80	64.88	66.69	67.81	68.64	69.30
84	68.59	70.44	71.59	72.44	73.11
88	72.30	74.20	75.38	76.24	76.93
90	74.17	76.09	77.27	78.14	78.84
92	76.03	77.97	79.17	80.05	80.75
96	79.77	81.75	82.97	83.87	84.58
100	83.52	85.54	86.78	87.70	88.42

Ports	P.01	P.02	P.03	P.04	P.05
104	87.28	89.33	90.60	91.53	92.27
108	91.04	93.13	94.42	95.37	96.12
112	94.81	96.94	98.25	99.21	99.97
115	97.65	99.80	101.12	102.09	102.86
120	102.37	104.57	105.92	106.91	107.69
128	109.96	112.22	113.61	114.62	115.43
132	113.76	116.06	117.46	118.48	119.31
136	117.58	119.89	121.32	122.36	123.18
138	119.48	121.82	123.25	124.29	125.12
140	121.38	123.73	125.18	126.23	127.06
144	125.20	127.59	129.04	130.10	130.94
150	130.94	133.36	134.84	135.92	136.78
152	132.86	135.29	136.78	137.87	138.73
156	136.69	139.14	140.65	141.75	142.62
160	140.52	143.00	144.53	145.64	146.51
161	141.48	143.98	145.50	146.61	147.48
168	148.20	150.74	152.29	153.41	154.31
176	155.90	158.48	160.06	161.21	162.12
180	159.75	162.36	163.94	165.11	166.02
184	163.60	166.24	167.84	169.01	169.93
192	171.32	173.99	175.63	176.82	177.76
200	179.05	181.77	183.43	184.64	185.59
204	182.91	185.67	187.33	188.54	189.50
207	185.82	188.59	190.27	191.48	192.44
208	186.79	189.56	191.24	192.45	193.42
210	188.73	191.50	193.19	194.42	195.38
216	194.54	197.35	199.05	200.29	201.27
224	202.30	205.14	206.88	208.12	209.12
228	206.17	209.04	210.78	212.05	213.05
230	208.12	211.00	212.74	214.00	215.00
232	210.06	212.95	214.70	215.96	216.97

Ports	P.01	P.02	P.03	P.04	P.05
240	217.84	220.76	222.53	223.82	224.83
248	225.62	228.57	230.37	231.68	232.69
252	229.51	232.49	234.29	235.60	236.63
253	230.49	233.46	235.26	236.58	237.61
256	233.41	236.40	238.21	239.52	240.55
264	241.21	244.22	246.06	247.40	248.44
270	247.05	250.10	251.95	253.28	254.34
272	249.00	252.07	253.91	255.26	256.30
276	252.91	255.98	257.85	259.20	260.26
280	256.82	259.89	261.77	264.02	264.18
288	264.63	267.74	269.64	270.99	272.08

Appendix E: Considerations with Message Networking server

The considerations presented in this Appendix apply only to Modular Messaging—Exchange. For information about the considerations for Modular Messaging—MSS, see Modular Messaging—MSS and the Message Networking server on page 162. In this Appendix, Modular Messaging refers to Modular Messaging—Exchange unless stated otherwise.

Modular Messaging—Microsoft Exchange systems can interoperate with other messaging systems through a Message Networking server. However, such implementations might not provide full support to certain features on the networked systems. Customers and planners must request and consult the following Message Networking engineering notes. These engineering notes are available on request.

- Message Networking Implementation Notes

  Provides information about the implementation of Message Networking and the differences to consider for customers moving from a point-to-point network. Many of these issues impact messaging subscribers and must be discussed with customers prior to implementation.

- Message Networking Directory Considerations

  Provides information about the implementation of Message Networking networked with Modular Messaging—Exchange. Addresses subscriber directory implementation required in such a configuration.

No support for Octel Analog Networking with Exchange 2007 and Exchange 2010

Support for Octel Analog Networking will not be available in a native Exchange 2007 and Exchange 2010 environment. Therefore, a voice network using Avaya Message Networking will not be possible in such environments. Octel Analog Networking requires an Exchange 2003 Peer Mail Server to host the gateway. This Peer Mail Server must be the same Exchange server that hosts the Voice Mail Domain mailbox.

No blind addressing from the telephone user interface

When subscribers address messages to a remote recipient from the telephone user interface (TUI), subscribers can use the Numeric Address of the recipient, provided that the remote recipient is pre-administered as a remote subscriber on the Modular Messaging system

When addressing from a graphical user interface (GUI) client, subscribers can use the Network Address of the recipient.

Manual directory initialization

Modular Messaging does not support automatic directory updates from a Message Networking server. The directory entries on a Modular Messaging system for remote subscribers must be populated manually.

Alternatively, Modular Messaging administrators can extract the directory from Message Networking and import it into the global directory for Microsoft Exchange.

In addition, Modular Messaging subscriber records must be built on the Message Networking server. Some possible ways to add subscriber records are:

- Bulk adding subscribers by file

  Use of File Transfer Protocol (FTP) to send a file to the Message Networking server. This file contains the numeric Network Addresses and e-mail addresses of Modular Messaging subscribers.

- Self-registration

  Self-registration of each Modular Messaging subscriber on the Message Networking server. To self-register, subscribers send a voice name message to a predefined self-registration mailbox on the Message Networking server.

- Subscriber administration

  Message Networking server administrators manually build the records of each Modular Messaging subscriber on the Message Networking server, using the administration screen interface.

No ongoing automatic directory updates

Modular Messaging does not support automatic directory updates from a Message Networking server. There is an ongoing need to manually synchronize the databases of Modular Messaging and Message Networking server. Whenever there is a change (add, delete, change) in any subscriber information, Message Networking and Modular Messaging databases require manual updates.

No voice name

For Modular Messaging subscribers, remote subscribers on the Message Networking server have a text-to-speech (TTS) name rather than a recorded voice name. When Modular Messaging subscribers address a message to a remote subscriber from the TUI, they hear the TTS name of that remote subscriber.

Double database entries on Modular Messaging

Currently, the Modular Messaging internal database stores two database entries for each subscriber. Of these entries, one entry is based on the subscriber telephone number, and the other entry is based on the subscriber e-mail address. For example, for a certain subscriber, the two entries might be `303-555-1234` and `subscriber@company.com`.

When a Modular Messaging subscriber uses Dial-by-Name to address a message from the TUI, this internal database is referenced. When the subscriber spells the name of the recipient on the telephone keypad, the subscriber is given a choice between the two entries for the recipient. Modular Messaging renders the name of the recipient, using TTS conversion. However, because the TTS rendering of both the e-mail address entry and the name are the same, they appear to be duplicates.

Receiving or sending fax messages through Message Networking server

When Modular Messaging subscribers receive or send fax messages through a Message Networking server, the following fax types are not supported:

- Group 4 fax: The Message Networking server does not support Group 4 fax transcoding.
- Multistrip fax: A multistrip fax message is a fax with one or more pages, each stored as multiple strips of image data. Depending on its product version, Modular Messaging might generate multistrip fax messages. The Message Networking server does not support multistrip faxes.

Appendix F: Options set on a Class of Service basis

Options set on a class of service basis

This appendix provides information about the various options that Modular Messaging administrators can set on a class of service (COS) basis.

A COS is a set of messaging capabilities that administrators define and assign to subscribers. At the time of installation, these classes of service contain the same default values. Administrators can then modify and rename classes of service to meet the requirements of subscribers. The classes of service report lists the current name and number for each COS.

A Modular Messaging—MSS system offers 512 classes of service.

A Modular Messaging—Exchange or Modular Messaging—Domino system offers 24 classes of service.

The following table lists the various options that administrators can set on a COS basis for a Modular Messaging—MSS system.

Option set on a COS basis	Description
Automatic Deletion Notification Feature Settings	
Retain New Messages	Specifies the number of days that messages in the New category are retained. Options to configure include Forever, Warn After, and Delete After. The minimum and maximum values that the Warn After and Delete After options accept are 0 and 999 days, respectively.
Retain Saved Messages	Specifies the number of days that messages in the Saved category are retained. Options to configure include Forever, Warn After, and Delete After. The minimum and maximum values that the Warn After and Delete After options accept are 0 and 999 days, respectively.
Retain Filed Messages	Specifies the number of days that messages in the Filed category are retained.

Option set on a COS basis	Description
	Options to configure include Forever, Warn After, and Delete After. The minimum and maximum values that the Warn After and Delete After options accept are 0 and 999 days, respectively.
Mailbox and Message Sizes	
Maximum Mailbox Size	Specifies the maximum size of a subscriber mailbox. The default value is 16.41 Mbyte, which is 174 minutes with GSM encoding or 35 minutes with G.711 encoding. The maximum for this field is 64 megabytes (MB).
Maximum Call Answer Message	Specifies the maximum length of Call Answer messages that can be left for subscribers. The default value is 2.33 MB, which is 25 minutes with GSM encoding or 5 minutes with G.711 encoding.
Maximum Voice Mail Message	Specifies the maximum size of voice mail messages that subscribers can create.. The default value is 2.33 MB, which is 25 minutes with GSM encoding or 5 minutes with G.711 encoding.
Subscriber Features and Services	
Time Zone	Associates a time zone with the subscribers assigned this COS. Subscribers can override this setting by selecting an option other than Use System Default in Subscriber Options. The default for this field is Use System Time Zone.
Message Waiting Indication Allowed	Specifies whether a new message triggers Message Waiting Indication (MWI).
Call Me Allowed	Specifies whether subscribers can use the Call Me feature.
Find Me Allowed	Specifies whether subscribers can use the Find Me feature. The Find Me feature is unavailable with analog port cards.
Notify Me Allowed	Specifies whether subscribers can use the Notify Me feature.
Call Handling	Specifies whether subscribers can access Call Handling options. With Call Handling, subscriber can record alternative messages for different situations, such as busy or no answer. Call Handling also allows a subscriber to block all incoming calls.
Call Screening	Specifies whether subscribers can access the Call Screening feature. Call Screening requires callers to give their name before transferring from Automated Attendant to a subscriber mailbox.
Outbound Fax Calls	Specifies whether subscribers can forward a fax to a telephone number or fax machine.

Option set on a COS basis	Description
Extended Absence Greeting Allowed	Specifies whether subscribers can record an Extended Absence Greeting (EAG).
Inbound Fax	Specifies whether subscribers can receive faxes.
Aria Date & Time Playback	Controls the inclusion of date and time information in the message playback. This can be set to Always, Never (the default), or under Subscriber control. This field is applicable only to subscribers using the Aria TUI.
Block messages when EAG is active	When Extended Absence Greeting (EAG) is enabled, specifies whether to allow callers to leave messages in their mailbox or not. This option can be configured using Subscriber Options, Web Subscriber Options, and TUI settings. This can be done only when a specific COS is set to “Subscriber Control”.
Page via PBX	Specifies whether subscribers can use the Intercom Paging feature.
Record Mailbox Greetings	Specifies whether subscribers can record the greetings that callers hear.
Caller Application Announcement Recording	Specifies whether subscribers can record prompts for Caller Applications.
Caller Application	Specifies the Caller Application to be used for inbound system calls to the primary Private Branch Exchange (PBX) extension for subscribers.
Telephone User Interface	Specifies the TUI to be used by all subscribers assigned this COS.
Restrict Client Access	Specifies whether subscribers are prevented from accessing their mailboxes using standards-based clients.
Personal Operator Configuration	Specifies whether subscribers are allowed to configure their personal operator settings.
Unsent Message Allowed	Specifies whether subscribers are allowed to use the Unsent Message feature.

The following table lists the various options that administrators can set on a COS basis for a Modular Messaging—Microsoft Exchange or Modular Messaging—IBM Lotus Domino system.

Option set on a COS basis	Description
Locate Messages Received	Allows subscribers to search for messages from a particular subscriber or Octel Analog Networking user.
Message Confirmation	Allows subscribers to view the date and time a recipient listened to a message and marked it as saved.

Option set on a COS basis	Description
Send Messages	Allows subscribers to send voice messages from their mailboxes to other subscribers on the local voice mail system, on a remote voice mail system that supports Octel Analog Networking, or to any user on the electronic mail network.
Operator Access	Allows callers to transfer to an operator when they need live assistance. Administrators can set options for transferring calls to the receptionist or to a personal operator.
Dial-by-Name	Allows subscribers to search for an extension or mailbox number by spelling the person's name by using the telephone keypad.
TUI type	Assigns a TUI type to subscribers, either Aria (the default), AUDIX, or Serenade. This field is not applicable to Modular Messaging—Domino.
Timezone	Specifies the time zone appropriate to the location of the subscribers. This field is not applicable to Modular Messaging—Domino.
Date and time playback	Controls the inclusion of date and time information in the message playback. This can be set to Always, Never (the default), or under Subscriber control. This field is applicable only to subscribers using the Aria TUI. This field is not applicable to Modular Messaging—Domino.
Block messages when EAG is active	When Extended Absence Greeting (EAG) is enabled, specifies whether to allow callers to leave messages in their mailbox or not. This option can be configured using Subscriber Options, Web Subscriber Options, and TUI settings. This can be done only when a specific COS is set to "Subscriber Control".
Fax call answer	Specifies whether subscribers can accept an incoming fax call. This field is not applicable to Modular Messaging—Domino.
Personal Operator Configuration	Specifies whether subscribers are allowed to configure their personal operator settings.
Unsent Message Allowed	Specifies whether subscribers are allowed to use the Unsent Message feature.

Appendix G: Options set on a per-subscriber basis

Options set on a per-subscriber basis

This section provides information about the various options that Modular Messaging administrators can set on a per-subscriber basis.

Administrators of the Modular Messaging—MSS can use the MSS Web administration pages to set subscriber attributes on a per-subscriber basis. The following lists these attributes. For more information on these attributes, see the *MSS online help*.

Attribute or Feature	Description
Name	Specifies the first name and last name of the subscriber.
Password	Specifies the default password the subscriber must use to log in to his or her mailbox. The password can be from one digit in length to a maximum of 15 digits. The password length must not be set to zero.
Mailbox Number	Specifies assign a unique Mailbox Number to a subscriber's mailbox. A Mailbox Number can be between 2-digits and 10-digits in length. For more information, see Local mailbox numbers on page 149.
Numeric Address	Specifies a numeric address that is unique among all addresses in the voice mail domain (VMD). The Numeric Address can be from 1 to 32 digits and can contain the Mailbox Number.
PBX Extension	Specifies the primary telephone extension of the subscriber.
Class of service	Subscribers can use this option to assign a class of service (COS) to a subscriber. The COS controls subscriber access to many features and provides general settings, such as mailbox size.
Community ID	Subscribers can use this option to assign a community identification (CID) number to a subscriber. Community IDs are used to control message sending and receiving among groups of subscribers.

Attribute or Feature	Description
ASCII Version of Name	If the subscriber name is entered in multi-byte character format, this field can be used to specify the ASCII translation of the subscriber name.
Immediately Expire Password?	Subscribers can use this option to determine if a subscriber's password must immediately expire. One situation where this field is useful is when changing ownership of a mailbox. This field has no effect if the Enable Password Expiry option is not selected on the Subscriber tab of the VMSC Telephone User Interface - Voice Mail Domain dialog box for the VMD in which this subscriber resides.
Is Mailbox Locked?	Subscribers can use this option to unlock a mailbox or to lock the mailbox and prevent access to it.
Backup Operator Mailbox	Specifies the mailbox number or transfer dial string of the subscriber's personal operator or assistant. This field specifies the transfer target when a caller to this subscriber presses 0 while listening to the subscriber's greeting.
Personal Operator Schedule	Specifies the Personal Operator schedule that determines when to route calls to the backup operator mailbox.
TUI Message Order	Specifies the order in which the subscriber will hear voice messages. The order can be Urgent Messages First, Oldest Messages First, or Newest Messages First.
Intercom Paging	Specifies the intercom paging setting for this subscriber. Settings include disable intercom paging, allow the subscriber to modify the setting, or allow the system to page the subscriber automatically.
VoiceMail Enabled	Specifies whether the subscriber can receive messages from other subscribers, e-mail messages (if enabled), and Call Answer messages. Even if a subscriber is not voice mail enabled: • The subscriber can use an e-mail or Web client to create, forward, and receive messages. • Other system users can use an e-mail or Web client to address messages to the subscriber. • The subscriber's information is displayed in the LDAP directory.
Secondary Extension	Subscribers can use these options to specify one or more alternate extension numbers for the subscriber. Secondary extensions can be used to specify a number for direct reception of faxes, to allow callers to this subscriber to use an existing Caller Application, or to identify each line appearance on the subscriber's telephone set if they have different telephone numbers.

Attribute or Feature	Description
Caller Application	Associates a Caller Application with a secondary extension. Callers who dial the extension experience the assigned Caller Application.

The following table lists the subscriber attributes options that administrators can set on a per-subscriber basis for a Modular Messaging—Microsoft Exchange or Modular Messaging—IBM Lotus Domino system. For more information on these attributes, see the *MAS Administration Guide*.

Feature	Description
Enable Modular Messaging	Enables Modular Messaging for the selected subscriber.
Voice mail domain	This field displays the voice mail domain (VMD) that is being administered. If required, subscribers can use this option to move the subscriber to another VMD.
Extension number	Specifies the subscriber's primary extension number.
Options...	Specifies a secondary extension number for the subscriber. A secondary extension is an alternative number that might be used for direct reception of faxes, to allow callers to this subscriber to use an existing Caller Application, or to identify each line appearance on the subscriber's telephone set if they have different telephone numbers.
Mailbox number	Specifies the subscriber's mailbox number.
Numeric address	Specifies the subscriber's Numeric Address that uniquely identifies a subscriber in the organization. If the subscriber used Octel Analog Networking, the numeric address length must not exceed 10 digits.
Personal operator	Specifies a personal operator for the subscriber.
Mailbox number	Specifies the mailbox number of the subscriber's designated personal operator. When callers request operator assistance during the times that the personal operator mailbox is active, the system transfers them to the extension associated with this mailbox.
Schedule	Specifies the personal operator's schedule.
Class of service	Assigns a class of service (COS) to the subscriber.
Require mailbox initialization at start of next subscriber session	Determines if the Mailbox Initialization feature is enabled for the subscriber.
TUI is locked due to failed logon attempts	Unlocks the TUI for a subscriber. A subscriber's TUI access can be locked due to failed logon attempts. Clear the checkbox to unlock the TUI for the subscriber.

Feature	Description
Allow call handling	Allows subscribers to use Subscriber Options to turn on the Call Handling feature.
Allow call screening	Allows subscribers to use Subscriber Options to turn on the Call Screening feature.
Allow intercom paging	Allows the subscriber to use the Subscriber Options to turn on the intercom paging feature.
Allow subscriber to edit announcements	Allows the subscriber to record and edit Caller Application announcements. If this option is enabled, subscribers can record announcements from the TUIs.
Allow Notify Me	Allows the subscriber to receive call notifications.
Allow Find Me	Allows the subscriber to use the Find Me feature.
Allow subscriber to edit greetings	Allows subscribers to edit personalized greetings, except the extended absence greeting (EAG).
Allow extended absence greeting	Allows subscribers to record an EAG.
Allow Call Me	Allows the subscriber to use the Call Me feature.
Allow Message Waiting Indicator	Allows the subscriber to use the Message Waiting Indicator feature.

Appendix H: MAS and MSS reports

Administrators can use the Reporting Tool application to generate predefined Messaging Application Server (MAS) reports. These reports are useful for monitoring system usage, planning capacity, and tracking system security.

For more information about the Reporting Tool application, see Reporting capabilities on page 87.

To generate Message Storage Server (MSS) reports, administrators can use the Web based administrative interface. For more information, see Message Storage Server administration on page 87.

This appendix provides information about the Modular Messaging MAS and MSS reports.

Messaging Application Server reports

The following table lists the MAS reports that administrators can generate by using Reporting Tool.

Report	Description
Basic Metrics report	Basic Metrics Report provides a general performance overview. This report records statistics, in the form of totals and percentages, on messaging activity in the voice mail domain (VMD). For example, the report includes the total number of incoming calls and the percentage of calls resulting in messages left. This report includes general information about telephone user interface (TUI) usage and statistical information about subscriber TUI logins. For a sample Basic Metrics report, see Basic Matrics report on page 407.
Hourly Statistics report	Hourly Statistics Report assists in capacity planning. This report records information about the number of incoming and outgoing calls for each hour in a specified time period. This information is useful for monitoring call activity across the VMD. For a sample Hourly Statistics report, see Hourly Statistics report on page 407.
Login Failures report	This report records information about unsuccessful mailbox logins that involve the MAS. For example, an unsuccessful login from the TUI. Logins might be fail because of an incorrect password or invalid mailbox number being entered.

Report	Description
	This information is useful for monitoring system security for the VMD. For a sample Login Failures report, see Login Failures report on page 408.
Port Statistics report	This report records incoming and outgoing call information for each port configured in the VMD. This information is useful for monitoring port usage. For a sample Port Statistics report, see Port Statistics report on page 409.
System Usage report	This report records call and messaging statistics for the VMD. This information is useful for monitoring the usage of the system, including the types of calls and their disposition; for example, the number of messages left, the number of fax calls, and the time that ports were used for text-to-speech (TTS) conversion of text messages. For a sample System Usage report, see System Usage report on page 410.
User Mailbox Statistics report	This report records information about telephone calls and messages received by each subscriber in the VMD. This information is useful for monitoring mailbox usage. For a sample Usage Mailbox Statistics report, see Usage Mailbox Statistics report on page 411.

Message Storage Server reports

The MSS collects information about system settings and attributes and information that depicts how the system is used. This information includes data about features, subscribers, communities, and remote messaging traffic. This information is displayed in the MSS reports.

The following table lists the MSS reports that administrators can generate by using the Web based administrative interface of the MSS.

Report	Description
Community Daily or Hourly Traffic report	This report shows the total number of messages sent and received by each community. This report also shows the number of messages that were not sent or received by each community. Messages might not be sent because of restrictions on sending during any day in the last 32-day period or any hour in the last 7 days. For a sample Community Daily or Hourly Traffic report, see Community Daily or Hourly Traffic report on page 411.

Report	Description
Feature Daily or Hourly Traffic report	This report shows traffic information on a feature-by-feature basis. Features are divided into Call Answer features and messaging features. For a sample Feature Daily or Hourly Traffic report, see Feature Daily or Hourly Traffic report on page 412.
Load Daily or Hourly Traffic report	This report shows daily load traffic information for 1 to 32 days or hourly traffic information for the last 7 days. Traffic load refers to the message traffic and storage relative to established mailbox thresholds. For a sample Load Daily or Hourly Traffic report, see Load Daily or Hourly Traffic report on page 413.
Network Load Daily or Hourly Traffic report	This report shows network channel traffic 1 day at a time for up to 32 days or 1 hour at a time for any hours within the last 7 days. This report can show any nodes that are exceeding specified threshold limits. For a sample Network Load Daily or Hourly Traffic report, see Network Load Daily or Hourly Traffic report on page 413.
Remote Message Daily or Monthly Traffic report	This report shows information about traffic loads between a local messaging system and a specified remote messaging system. For a sample Remote Message Daily or Monthly Traffic report, see Remote Message Daily or Monthly Traffic report on page 414.
Report of Classes-of-Service	This report shows information about the current Classes-of-Service. For a sample Report of Classes-of-Service, see Report of Classes-of-Service on page 415.
Report of Local Subscribers	This report shows information about the current local subscribers. Information includes a count of the local subscribers, the number of local subscriber mailboxes in use, and the total number of subscriber licenses purchased for this system. This report also shows information about the number of other mailboxes that are administered to run system features, such as Enhanced Lists and Internet Messaging. For a sample Report of Subscribers, seeReport of Local Subscribers on page 416.
Report of Remote Subscribers	This report shows information about current remote subscribers administered on this system. For a sample Report of Remote Subscribers, see Report of Remote Subscribers on page 417.
Report of Networked Machines	This report shows information about the current networked machines. For a sample Report of Networked Machines, see Report of Networked Machines on page 417.

Report	Description
Report of Trusted Servers	This report shows information about the current trusted servers. For a sample Report of Trusted Servers, see Report of Trusted Servers on page 418.
Subscriber Daily or Monthly Traffic report	This report shows traffic information about a specific subscriber for any day within the most recent 8-day period or any month within the last 13 months. This report can help administrators track a particular subscriber's mail-usage patterns. For a sample Subscriber Daily or Monthly Traffic report, see Subscriber Daily or Monthly Traffic report on page 418.
System Evaluation report	This report is a Web administration page that provides a summary of various MSS settings and attributes. This report also shows information about dormant mailboxes. A dormant mailbox is a mailbox that has not been accessed in 30 days, or a new mailbox that has not received any messages in 30 days. For a sample System Evaluation report, see System Evaluation report on page 419.

Report samples

Basic Matrics report

BASIC METRICS

VMD-wide call and messaging statistics 1

GENERAL INFORMATION

Total Incoming Calls:	647
Total Messages Processed:	259
Total Subscriber Logon (TUI) Attempts:	334
Total Subscriber Logon (TUI) Successes:	328

ANALYSIS

Percentage of Incoming Calls resulting in Messages:	40.03%
Subscriber Logons (TUI) as a percentage of Incoming Calls:	51.62%
Completed Logons (TUI) as a percentage of Logon Attempts:	98.20%
Percentage of Failed Logon Attempts: (Client hanging up and system failures)	1.20%
Percentage of Subscriber Logon Failures: (Incorrect PW or Incorrect Mailbox #'s)	0.60%

Hourly Statistics report

HOURLY STATISTICS

Information on incoming and outgoing calls 1

Date	Time Periods Starting	Incoming Calls	Failed Outgoing Calls	Outgoing Calls
2003/02/09	11:00	17	0	26
	12:00	9	0	7
	13:00	23	1	14
	14:00	32	0	24
	15:00	27	0	35
	16:00	11	2	17
	17:00	6	1	5
	18:00	4	1	4
	19:00	2	0	6
	20:00	3	0	1
	21:00	2	0	3

Login Failures report

LOGIN FAILURES

02/10/2003 **Unsuccessful mailbox login attempts due to incorrect password** 1

Mailbox Number	Mailbox Name	Last Failed Login	Total Failed Logins
1234	Paul Ryder	2003-02-10 13:08:34	1
5678	Marshall Raber	2003-02-09 14:11:22	1
9012	Penny Lee	2003-02-09 16:08:02	1
3456	J Frankel	2003-02-09 18:31:47	1

Number of invalid mailbox numbers entered: 4

Port Statistics report

PORT STATISTICS

2/23/2006

Information on each port configured in the VMD

INDIVIDUAL PORT STATISTICS

Server Name	Port Number	Incoming Calls	Outgoing Calls	Time Busy (seconds)	Percentage
DRWHO	1	919	0	32,292	1.3%
DRWHO	2	90	0	3,053	0.1%
DRWHO	3	7	0	114	0.0%
DRWHO	4	0	0	0	0.0%
DRWHO	5	0	0	0	0.0%
DRWHO	6	0	0	0	0.0%
DRWHO	7	0	0	0	0.0%
DRWHO	8	0	0	0	0.0%
DRWHO	9	0	0	0	0.0%
DRWHO	10	0	0	0	0.0%
DRWHO	11	0	0	0	0.0%
DRWHO	12	0	0	0	0.0%
DRWHO	13	0	0	0	0.0%
DRWHO	14	0	0	0	0.0%
DRWHO	15	0	0	0	0.0%
DRWHO	16	0	0	0	0.0%
DRWHO	17	0	0	0	0.0%
DRWHO	18	0	3	58	0.0%

System Usage report

SYSTEM USAGE

02/10/2003 VMD-side call and messaging statistics 1

GENERAL CALL INFORMATION

Number of Incoming Calls:	15
Number of Times Users Logged On:	1
Time All Ports Busy (seconds):	0
Time All Text-to-Speech Ports Busy (seconds):	1
Number of Successful Transfers to Fax Gateway:	0
Number of Failed Transfers to Fax Gateway:	1

CALLERS ACTIONS

Dialed Extension:	4
Defaulted to Assistance:	1
Dialed 0 for Assistance:	1
Left a Message for a Subscriber:	4
Pressed # to Logon:	3
Asked to Leave a Quick Message:	2

INCOMING CALL SUMMARY

Due to Busy:	2
Due to RNA:	2
Direct Calls:	2
Diverted Calls:	2
Unknown Calls:	2

OUTGOING CALLS SUMMARY

Number of Calls That Were Not Answered:	1
Number of Calls Placed to Busy Extensions:	1
Number of Calls that Got Connected:	1
Total Number of Outgoing Calls Excluding Calls to Clients:	4
Number of Failed Outgoing Calls Excluding Calls to Clients:	2
Number of Connected Outgoing Calls Excluding Calls to Clients:	2

MESSAGE SUMMARY

Busy:	1
RNA:	1
Direct:	1
Subscriber:	5
Quick Message:	1
Transfer to Mailbox:	1

Usage Mailbox Statistics report

USER MAILBOX STATISTICS

9/27/2006

Mailbox Specific Statistics

Mbox#	MailboxName	INCOMING CALLS TRANSFERRED TO EXT.	MESSAGES LEFT FOR USER					
			Ext. Busy	Ext. RNA	Direct	By Subscribers	Via QuickMsg	Via Xfer
7269	(Unknown Name)	0	2	2	0	4	0	0
6789	Client Test	0	0	0	0	0	0	0

Community Daily or Hourly Traffic report

COMMUNITY DAILY TRAFFIC

Date: November 07, 2008 Ending Time: 03:23

Number of Voice Mail Messages

Community ID	Sent By	Received By	Not Sent By	Not Received By
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0

Feature Daily or Hourly Traffic report

FEATURE DAILY TRAFFIC

Date: November 07, 2008 Ending Time: 03:25

REMOTE SUBSCRIBERS	
Administered	Non Administered
7	0

VOICE MAIL		
	Number Sent	Current
Total Messages	0	13
Voice Components	0	3
FAX Components	0	0
Binary Attachments	0	0
Text Components	0	13
Broadcast Messages	0	0
Login Announcements	0	0
Urgent Messages	0	3
Private Messages	0	0
	Minutes	
Average Storage Time	0	

CALL ANSWER		
	Number Received	Current
Total Messages	0	0
Voice Components	0	0
FAX Components	0	0
	Minutes	
Average Storage Time	0	

Load Daily or Hourly Traffic report

LOAD DAILY TRAFFIC

Date: November 07, 2008 Ending Time: 03:26

TOTAL SUBSCRIBER THRESHOLD EXCEPTIONS	
Lists	0
List Space	0
Message Space, Lower	0
Message Space, Upper	0
Subscribers Over Threshold	0
Rescheduled Deliveries	0

SYSTEM STORAGE	(MBytes)	(hours)
Total Storage Free	49092.4	8666.2
Total Storage Used	198.9	35.1
Message Storage Used	2.1	0.3
Voiced Name Storage Used	2.0	0.4
Directory Storage Used	194.8	34.4

Network Load Daily or Hourly Traffic report

NETWORK-LOAD DAILY TRAFFIC

Date: November 07, 2008 Ending Time: 03:26

Remote Deliveries Rescheduled	0
Total Undeliverable Remote Messages	0

	Incoming	Outgoing	Total
USAGE (SECONDS)	0	0	0
PEG COUNT (NUMBER OF SESSIONS)	0	0	0

Remote Message Daily or Monthly Traffic report

REMOTE-MESSAGES DAILY TRAFFIC

Date: November 07, 2008 Ending Time: 03:27

Machine Name italy-mssh Machine Type ldap

	Local Originiation		Remote Originiation	
	Prime	Non-Prime	Prime	Non-Prime
Transfer Sessions	0	0	0	0
Usage (seconds)	0	0	0	0
Average Usage	0	0	0	0
Messages Sent	0	0	0	0
Messages Rejected	0	0	0	0
Administrative Updates	0	0	0	0

Session Failures - Far End "No Answer"	0

Report of Classes-of-Service

Report of Classes-of-Service

Server Name: arnala.outland.avaya.com **Number of Classes-of-Service:** 512

COS Name	COS Number
class00	0
class01	1
class02	2
class03	3
class04	4
class05	5
class06	6
class07	7
ELA	8
class09	9
class10	10
class11	11

Report of Local Subscribers

Report of Local Subscribers

Subscriber Licenses Used: 2533 of 20000 **Total Subscribers:** 2535

System Mailboxes: 2 **Filtered Subscribers:** 2535

Subscriber Name	Mailbox Number	Numeric Address	COS	CID	Miscellaneous 1	Miscellaneous 2	Miscellaneous 3	Miscellaneous 4
Abhijeet	10032	1810032	0	1				
Abhijit	10010	1810010	0	1				
Asawari	10012	1810012	0	1				
Ashwini	10030	1810030	0	1				
Asish	10015	1810015	0	1				
Biswas, Swarnendu	10019	1810019	0	1				
Chaitanya	10027	1810027	0	1				
Chander	10033	1810033	0	1				
Cherry	10017	1810017	0	1				
Desai, Satyajit	10024	1810024	0	1				
Devayani	10020	1810020	0	1				
FAX	10098	1810098	0	1				

Report of Remote Subscribers

Report of Remote Subscribers

Remote Machine: internet **Total Subscribers:** 7 **Filtered Subscribers:** 7

Subscriber Name	Machine Name	Mailbox Number	Numeric Address	Community
Bryce Billinger	internet			1
Mail Delivery Subsystem	internet			1
_	internet			1
Joe Blow	internet			1
Mail Delivery Subsystem	internet			1
Rock Block	internet			1
ExternalCaller(VVS1)	internet			1

Back Return to Main Help

Report of Networked Machines

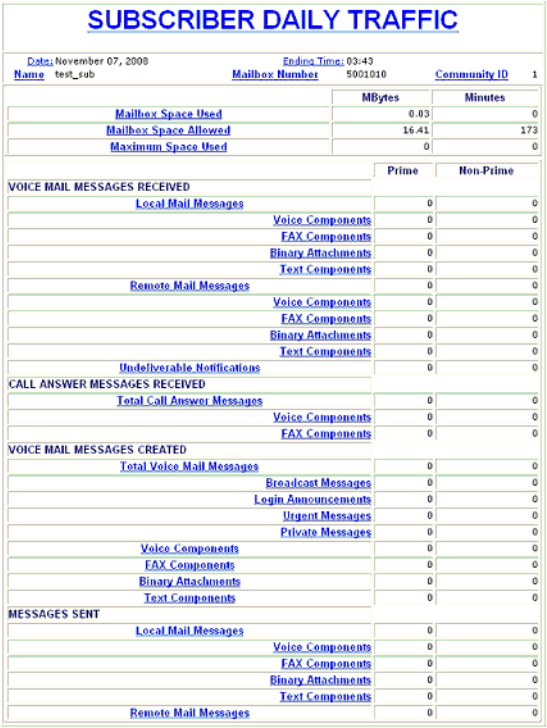
Report of Networked Machines

Machine Name	IP Address	Machine Type	LDAP Port	Updates In	Updates Out	Total Subscribers
arnala	198.152.137.83	local	56389	no	no	0

Back Return to Main Help

Report of Trusted Servers

Subscriber Daily or Monthly Traffic report



SUBSCRIBER DAILY TRAFFIC

Date: November 07, 2008 Ending Time: 03:43
Name test_sub Mailbox Number 5001010 Community ID 1

	MBytes	Minutes
Mailbox Space Used	0.03	0
Mailbox Space Allowed	16.41	173
Maximum Space Used	0	0

	Prime	Non-Prime
VOICE MAIL MESSAGES RECEIVED		
Local Mail Messages	0	0
Voice Components	0	0
FAX Components	0	0
Binary Attachments	0	0
Text Components	0	0
Remote Mail Messages	0	0
Voice Components	0	0
FAX Components	0	0
Binary Attachments	0	0
Text Components	0	0
Undeliverable Notifications	0	0
CALL ANSWER MESSAGES RECEIVED		
Total Call Answer Messages	0	0
Voice Components	0	0
FAX Components	0	0
VOICE MAIL MESSAGES CREATED		
Total Voice Mail Messages	0	0
Broadcast Messages	0	0
Login Announcements	0	0
Urgent Messages	0	0
Private Messages	0	0
Voice Components	0	0
FAX Components	0	0
Binary Attachments	0	0
Text Components	0	0
MESSAGES SENT		
Local Mail Messages	0	0
Voice Components	0	0
FAX Components	0	0
Binary Attachments	0	0
Text Components	0	0
Remote Mail Messages	0	0

System Evaluation report

System Evaluation Report

System Status

System Status: UP

Site Information

Name of Business: unknown
Phone Number: unknown
Installation Location Number (DL): unknown

Software Summary

Software Release: 5
Custom Software Installed?: no
Green Features Active?: no

Hardware Summary

System Type: [illegible]
RAM Size in Bytes: [illegible]
RAM Size in Megabytes: 2026
Total Number of Disks: 2
Total Space: [illegible]
Remote Maintenance Board (RMB): no
RAID: yes
LAN board types: Intel Corporation [illegible] Gigabit Ethernet Controller
Intel Corporation [illegible] Ethernet Pro 100 (rev 10)
Machine Name: [illegible]
IP address: [illegible]

Reliability Information

Messaging in service: [illegible]
User forced shutdown:
Messaging application error shutdown:
Last Linux reboot: [illegible]
Next scheduled reboot: 177 days

Remote Machines

No Remote Machines Administered

Extension Ranges

Node ID	Dial Prefix	Starting Extension	Ending Extension
0		0000000	9999999
1		13035700000	13035799999

Dormant Mailboxes

Subscriber Name	Mailbox Number	Switch Number	Last Access
test_sub	5001000	1	1969-12-31 17:00:00

File System Usage

File System	Type	1024 Blocks	Used	Available	Capacity	Mounted On
/dev/mapper/vgMSS-root	ext3	4257464	1375864	2665352	35%	/
/dev/mapper/vgMSS-backup	ext3	5063712	42964	4763520	1%	/backup
/dev/md0	ext3	101018	13167	82635	14%	/boot
none	tmpfs	1037444	0	1037444	0%	/dev/shm
/dev/mapper/vgMSS-database	ext3	4257464	98156	3943040	3%	/msg/database
/dev/mapper/vgMSS-media1	ext3	57475340	231824	54353888	1%	/msg/media1
/dev/mapper/vgMSS-software	ext3	1032088	164452	815208	17%	/msg/software
/dev/mapper/vgMSS-var	ext3	4031680	243224	3583656	7%	/var

Installed Software Packages

Package Name	Version	Description	Install Date	Stat
APPLset	7.006-00.00.817	Message Core Application Set	Sat Oct 18 02:55:18 2008	F
asg	10.018-08.00.030	Messaging Access Security Gateway Package	Sat Oct 18 02:52:58 2008	F
AUDIOtone	10.018-08.00.030	Messaging Platform Tuning	Sat Oct 18 02:52:06 2008	F
cdbstub	10.018-08.00.030	Messaging CDB Stub Package	Sat Oct 18 02:52:37 2008	F
cpmtoos	10.018-08.00.030	CMOS Tools Package	Sat Oct 18 02:55:46 2008	F
cshttps	10.018-08.00.030	CornerStone Https Package	Sat Oct 18 02:52:45 2008	F
cswebadm	10.018-08.00.030	Messaging Web Administration Package	Sat Oct 18 02:52:42 2008	F
dcc	7.006-00.00.817	Message Core Software	Sat Oct 18 02:55:16 2008	F
ela	7.006-00.00.817	Enhanced List Application (ELA) Software	Sat Oct 18 02:55:11 2008	F
im	7.006-00.00.817	Internet Messaging	Sat Oct 18 02:55:06 2008	F

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