IP Office™ Platform 10.1

Platform Guidelines: Capacity

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Contents

Chapter 1.
Purpose

1. Purpose

The following document covers various aspects of IP Office™ Platform 10.1 capacity and performance that may have an influence on the design of a specific customer's solution. This document also includes the relevant aspects of the IP Office Select product offer and when it should be considered.

1.1 Intended Audience

This document is intended for pre-sales, solution design, installation, administration and support personnel who required knowledge of IP Office Server Edition and IP Office Select capacity and performance.

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1.4 Applicability

The following information is applicable to IP Office Select, IP Office Server Edition, IP Office IP500 V2 and attached endpoints for IP Office Release 10.1.

Chapter 2.
Overview

2. Overview

Before proceeding with any capacity analysis or planning, the following resources should be consulted:

- The Avaya IP Office™ Platform Solution Description gives a high level view on deployment components.
- IP Office Technical Bulletins: Bulletins announce the general availability of new releases and their content. They can be found at: http://marketingtools.avaya.com/knowledgebase/
- IP Office Technical Tips: Provide more detailed information on new features, changes to supported limits or potential issues. They can be found at: http://marketingtools.avaya.com/knowledgebase/
- Virtualised Deployments: IP Office Server Edition components are supported in a virtualised environment using VMware technologies; the performance and capacity is directly governed by static and dynamic resource assignments which are not covered here. For more information, see *"Deploying Avaya IP Office™ Platform Server Edition Servers as Virtual Machines"*.
- Avaya Contact Center Applications: IP Office Server Edition supports differing capacity and performance levels when IP Office Contact Centre (IPOCC) or Avaya Contact Center Select (ACCS) are attached. See Avaya Contact Center Applications 13 .
- Other attached Avaya DevConnect applications: Please refer to the relevant application documentation.

The Avaya IP Office Platform Solution Description provides information about solution components, their capabilities and capacities sufficient to allow a high level design. This capacity planning document should subsequently be used to qualify and refine that design.

The most complex single component to consider is generally the IP500 V2/IP Office Server Edition IP500 V2 Expansion System due to its combination of VoIP, digital and analog phones/trunks, and the flexibility of constructs.

The Linux components (Primary Server, Secondary Server, and Linux Expansion) are VoIP only and single construct, save for the decision whether to move the one-X Portal server from the Primary to a separate platform for capacity.

Releases of IP Office Server Edition prior to IP Office R10.1 have differing capacities and performance limits; the corresponding release documentation should be used.

2.1 Changes from Previous Release

The following are summaries of the supported capacity changes and changes to this document between IP Office releases:

Release 10.0 to Release 10.1

- Unified Messaging Capacity quoted
- IP Office Integrated Contact Reporter added
- IP Office Media Manager added
- one-X Portal OpenAPI added

Release 9.1FP to Release 10.0

Compared to IP Office Release 9.1FP, for Release 10.1 the following capacity and performance changes have occurred:

Feature	Release 10.0	Release 9.1
Maximum users/extension per non-IP Office Select primary/secondary server.	2000	1500
Maximum button module buttons for IP Office Select, per Linux server:	8192	4096
Maximum Hunt/Presence groups for IP Office Select:	600	500
Total Hunt/Presence group members for IP Office Select:	6000	5000
Voice message store capacity for IP Office Select:	3600 hours	3000 hours
Voicemail email users IMAP/SMTP/MAPI:	3000	2500
Voicemail MS Exchange integration users:	3000	2500
Active SoftConsole applications for IP Office Select:	75	50
Centralized (external) directory capacity:	10,000	7,500
Personal directory capacity, per user, Linux:	250	100
Personal directory capacity, per user, IP500 V2:	250	100
Primary > Secondary failover time:	20 minutes	30 minutes
Primary VMware HA failover time:	20 minutes	30 minutes
one-X Portal Server VMware HA failover time:	20 minutes	30 minutes
% of VoIP extensions on Linux servers may use TLS for signalling and configuration	50%	Not specified.
VoIP extensions on IP500 V2 may use TLS for signalling and configuration	60	Not specified.
9600 Phone upgrade performance, R620/R630:	300 per 50 minutes	200 per 50 minutes
Avaya Communicator for Windows clients who may use HTTPS	100%	50%

- Increased capacities of recording and conference channels when Avaya Contact Center Select connected[13] .
- WebRTC capacities quoted[36]
- Web Collaboration capacities quoted[37]
- Button Module capacities quoted[38]
- Paging capacities quoted[39]
- CTI & TAPI capacities quoted[39]
- Directory & Call log capacities quoted[40]
- WebLM capacities quoted[40]

2.2 Virtualised Deployments

IP Office Server Edition components are supported in a virtualised environment using VMware technologies. This document will refer to the option as 'OVA' (Open Virtual Appliance).

In general OVA is regarded as the Dell R630, noting that:

- The necessary host and Virtual Machine (VM) resources have been assigned.
- The supported maximum capacities and performance of an Expansion differs from a Primary or Secondary regardless of the platform.
- IP Office Select operation is required as necessary, see IP Office Select 12.

For further information about VM resourcing and OVA-specific planning, see *"Deploying Avaya IP Office™ Platform Server Edition Servers as Virtual Machines"*.

2.3 IP Office Select

Avaya IP Office Select is a premium IP Office Server Edition offer providing extended capacity, performance and features over basic IP Office Server Edition. Where IP Office Select is required, it is indicated in the relevant section. Where not indicated, either IP Office Server Edition or IP Office Select can be used.

In summary, IP Office Select offers the following increased capacities, on the Dell R620/R630 and OVA platforms only:

- Users/extensions per server (1500 > 3000)
- Users/extensions per solution (2000 > 3000)
- Expansion systems (30 > 148)
- Power User/UC clients (750 > 3000)
- Hunt Groups (300 > 600)
- Voicemail/Attendant/Recording channels (150 > 500)
- Conference channels (256 > 512)
- SIP trunk calls (512 > 1024)
- Inter IP Office line channels (250 > 500)
- Solution SoftConsole instances (32 > 75)
- Button module buttons per Linux server (4096 > 8192)

IP Office Select offers the following increased performance, on the Dell R630 and OVA platforms only:

- Peak call Rate (18,000 > 20,000)

IP Office Select also offers the following additional features:

- Expansion to Expansion Inter IP Office lines
- Location based phone resilience
- Expansion to Expansion phone and hunt group resilience
- VMWare High Availability (HA)
- Active Directory/LDAP integration
- Resilient one-X Portal server on a second one-X Portal server or Secondary Server

The decision to deploy IP Office Server Edition or IP Office Select should be made at the outset; however it is possible to convert a IP Office Server Edition to an IP Office Select solution at a later date without loss of configuration or data. Moving from IP Office Select to IP Office Server Edition requires complete reconfiguration.

2.4 Avaya Contact Center Applications

IP Office Server Edition R9.1 onwards supports both IP Office Contact Center (IPOCC) and Avaya Contact Center Select (ACCS). When either is connected, certain aspects of IP Office Server Edition capacity and performance are determined by that application. These include:

- Maximum agents
- Supported call rate
- Maximum Recording channels
- Maximum Conference channels for recording calls
- Available capacity and performance for non-agent users

These are irrespective of whether IP Office Select or IP Office Server Edition is used as the IP Office system.

Maximum IP Office conference and recording channels are covered in Audio Conferencing 30 and Call Recording 34; please refer to the relevant application documentation for all other aspects:

- Avaya IP Office Contact Center Feature Description
- Avaya Contact Center Select Solution Description

IP Office Server Edition R10.1 onwards supports IP Office Integrated Contact Reporter. See IP Office Integrated Contact Reporter 41 for more information.

Chapter 3.
Capacity Planning

3. Capacity Planning

When designing a IP Office Server Edition Solution, many aspects need to be considered for capacity. These include:

- IP Office Select or non-IP Office Select deployment
- Maximum extension, user capacity; both per server and solution
- Maximum anticipated site/node capacity
- Maximum trunk capacity
- Hunt group quantity, size and location
- The total concurrent VoIP call capacity
- Call media destination location and type; both intermediate and final
- Direct/indirect/secure VoIP media
- Conference, and recording capacity
- Multi-Site Network link capacities
- Call Destination
- IP Infrastructure & VoIP QoS
- Trunk utilisation and call traffic profile
- Resilience and Failover requirements
- Available licenses

All should be assessed as one factor may limit another.

Note:

- Unless otherwise specified, the Avaya-supplied HP DL120, Dell R210 and Dell R220 servers can be considered equivalent.
- Unless otherwise specified, the Avaya-supplied Dell R620 and Dell R630 servers can be considered equivalent.

3.1 Primary & Secondary Server

3.1.1 Maximum Extension/User/Site Capacity

The server platform type should be selected to support the maximum potential users/extensions/sites according to the following table. The extension limits shown are for 9600/1600 Series H323 extensions not using TLS.

Primary / Secondary Server Type		Maximum Server Users / Extensions	Maximum Solution Users / Extensions	Maximum Expansion Systems
IP Office Server Edition	Dell R220	750	1500	30
	HP DL360G7	1500	2000	30
	Dell R630	2000	2000	30
	OVA[1]	2000	2000	30
IP Office Select	Dell R630[2]	3000	3000	148
	OVA[1][2]	3000	3000	148

1. Assumes sufficient VM resources assigned.
2. Requires IP Office Select.

Note:

- The secondary server and primary server platforms must match the Primary Server in capacity and performance.
- The Avaya-supplied HP DL120, Dell R210 and Dell R220 can be considered equivalent.
- The Avaya-supplied Dell R620 and Dell R630 can be considered equivalent.
- A mix of physical and virtualized servers is supported, providing the resources assigned to the virtual server match those of the physical server.
- Maximum users and extensions are configuration limits as well as a currently active/registered limit.
- Extension and user limits include potential resilience failover extensions/users. Again these are configuration limits as well as currently active/registered limits.
- Extension capacity support includes the system acting as DHCP and file server for the phones. 9600/1600 Series phone upgrade performance is limited according to server type as follows. If upgrade performance above these figures is required, an external HTTP/S server can be used.
  - Dell R220: 100 phones per 50 minutes.
  - HP DL360G7: 200 phones per 50 minutes.
  - Dell R630: 300 phones per 50 minutes.
  - OVA: Up to 300 phones per 50 minutes.
- The special user 'NoUser' is not counted. Simultaneous users/extensions are not counted.
- Each VoIP extension that uses TLS for signalling or configuration reduces the extension capacity by 2.
- Maximum per server capacity of other extension types may be lower; for example DECT R4 (384 per system), 1100/1200 Series phones (1000 per system), D100 DECT (32 D160 handsets).
- DECT R4, D100 DECT and 1100/1200 Series phones have directory capacity limitations. See Directory & Call Log 40.
- Remote worker 9600 H323 extensions are supported at a lower capacity for the HP DL360G7 (maximum 256 remote workers) and R220 servers (maximum 128 remote workers).
- For incremental capacity and performance support on smaller OVA profiles, see the technical manual *"Deploying Avaya IP Office Servers as Virtual Machines"*.

The following occurs if these figures are exceeded:

- IP Office Manager does not permit the administration of more than 2000 solution extensions/users if the solution is not IP Office Select.
- IP Office Manager does not permit the administration of more than 1500 per server extensions/users if the solution is not IP Office Select.
- Manager will not permit the administration of more than 30 Expansions if the solution is not IP Office Select, 148 Expansion Systems for IP Office Select; it will always reserve one system for a Secondary Server.
- The Primary/Secondary Server will not accept phone registrations from more than the above per-server quantity of extensions; any more are rejected. This is important when considering fall back scenarios.

3.1.2 Maximum Trunk Capacity

The Primary/Secondary Server supports three types of trunk/line: SIP, H323 and IP Office.

Primary/Secondary Server Type		Maximum Registered SIP Trunks	Total SIP Trunk Calls/ Sessions (direct/indirect media)	Maximum IP Office (SCN) Trunks	Maximum Calls/Sessions per SCN Trunk
IP Office Server Edition	Dell R220	125	256/128	32	250
	HP DL360G7	250	512/256	32	250
	Dell R630	250	512/256	32	250
	OVA	250	512/256	32	250
IP Office Select	Dell R630	250	1024/512	150	500
	OVA	250	1024/512	150	500

Note:

- The Avaya-supplied HP DL120, Dell R210 and Dell R220 can be considered equivalent.
- The Total SIP Trunk Calls figure is the maximum number of concurrent SIP trunk calls/sessions for one system. They can be distributed over one or more trunks on the same system.
- SIP trunk concurrent call capacity is also limited by available licenses and the SIP Line | SIP URI | Max Calls per Channel setting and the maximum server call capacity 19.
- The number of SIP trunk session licenses requested by each system is defined by the Maximum SIP Sessions setting on the License | Remote Server | Reserved Licenses tab of IP Office Server Edition Manager. One available SIP Trunk session license enables one concurrent SIP session/call.
- The maximum number of configured URIs per SIP trunk is 150. This is not correlated with maximum SIP trunks or concurrent calls/sessions.
- The "Maximum Calls/Sessions per SCN Trunk" figure is the maximum number of concurrent sessions supported on a single inter-node link whether WebSocket or Proprietary type. Yhe number of concurrent sessions is controlled by the Line | IP Office Line | Number of Channels setting and is also limited by the maximum server call capacity 19.
- H323 trunks are distinct from SCN (IP Office Line), but are taken from the same capacity pool.
- The above figures are a theoretical maximum; other factors can reduce what can be utilized on a concurrent basis:
  - Available licenses
  - Trunk configuration
  - Maximum server call capacity
  - IP infrastructure

The following occurs if the maximum numbers are exceeded:

- Unless administered, IP Office does not limit the number of concurrent trunk calls and makes a best effort to service all. VoIP voice quality will degrade as load increases; high overload conditions will cause the server to perform poorly in general.

3.1.3 Server Concurrent Call Capacity

Each server type is rated to support every single extension engaged in a call providing it is direct media and regardless of security settings. If the media stream passes through the server some way, the capacity is reduced.

Primary/Secondary Server Type		Concurrent Calls, direct media	Concurrent Calls, indirect media	Concurrent Calls (Secure), indirect media
IP Office Server Edition	Dell R220	750	128	64
	HP DL360G7	1500	256	128
	Dell R630	2000	1024	512
	OVA	2000	1024	512
IP Office Select	Dell R630	3000	1024	512
	OVA	3000	1024	512

Note:

- The Avaya-supplied HP DL120, Dell R210 and Dell R220 can be considered equivalent.
- One VoIP call is one pair of RTP or SRTP streams between IP Office and a VoIP endpoint – for example VoIP phone, VoIP trunk, IP Office line, Voicemail Pro. Note that an indirect media call via IP Office from one VoIP endpoint to another counts as two calls; one between IP Office and endpoint A and one between IP Office and endpoint B.
- Direct media is RTP/SRTP data directly between VoIP endpoints, not via IP Office. There are some IP Office networking constraints to achieve direct media. See Call Media Path 20.
- Transcoding between any codec does not reduce the server indirect media concurrent call capacity.
- Direct media with SRTP does not reduce the direct media capacity.
- One SRTP indirect media call reduces the available RTP call capacity by 2 (and vice versa).
- If SRTP transcoding is present (for example where the security parameters are mismatched between two phones), the capacity is reduced by a further 50%.
- If the server is running Voicemail Pro, one call to voicemail, attendant, recording or IVR consumes one indirect media call.
- If the server is the location for an audio conference, each member consumes one indirect media call.
- OVA capacities assume sufficient virtual machine resources have been assigned.

Concurrent call maximum capacity can be administered via IP Office Server Edition Manager in a number ways to ensure limits are not exceeded:

- Number of Channels and Outgoing Channels setting in the Line | VoIP tab of IP Office lines
- Max Calls per Channel setting in the Line | SIP URI tab of SIP trunks
- Call Admission Control area of the Location settings.
- VoIP Security area of the System settings.
- Media Security area in the Line | VoIP Settings tab.
- Media Security area in the Extension | VoIP tab.

The following occurs if the maximum numbers are exceeded:

- Unless administered, IP Office does not limit the number of concurrent calls and makes a best effort to service all.
- VoIP voice quality will degrade as load increases; high overload conditions will cause the Server to perform poorly in general.

3.1.4 Call Media Path (Linux)

Where calls go between VoIP endpoints (e.g. SIP trunk to H.323 extension) there are two options: Direct and indirect media. Direct media does not use the server's routing engine and hence the base capacity concurrent calls will apply.

Direct media is a configurable parameter for VoIP trunks and extensions with a default of active.

Indirect media will occur either where configured, or if direct media is not possible (even if configured). Some causes would be:

- VoIP traffic routed between the LAN1 and LAN2 interface
- Unsuccessful codec negotiation (including silence suppression, DTMF transport as well as basic codec support)
- A VoIP endpoint that does not support direct media
- Mismatch of RTP and SRTP
- Mismatched SRTP or SRTCP security settings such as no common cipher suite. These should be avoided if at all possible due to the limited indirect media SRTP capacity.
- Network Address Translation (NAT) traversal usually associated with Remote Worker phone deployments.

The above should be avoided if at all possible due to the limited indirect media capacity.

3.1.5 Hunt & Presence Groups

See Hunt & Presence Groups 29.

3.1.6 Conferencing Capacity

See Audio Conferencing 30 .

3.1.7 Voicemail/Auto Attendant/IVR

See Voicemail/Auto Attendant/IVR 31.

3.1.8 Call Recording

See Call Recording 34 .

3.1.9 Multi-Site Network Link Capacity

See Multi-Site Network Link Capacities 42 .

3.1.10 Call Destination Server

See Call Destination Server 42 .

3.1.11 IP Infrastructure, Bandwidth & VoIP QoS

See IP Infrastructure, Bandwidth & VoIP QoS 43 .

3.1.12 Call Traffic Profile

See Call Traffic Profile 45 .

3.1.13 Resilience and Failover

See Resilience and Failover 46.

3.2 one-X Portal Server

The following one-X Portal client capacity is supported with three main options:

- The one-X Portal server running on the Primary
- Standalone server with increased capacity
- Second server to provide geo-resilience (Secondary or second standalone one-X server)

Platform		Maximum one-X Portal Clients – Primary	Maximum one-X Portal Clients – Stand Alone	Maximum Solution Call Rate, BHCC
IP Office Server Edition	Dell R220	375	750	7,200
	HP DL360G7	750	750	9,000
	Dell R630	750	750	9,000
	OVA[1]	750	750	9,000
IP Office Select	Dell R630[2]	1500	3000	10,000
	OVA[1][2]	1500	3000	10,000
IP500 V2	UCM V1/V2	–	50	3600

1. Assumes sufficient VM resources assigned.
2. Requires IP Office Select.

Note:

- The quoted Busy Hour Call Completion (BHCC) rates assumes a Normal call distribution.
- The Avaya-supplied HP DL120, Dell R210 and Dell R220 can be considered equivalent.
- If one-X Portal server geo-resilience is required, it must be a Secondary if Primary one-X server used, or another standalone one-X server if standalone one-X server used.
- The maximum supported total solution call rate is 7,200/9,000/10,000 BHCC when one-X Portal users are active.
- The one-X Portal client types can be of any mix, including plugins. HTTP or HTTPS. From R10.0, 100% can now be Avaya Communicator for Windows over HTTPS (was 50%).
- With one-X Portal users active, a solution-wide limit of 750 conference channel participants applies, but this limit does not include recording channels
- It is possible to migrate from a one-X Server located on the Primary to a stand-alone server at a later date. See the one-X Portal documentation for the migration process.
- For incremental capacity and performance support on smaller OVA profiles, see the technical manual *"Deploying Avaya IP Office Servers as Virtual Machines"*.

The following sections in this document should also be reviewed:

- Conferencing Capacity 30
- IP Infrastructure, Bandwidth & VoIP QoS 43
- Resilience and Failover 46

3.3 IP500 V2 Expansion System

When designing a IP Office Server Edition Solution that includes a IP500 V2 Expansion System, many aspects need to be considered for capacity. These include:

- Maximum trunk and extension capacity
- The total concurrent VoIP call capacity
- The VCM channel capacity
- Call media destination location and type; both intermediate and final
- Direct/indirect/secure VoIP media
- Conference, and recording capacity
- Multi-Site Network link capacities
- Call Destination
- IP Infrastructure & VoIP QoS
- Trunk utilisation and call traffic profile
- Resilience and Failover

All of the above should be assessed as one factor may limit another.

3.3.1 Maximum Extension/User Capacity

A single IP500 V2 Expansion can support 384 users and up to:

- 384 Analog extensions
- 384 Digital extensions
- 384 VoIP extensions (H.323, SIP or DECT R4)

The total may not exceed 384 extensions.

Analog and digital extension capacity is dependent upon the hardware fitted to the system unit. The following table shows the various constructs and the resulting maximum (note that many variants are not shown, just the ones which give the maximum):

Base Card #1	Base Card #2	Base Card #3	Trunk Card #4	Exp. Module #1-8	Exp. Module #9-12	Max Digital	Max Analog Extn.	Max VoIP Extn.
Phone 8	Phone 8	Phone 8	4 Port Exp.	Phone 30	Phone 30	0	384	0
DS 8	DS 8	DS 8	4 Port Exp.	DS 30	DS 30	384	0	0
-	-	-	-	-	-	0	0	384

Note:

- Maximum users and extensions are configuration limits as well as a currently active/registered limit.
- Extension and user limits include any resilience fail-over extensions/users; again these are configuration limits as well as a currently active/registered limit.
- Extension capacity support includes IP Office acting as a server for any DHCP, upgrade and other operational files. 9600/1600 phone upgrade performance is limited to 50 within 50 minutes for the same phone type. Upgrading more than 50 phones at a time from IP500 V2 is not recommended. If upgrade performance above these figures are required, an external HTTP/S server can be used.
- H323, DECT R4 and SIP extension capacity is also limited by available licenses.
- 9600 H323 Remote worker extensions are supported at a lower capacity; maximum 120.
- 9600 H323 extensions with TLS are supported at a lower capacity; maximum 40.

3.3.2 Maximum Trunk Capacity

A single IP500 V2 Expansion can support up to:

- 204 Analog trunks total
- 8 E1/PRI digital trunks with 240 channels total
- 8 T1/PRI digital trunks with 192 channels total
- 16 BRI digital trunks with 32 channels total
- 125 SIP trunks with 128 concurrent calls total
- 32 H323/SCN trunks with 250 concurrent calls per trunk

This is a theoretical maximum possible trunk channels that can be supported, but other factors will reduce what can be utilised on a concurrent basis:

- Available licenses
- Trunk configuration
- VCM channels
- Maximum server call capacity

Analog and digital trunk capacity is dependent upon the hardware fitted to the system unit. The following table shows the various constructs and the resulting maximum (note that many variants are not shown):

Trunk Card #1	Trunk Card #2	Trunk Card #3	Trunk Card #4	Exp. Module #1-8	Exp. Module #9-12	Max BRI	Max PRI E1/T1	Max Analog
Dual PRI	Dual PRI	Dual PRI	Dual PRI	ATM 16	-	0	240/192	128
ATM 4	ATM 4	ATM 4	4 Port Exp.	ATM 16	ATM 16	0	0	204
BRI 8	BRI 8	BRI 8	BRI 8	ATM 16	-	32	0	128
-	-	-	-	-	-	0	0	0

Server Type	Maximum Registered SIP Trunks	Total SIP Trunk Calls (direct/ indirect media)	Maximum IP Office (SCN) Trunks	Maximum Calls per SCN Trunk
IP500 V2	125	128/120	32	250

Note:

- The Total SIP Trunk Calls figure is effectively the maximum number of concurrent SIP trunk calls/sessions. They can be distributed over one or more trunks on the same system.
- SIP trunk concurrent call capacity is also limited by available licenses and the SIP Line | SIP URI | Max Calls per Channel setting.
- The number of SIP Trunk session licenses requested by each system is defined by the Maximum SIP Sessions setting on the License | Remote Server | Reserved Licenses tab of IP Office Server Edition Manager. One available SIP Trunk session license enables one concurrent SIP session/call.
- The maximum number of configured URIs per SIP trunk is 150. This is not correlated with maximum SIP trunks or concurrent calls.
- The Maximum Calls per SCN Trunk figure is the maximum number of concurrent sessions supported on a single inter-node link whether WebSocket or Proprietary type. Note that the number of SCN channels is controlled by the Number of Channels setting on the IP Office Line | Line tab of IP Office Server Edition Manager.
- H323 trunks are distinct from SCN, but are taken from the same capacity pool.
- The PRI trunk capacity is also limited by available licenses. One available PRI Trunk Channel license enables one concurrent PRI call.

3.3.3 Concurrent Call Capacity

The concurrent call capacity between digital/analog extensions and/or digital/analog trunks is non-blocking. i.e. All extensions and trunks may be involved in calls. Any VoIP calls will not affect this capacity.

The IP500 V2 Expansion has a number of concurrent VoIP call capacities that can influence the solution design:

Parameters		Concurrent VoIP calls	Comment
Unsecure or Secure	Direct media	384	Calls with direct media between VoIP endpoints/trunks.
Unsecure	Indirect media, IP500 V2 VCM	120	Calls between the VoIP and digital/analog domain. Also limited by the available VCM channel capacity (see below)
Unsecure or secure	Indirect media, IP500 V2 RTP relay	120	Calls between VoIP endpoints/trunks that cannot go direct media, but do not require a VCM. Note that a VCM channel is always required during call setup. The value is per call leg. For example 60 H.323 extensions calling 60 H.323 extensions constitutes 120 total calls.
Secure	Indirect media, IP500 V2	40	The value is per call leg. This means 40 VCM calls or 20 indirect media calls if some SRTP settings demand decoding, then re-encoding. If a mixed RTP/SRTP call environment, each SRTP leg removes three from the RTP call capacity.

These are not cumulative VoIP capacity figures – for example a mixture of two call types will change the capacity to a value between the two limits. Calls that remain in the digital/analog domain do not affect this VoIP call capacity.

Concurrent call maximum capacity can be administered via IP Office Server Edition Manager in a number ways to ensure limits are not exceeded:

- Number of Channels and Outgoing Channels setting in the Line | VoIP tab of IP Office lines
- Max Calls per Channel setting in the Line | SIP URI tab of SIP trunks
- Call Admission Control area of the Location settings.
- VoIP Security area of the System settings.
- Media Security area in the Line | VoIP Settings tab.
- Media Security area in the Extension | VoIP tab.

The following occurs if the maximum numbers are exceeded:

- Unless administered, the IP500 V2 Expansion does not limit the number of concurrent calls and makes a best effort to service all. VoIP voice quality will degrade as load increases; high overload conditions will cause the IP500 V2 Expansion to perform poorly in general.

3.3.4 VCM Channel Capacity

Voice Compression Module (VCM) channels allow the IP500 V2 Expansion to convert media (e.g. voice) between analog/digital and the Voice over IP (VoIP) domains. These are essential when routing analog/digital trunk calls to or from VoIP endpoints.

It is important to note that media communication with any other IP Office Server Edition component requires the use of VoIP, including Primary, Secondary, other expansions, call recording, attendants, IVR, conferencing and voicemail.

Local IP500 V2 Expansion conferences and music on hold use the digital domain; hence all VoIP parties (trunk or extension) will require a VCM channel.

VCM channels are also used to perform VoIP transcoding. Transcoding is used where the VoIP codec differs between two legs of a call; for example a VoIP endpoint supporting only G.729 calling a SIP trunk with only G.711. This case will use two VCM channels and should be avoided wherever possible.

The following table summarises VCM channel usage.

Endpoint A	Endpoint B	VCM channels used[1]	Notes
Analog/Digital trunk or extension	Analog/Digital trunk or extension	None	D100 DECT and DECT R4 endpoints are classified as VoIP
	Local Conference	None	Conference hosted on the IP500 V2
	Local Music on Hold	None	
	Embedded Voicemail	None	Includes voicemail, attendants, announcements Embedded Voicemail not supported in IP Office Server Edition
Analog/Digital trunk or extension	VoIP trunk or extension	1	
	Central Voicemail	1	Includes voicemail, IVR attendants, announcements
	Remote Conference	1	
	Remote Music on Hold	1	Maximum of 3 MOH sources streamed from Primary Server using a maximum of 3 VCM channels
	Call recording	1	Using Voicemail Pro, ACCS or IPOCC
VoIP trunk or extension	VoIP trunk or extension	None[2]	VoIP endpoints includes IP Office Line (SCN trunk), SM and H323 lines, DECT endpoints
	Central Voicemail	None[2]	Includes voicemail, IVR attendants, announcements
	Remote Conference	None[2]	
	Remote Music on Hold	None[2]	Streamed from Primary Server
	Call recording	None[2]	Using Voicemail Pro, ACCS or IPOCC
VoIP trunk or extension	Analog/Digital trunk or extension	1	
	Local Conference	1	Conference hosted on the IP500 V2
	Local Music on Hold	1 per MOH source[2]	Maximum of 4 MOH sources. One VCM channel will be used per codec type per source.
	Embedded Voicemail	1	Includes voicemail, attendants, announcements Embedded Voicemail not supported in IP Office Server Edition

Note:

1. Unless otherwise specified, the VCM channel is used for the duration of the call and the VCM resource is always local.
2. Assumes both endpoints' VoIP codecs match, if they do not match 2 VCM channels are used.

Three base card types provide VCM channel capacity for the IP500 V2 Expansion:

- VCM 32
- VCM 64
- Combination card

Each base card can carry a trunk module, however the Combo card can only support BRI and analog. Hence, if more than two dual PRI cards are required, the VCM capacity is reduced. Also note that the type of trunk module fitted to the Combo card is fixed.

The following table shows various constructs and the resulting theoretical maximum

Note:

All the variants are not listed in the table. Only the variants that provide the maximum capacity are listed.

Base Card #1	Base Card #2	Base Card #3	Base Card #4	Maximum G.711 calls	Maximum G.729 calls	Maximum G.723 calls	Maximum G.722 calls
VCM 64	VCM 64	-	-	128	120	88	120
VCM 64	VCM 64	Combo	-	138	130	98	130
VCM 64	VCM 64	Combo	Combo	148	140	108	140

The capacity in the above table is for a bidirectional channel between a VoIP and an analog or digital endpoint and assumes the calls are of the same codec type. Differing codec types can be supported at the same time; the lowest channel figure should be used for calculations.

If VCM channels are used to convert SRTP media, a maximum of 40 calls per system are supported regardless of codec type.

The IP500 V2 Expansion manages this common resource as efficiently as possible but if there are insufficient at any one time:

- Outgoing calls will not get connected (they do not receive dial tone)
- Incoming calls will queue until a VCM channel is free
- Transfers cannot be made

3.3.5 Call Media Path (IP500 V2)

Where calls start and remain in the digital and/or analog domain, the IP500 V2 Expansion's VCM and VoIP capacities have no effect. The base non-blocking capacity of the IP500 V2 Expansion will apply.

Where calls go between VoIP and digital/analog domains within the IP500 V2 Expansion, the indirect media limit of 120 concurrent calls and VCM availability will always apply.

Where calls go between VoIP domains (for example SIP trunk to H.323) there are two options: Direct and indirect media. Direct media does not use the IP500 V2 Expansion's routing engine and hence the base capacity of 384 concurrent calls will apply.

Direct media is a configurable parameter for VoIP trunks and extensions with a default of active.

Indirect media will occur either where configured, or if direct media is not possible (even if configured). Some of the reasons are:

- VoIP traffic routed between the LAN1 and LAN2 interface
- Unsuccessful codec negotiation (including silence suppression, DTMF transport as well as basic codec support)
- A VoIP endpoint that does not support direct media
- Mismatch of RTP and SRTP
- Mismatched SRTP or SRTCP security settings such as no common cipher suite. These should be avoided if at all possible due to the limited indirect media SRTP capacity.
- Network Address Translation (NAT) traversal usually associated with Remote Worker phone deployments.

3.3.6 Hunt & Presence Groups

See Hunt & Presence Groups 29.

3.3.7 Conferencing Capacity

See Audio Conferencing 30.

3.3.8 Voicemail/Auto Attendant/IVR

See Voicemail/Auto Attendant/IVR 31 .

3.3.9 Call Recording

See Call Recording 34 .

3.3.10 Multi-Site Network Link Capacity

See Multi-Site Network Link Capacities 42 .

3.3.11 Call Destination Server

See Call Destination Server 42 .

3.3.12 IP Infrastructure, Bandwidth & VoIP QoS

See IP Infrastructure, Bandwidth & VoIP QoS 43.

3.3.13 Call Traffic Profile

See Call Traffic Profile 45 .

3.3.14 Resilience and Failover

See Resilience and Failover 46.

3.4 Linux Expansion System

When designing a IP Office Server Edition solution that includes a Linux Expansion System, the same aspects that are covered for the IP500 V2 Expansion 22 above need to be assessed, with the following differences:

- Maximum extension capacity for each Linux Expansion:
  - No digital or analog extensions
  - Maximum users/extensions 750, except DECT R4 which is 384.
  - 128 maximum remote worker 9600 H323 extensions.
- Maximum trunk capacity for each Linux Expansion:
  - No digital or analog trunks.
  - Maximum SIP sessions/calls 256 total.
- The concurrent call capacity of the Linux Expansion:
  - No analog/digital calls
  - Indirect media capacity 128 (64 when SRTP used)
  - Direct media capacity 750
- The VCM channel capacity for each Linux Expansion:
  - Only transcoding is relevant; 128 channels
  - There is no capacity difference due to codec type

Note:

- The server type may additionally be an HP DL360G7, Dell R630 or OVA, however the supported capacities/performance are not increased.

All of the above should be assessed as one factor may limit another.

The following sections in this document should also be reviewed:

- Call Media Path (Linux) 20
- Hunt & Presence Groups 29
- Audio Conferencing 30
- Call Recording 34
- Multi-Site Network Link Capacities 42
- Call Destination Server 42
- IP Infrastructure, Bandwidth & VoIP QoS 43
- Call Traffic Profile 45
- Resilience and Failover 46

3.5 General Capacity Considerations

3.5.1 Hunt & Presence Groups

Hunt Groups are sets of telephone users targeted by calls. Presence groups are sets of one-X Mobile or XMPP users for IM purposes. Both are viewed together for group capacity, of which there are both per-solution and per system limits:

Platform		Maximum Server Groups	Maximum Server Group size	Maximum Solution Groups	Total Hunt Solution Group Members
Standard / IP Office Server Edition	All Linux Servers / OVA	300	750	300	3000
	IP500 V2	200	384	300	3000
IP Office Select	All Linux Servers / OVA	600	1250	600	6000
	IP500 V2	200	384	600	6000

Note:

- Maximum Solution Groups is the total number of hunt and presence groups over the whole solution.
- Maximum Server Group size is the maximum number of members in a single hunt/presence group.
- Total Hunt Solution Group Members is the total members over all hunt/presence groups.
- Collective or Collective Call Waiting ring mode must not be used with IP DECT extensions.

The following occurs if these figures are exceeded:

- IP Office Manager does not permit the administration of more than 300 solution groups if the solution is not IP Office Select.
- IP Office Manager does not permit the administration of more than 750 per group members if the solution is not IP Office Select.
- If the number of groups or individual size is exceeded (particularly if the Ring Mode is Collective or Collective Call Waiting), there may be inaccurate hunt group call presentation, or a general slowdown in other operation such as UC or management clients.
- Collective or Collective Call Waiting ring mode with IP DECT extensions will stop service to all other IP DECT extensions

3.5.2 Audio Conferencing

Each Primary and Secondary supports a local audio conference capability with the following capacities:

Primary/ Secondary Platform		Total Conference Channels	Maximum conference size	Total Conference Channels with ACCS	Total Conference Channels with IPOCC
IP Office Server Edition	Dell R220	128	128	414	414
	HP DL360	256	256	825	825
	Dell R630	256	256	1650	825
	OVA	256	256	1650	825
IP Office Select	Dell R630	512	256	1650	825
	OVA	512	256	1650	825

Each IP500 V2 and Linux Expansion System supports a local audio conference capability with the following capacities:

Expansion Platform	Total Conference Channels	Maximum conference size	Total Conference Channels with ACCS	Total Conference Channels with IPOCC
Linux/OVA	128	128	128	128
IP500 V2	128	64	128	128

Note:

- The Avaya-supplied HP DL120, Dell R210 and Dell R220 can be considered equivalent.
- OVA will always advertise these figures; however performance/capacity is dependent on VM resources assigned.
- The figures cover both ad-hoc and meet-me conference types
- With one-X Portal users active, a solution-wide limit of 750 conference channel participants applies, but this does not include conferences used for call recording.
- IP Office Server Edition supports differing capacity and performance levels when IP Office Contact Centre (IPOCC) or Avaya Contact Center Select (ACCS) are attached. See Avaya Contact Center Applications 13.
- The increased capacities for ACCS and IPOCC are only supported when the applications are actively connected to the host IP Office and should only be used for call recording purposes.
- No dynamic solution-wide conference allocation is supported, only static via call flows or Conference Meet Me short code Line Group ID.
- IP500 V2 Expansion conferences exist in the digital domain; hence all VoIP parties (trunk or extension) will require a VCM channel for the duration. See VCM Channel Capacity 25.
- Further information on conferences can be found at: http://marketingtools.avaya.com/knowledgebase/businesspartner/ipoffice/mergedProjects/manager/_frame2.html?Conferencing.Overview.html.

The location of the conference resource used is determined by a number of factors:

- A user performing an ad-hoc conference will use the system's conference capacity on which they are logged in to.
- A meet-me conference using a user's personal meet-me bridge will use the system on which they are logged in to.
- A meet-me conference created by Voicemail Pro call flows, or the Conference meet-me short code feature will use the system on which the feature was invoked.
- To invoke a meet-me Conference on a remote system, use the Line Group ID field of the Conference Meet Me short code feature. By default this is set to 0, for local system.
- For the case where a conference is scheduled by one-X Portal and at the scheduled time the conference dials the delegates: The conference location will be the server to which the active one-X Portal is attached.

Recording a conference will require an additional conference channel, as well as an IP Office Line (SCN trunk) channel to the recording destination (Primary or Secondary Server, alternate during fail over operation). Neither IP Office nor Voicemail Pro can automatically link or move conference locations, but existing conferences can be connected together.

When conference resources run out, attempts to record calls, join or create conferences are rejected.

3.5.3 Voicemail/Auto Attendant/IVR

Leaving a Voicemail for a user or hunt group will use one licensed (and available) voicemail channel and consume one from the indirect media call capacity of the Voicemail Pro server (Primary or Secondary).

If the endpoint is remote, an IP Office Line (SCN trunk) channel will be used. If the source of the call is digital/analog, a VCM channel will additionally be required.

A voicemail collect operation will use the same resources as voicemail leave.

Invoking an Auto Attendant, Announcement or IVR script uses the same resources as voicemail, and is taken from the same pool of licenses and voicemail channel capacity; one active Auto Attendants/IVR/Announcement takes one channel and license.

The total solution voicemail channel capacity is determined by a number of factors:

- The number of per-server supported voicemail channels:
  - Dell R630/OVA: 250
  - HP DL360: 150
  - Dell R212 server: 75
  - IP500 V2 UCM V1/V2: 40 (20 when one-X Portal is running on the module)
- Whether the Dual Voicemail Pro feature is active (IP Office Select only) – this doubles the maximum capacity to 500 channels.
- The number of licensed voicemail channels: Each active master Voicemail Pro must have its own licenses. It inherits the other set when active as a backup.
- Call recording also uses licensed voicemail channels. One active recording channel consumes one voicemail/AA channel.

When the Dual Voicemail Pro feature is active (IP Office Select only) and not under fail-over conditions, users will be provided services from one of the Voicemail Pro servers:

All Primary users' voicemail, announcements, call recording, auto attendant and IVR invocation will be directed to the Primary Voicemail Pro instance.

All Secondary users' voicemail, announcements, call recording, auto attendant and IVR invocation will be directed to the Secondary Voicemail Pro instance.

All Expansion users' voicemail, announcements, call recording, auto attendant and IVR invocation will be directed to the Voicemail Pro instance defined by the System | Voicemail | Voicemail Destination setting. This is initially selected by the Initial Configuration Utility (ICU).

If voicemail channel resources run out:

- Calls continue to alert and do not switch to voicemail.
- Voicemail collect will fail to connect to the Voicemail server.
- Calls to Attendants/call-flows will continue to alert.
- Announcements will not be played.
- Text To Speech (TTS) will not be output during call flows.
- Note that the TTS channel capacity is 250. As the TTS channel is utilized for a very short period, this capacity should not prove a limitation.

To ensure Voicemail Pro channel capacity is available for voicemail, call flow and announcement operations, the IP Office Server Edition Manager settings Voicemail Channel Reservation on the Primary and Secondary Server's System | Voicemail tab can be configured to reserve channels exclusively for specific uses.

The solution voicemail capacity is fixed at 60 minutes per user or group mailbox. This is separate from the call recording capacity. Please refer to the Voicemail Pro documentation for more information.

What happens if mailbox storage resources run out?

- Voicemail leave operations will receive an announcement that the user/group's mailbox is full.
- Voicemail collect will continue to function.

The following sections in this document should also be reviewed:

- Call Media Path (Linux) 20 and Call Media Path (IP500 V2) 27
- Call Recording 27
- Multi-Site Network Link Capacities 42
- Call Destination Server 42
- Call Traffic Profile 45
- Resilience and Failover 46

3.5.4 Unified Messaging Capacity

Voicemail Pro provides a number of integration options for unified messaging (UMS):

Platform		Native/IMAP/SMTP	Exchange Integration		Gmail Integration	
			via EWS	via MAPI	Copy/Alert	Forward
IP Office Server Edition	Dell R220	750	750	490	750	250
	HP DL360G7	1500	1500	490	1500	250
	Dell R630	2000	2000	490	2000	250
	OVA[1]	2000	2000	490	2000	250
IP Office Select	Dell R630[2]	3000	3000	490	3000	250
	OVA[1][2]	3000	3000	490	3000	250
IP500 V2	UCM V1/V2	384 (200) [1]	384 (200) [1]	384 (200) [1]	384 (200) [1]	384 (200) [1]

1. Capacity when one-X Portal is running on the module.

Notes:

- Use of these options requires the user or hunt group to be licensed, either using an appropriate IP Office user profile license or the legacy UMS Web Services license.
- Each voicemail server in a dual active Voicemail Pro deployment supports independent UMS integration capacity.
- When resilience active, UMS integrations are supported at the same per-server capacity.
- The MAPI exchange integration supports 245 users per MAPI proxy service running on the Exchange Server. A maximum of two MAPI proxy services can be running, giving a total of 490 mailboxes.
- Hunt Groups cannot support Gmail integrations
- The Gmail maximum message length is 14 minutes

3.5.5 Call Recording

Each Primary and Secondary supports a voice call recording capability with the following capacities:

Platform		Server Recording Channels[1]	Solution Recording Channels[1]	Solution Recording Channels with ACCS[2]	Solution Recording Channels with IPOCC[2]
IP Office Server Edition	Dell R220	75	75	175	175
	HP DL360	150	150	350	350
	Dell R630	150	150	500	350
	OVA	150	150	500	350
IP Office Select	Dell R630	250	500	500	350
	OVA	250	500	500	350

1. Both Contact Recorder for IP Office and IP Office Media Manager support recordings manager at the maximum channel and call rate appropriate to the voicemail server platform. However, IP Office Media Manager supports these values for VRLA recording only. IP Office Media Manager supports VRL recording at 25% capacity.
2. IP Office Media Manager is not qualified with ACCS or IPOCC deployments. Contact Recorder for IP Office must be used.

Note:

- The Avaya-supplied HP DL120, Dell R210 and Dell R220 can be considered equivalent.
- OVA will always advertise these figures; however performance/capacity is dependent on vCPU and vRAM assigned.
- Call recording uses a 3 party conference per recorded call. Note that without ACCS or IPOCC connected, the primary server does not have sufficient conference channels for the whole solution - other server's conference resources must be used.
- Conference recording adds a further conference channel to an existing conference.
- Each recording requires one licensed (and available) voicemail channel, a VCM (for the IP500 V2 Expansion) and IP Office Line (SCN trunk) channel as the recording destination is on the Primary or Secondary Server. See VCM Channel Capacity 25.
- IP Office Server Edition supports differing capacity and performance levels when IP Office Contact Centre (IPOCC) or Avaya Contact Center Select (ACCS) are attached. See Avaya Contact Center Applications 13.
- The increased capacities for ACCS and IPOCC are only supported for call recording, and are active when the application is connected to the host IP Office.
- The solution internal call recording capacity is fixed at 333 hours total (555 hours for IP Office Select). This is separate from the voice mailbox recording capacity and separate from any Contact Recorder/IP Office Media Manager storage. Please refer to the Voicemail Pro documentation for more information.
- Both Contact Recorder for IP Office (for VRL and VRLA) and IP Office Media Manager (for VRLA only) support recordings management at the maximum channel and call rate appropriate to the server platform.
- If the Dual Voicemail Pro feature is active (IP Office Select only) the maximum solution capacity is doubled to maximum of 500 channels, the per-server capacity remains unchanged.
- One active recording channel consumes one voicemail/AA channel. If the call is being recorded in two places – for example at the user and the incoming trunk – two licensed and available voicemail channels are required.
- Maximum recording call rate is 7,200/9,000/10,000 BHCC for a Linux Server, 3,600 BHCC for an Expansion. See Call Traffic Profile 45. Recording call rate is further reduced for ACCS and IPOCC. See Avaya Contact Center Applications 13.

The location of conference resource used is determined by point of recording:

- Incoming Call Route (ICR) recording is done at trunk's location
- User recording done at user's location
- System recording at system's location.
- Conference recording at conference location.

To ensure Voicemail Pro channel capacity is available for recordings, the IP Office Server Edition Manager settings Voicemail Channel Reservation on the Primary and Secondary Server's System | Voicemail tab can be configured to reserve channels exclusively for specific uses.

If recording channel resources run out:

- If the recording is mandatory, busy will be returned.
- If the recording is not mandatory, further attempts to record calls or conferences will not be successful, but there may still be visual recording indications.

If recording storage resources run out, further attempts to record calls or conferences will not be successful and receive announcements to that effect.

The following sections in this document should also be reviewed:

- Call Media Path (Linux) 20 and Call Media Path (IP500 V2) 27
- Conferencing Capacity 30
- Voicemail/Auto Attendant/IVR 31
- Multi-Site Network Link Capacities 42
- Call Destination Server 42
- Call Traffic Profile 45
- Resilience and Failover 46

3.5.6 WebRTC Gateway

The following WebRTC client capacity is supported with two main options aligned to the one-X Portal Server:

- WebRTC Gateway running on the Primary Server
- Standalone server with increased capacity (IP Office Application Server with just one-X Portal)

Platform		Maximum WebRTC Sessions		Maximum WebRTC Clients		Maximum Call Rate, BHCC
		Primary	Stand Alone	Primary	Stand Alone	
IP Office Server Edition	Dell R220	64	128	375	7200	7200
	HP DL360G7	128	256	750	9000	9000
	Dell R630	512	1024	1024	9000	9000
	OVA[1]	512	1024	1024	9000	9000
IP Office Select	Dell R630[2]	512	1024	1024	10000	10000
	OVA[1][2]	512	1024	1024	10000	10000

1. Assumes sufficient VM resources assigned.
2. Requires IP Office Select.

Note:

- The quoted Busy Hour Call Completion (BHCC) rates assumes a Normal call distribution.
- The WebRTC server application must run co-resident with the one-X Portal server.
- The maximum WebRTC sessions figures are the maximum number of WebRTC Gateway client sessions.
- If video used, capacity is reduced by 2 for each session.
- Each WebRTC session results in a SIP session with indirect media between the WebRTC Gateway and the user's IP Office.

The following sections in this document should also be reviewed:

- Server Concurrent Call Capacity 19
- one-X Portal Server Capacity 21
- IP Infrastructure, Bandwidth & VoIP QoS 43

3.5.7 Web Collaboration

The following Web Collaboration client capacity is supported with two main options aligned to the one-X Portal Server:

- Web Collaboration server running on the Primary
- Standalone server with increased capacity (IP Office Application Server running just one-X Portal)

Server Type	Maximum Web Collaboration Sessions – Primary	Maximum Web Collaboration Sessions – Stand Alone	Maximum Document Storage
Dell R220	16x3 -> 1x48	42x3 -> 2x64	10 documents per user
HP DL360G7	21x3 -> 1x64	85x3 -> 2x128	10 documents per user
Dell R630	42x3 -> 2x64	170x3 -> 2x256	10 documents per user
OVA[1]	42x3 -> 2x64	170x3 -> 2x256	10 documents per user

1. Assumes sufficient VM resources assigned.

Note:

- The Web Collaboration server application must run co-resident with the one-X Portal server.
- Maximum document storage assumes an average 6MB per document and 10% of users are Web Collaboration enabled.
- Any corresponding audio conference is entirely separate from the Web Collaboration session.
- For incremental capacity and performance support on smaller OVA profiles, see the technical manual *"Deploying Avaya IP Office Servers as Virtual Machines"*.

If document storage resources run out, further attempts to upload documents will be rejected. Previous uploaded documents need to be deleted to release space.

The following sections in this document should also be reviewed:

- one-X Portal Server capacity 21
- Conferencing Capacity 20
- IP Infrastructure, Bandwidth & VoIP QoS 43

3.5.8 SoftConsole

The SoftConsole receptionist application can be attached to any IP Office Server Edition node type that supports extensions and has both per-server and per-solution constraints:

Platform		Maximum Server SoftConsole Users	Maximum Solution SoftConsole Users	Monitor Maximum - Hunt Groups /Users
Standard/IP Office Server Edition	All Linux Servers/OVA[1]	10	32	20
	IP500 V2	4	32	10
IP Office Select	All Linux Servers/OVA[1][2]	10	75	40
	IP500 V2[2]	4	75	10

1. Assumes sufficient VM resources assigned.
2. Requires IP Office Select.

Note:

- Monitor Maximum - Hunt Groups /Users is the maximum active SoftConsole applications that can be used to monitor the same hunt group or user.

The following occurs if these figures are exceeded:

- IP Office Manager does not permit more than 32 SoftConsole users if the solution is not IP Office Select.

3.5.9 Button Modules

Button module capacity is defined in terms of the total number of additional buttons per system, whether used or not.

Platform		Total Buttons	Maximum BM32	Maximum DBM32	Maximum BM12	Maximum SBM24	Maximum Appearances[1]
IP Office Server Edition	Dell R220	4096	128	-	170	170	20
	HP DL360	4096	128	-	170	170	20
	Dell R630	4096	128	-	170	170	20
	OVA	4096	128	-	170	170	20
IP Office Select	Dell R630	8192	256	-	340	340	40
	OVA	8192	256	-	340	340	40
All	IP500 V2	1024	32	32	42	42	10

Note:

- Capacities are regardless of whether the buttons are configured for use or not, and whether physical or logical (as in the case of BM12).
  - BM32 (1616 IP telephones): 32 buttons each.
  - DBM32 (1416 digital telephones): 32 buttons each.
  - BM12 (9608, 9611 and 9641 IP telephones): 24 buttons each; 2 pages of 12.
  - SBM24: (9630G, 9640, 9640G, 9650, 9650C, 9608, 9611, 9641 IP telephones): 24 buttons each.

1. Maximum Appearances is the supported limit for the total solution-wide buttons that can be programmed to the same call appearance, line appearance or covered user.

3.5.10 Paging

The paging function is limited by the number of extensions present in the paging group, and the platform type.

Platform		Maximum Paging Group Size
IP Office Server Edition	Dell R220	128
	HP DL360	128
	Dell R630	256
	OVA[1]	256
IP Office Select	Dell R630[2]	256
	OVA[1][2]	256
All	IP500 V2	64

1. Assumes sufficient VM resources assigned.
2. Requires IP Office Select.

Note:

- Paging groups that include any user on a IP500 V2 Expansion are limited to 64
- Paging groups with SRTP endpoints will reduce the maximum size pro-rata up to 50%

3.5.11 CTI & TAPI

Each CTI or TAPI connection contributes to the overall loading of a system, whether directly or indirectly connected. Capacity is specified in three ways per system:

- Total number of CTI links (sessions)
- Number of CTI controlled users per session
- Total number of CTI controlled users

Platform		Maximum CTI sessions	Maximum CTI users per session	Total CTI controlled users	Maximum BHCC
IP Office Server Edition	Dell R220	5	750	3750	9,000
	HP DL360	5	1500	7500	9,000
	Dell R630	5	2000	10000	9,000
	OVA[1]	5	2000	10000	9,000
IP Office Select	Dell R630[2]	5	3000	15000	10,000
	OVA[1][2]	5	3000	15000	10,000
All	IP500 V2	3	384	1152	7,200

1. Assumes sufficient VM resources assigned.
2. Requires IP Office Select.

Note:

- The quoted Busy Hour Call Completion (BHCC) rates assumes a Normal call distribution.
- An active one-X Portal, ACCS or IPOCC server counts as one CTI session for each and every IP Office in the IP Office Server Edition solution.
- An active one-X Portal is one that has at least one portal client of any type or an openAPI session
- An active 3rd Party TAPI session counts as one CTI session for that IP Office.
- All 1st party TAPI sessions together count as one CTI session for that IP Office.
- An active one-X Portal makes every user a CTI controlled user for each and every IP Office.
- An active ACCS or IPOCC makes every Agent a CTI controlled user for that IP Office.
- An active portal openAPI session counts as one CTI session for each and every IP Office.
- A single portal openAPI session supports the BHCC and CTI users per session quoted above.

3.5.12 Directory & Call Log

The following directory capacities are supported:

Platform	External Directory Entries, LDAP	External Directory Entries, HTTP	External Directory Entries, Config	Personal Directory per user	Personal Directory per system
Dell R220	10000	10000	10000	250	100,000
HP DL360	10000	10000	10000	250	100,000
Dell R630	10000	10000	10000	250	100,000
OVA[1]	10000	10000	10000	250	100,000
IP500 V2	10000	10000	2500	250	10,800

1. Assumes sufficient VM resources assigned.

Note:

- The external (central) directory feature capacity is solution-wide and cannot exceed 10,000 entries total
- Any duplicate entries are discarded on import.
- Only the Primary can be administered with external directory entries as part of the configuration
- 1100/1200 Series phones cannot support above 1000 directory entries
- DECT R4 cannot support above 2000 directory entries
- D100/D160 DECT cannot support above 100 directory entries

If the number of supported entries is exceeded, the directory is truncated to the first N.

The following call log capacities are supported:

Platform	Personal Call Log per user	Notes
Dell R220	60	Last N retained
HP DL360	60	Last N retained
Dell R630	60	Last N retained
OVA[1]	60	Last N retained
IP500 V2	30	Last N retained

1. Assumes sufficient VM resources assigned.

Note:

- One call log entry is one calling party with last call status and total number of calls, not just a single log per call per caller.
- If a user hot desks to/from a IP500 V2 Expansion, only the last 30 retained.

3.5.13 WebLM Server

The WebLM server application that is co-resident on the Primary and Application Server is primarily intended for use by IP Office components, but can be used for other Avaya license clients such as IPOCC and ACCS providing the following capacities are not exceeded:

Platform	Maximum License files	Maximum WebLM clients	Maximum client requests
Dell R220	150	300	6000
HP DL360	300	600	12500
Dell R630	300	600	12500
OVA[1]	300	600	12500

1. Assumes sufficient VM resources assigned.

Note:

- One license type from one client constitutes one client request; for example one Expansion System requesting 6 different license types (say Edition, SIP trunk channels, IP Endpoint, SoftConsole, Power User, Basic User), will result in 6 client requests.

3.5.14 IP Office Integrated Contact Reporter

The IP Office Integrated Contact Reporter (ICR) application is supported from R10.1 on the Primary and Linux Application Server:

Platform	Maximum Agents	Maximum Supervisors	Monitored Hunt Groups	Maximum Monitored Users	Maximum BHCC
Dell R220	25	5	60	300	1200
HP DL360	25	5	60	300	1200
Dell R630	25	5	60	300	1200
OVA[1]	25	5	60	300	1200

1. Assumes sufficient VM resources assigned.

Notes:

- Supervisors can also be Agents, giving an effective total of 30 agents
- The quoted Busy Hour Call Completion (BHCC) rates assumes a Normal call distribution.
- Monitored hunt groups are the total number of groups that can be monitored by ICR.
- Monitored users are the total number of users (agent and non-agent) in all monitored groups.
- One ICR agent can support a maximum of 40 BHCC and can be a member of up to 10 monitored hunt groups
- For incremental capacity and performance support on smaller OVA profiles, see *"Deploying Avaya IP Office Platform Server Edition Servers as Virtual Machines"*.

3.5.15 Multi-Site Network Link Capacities

A multi-site network link is the IP Office Line (SCN trunk) connection between each IP Office Server Edition node. The links are arranged in a star topology with the Primary Server at the centre, or double star when a Secondary is present.

Regardless of direct/indirect media, VCM or codec used, a further capacity consideration is the Multi-site network links between all IP Office Server Edition nodes. Each IP500 V2 or Linux link has a maximum capacity of 250 channels/calls (500 for IP Office Select Linux servers). The maximum total and outgoing channels are independently configurable in IP Office Server Edition Manager via the IP Office Line | VoIP Line tab, and have a default of 128 for both.

This is per link, not a per system limit; for example a Primary or Secondary may have up to 250/500 concurrent calls to each Expansion system. Due to the star topology of IP Office Server Edition, calls between Expansion systems typically go via the Primary or Secondary and therefore these calls must also be taken into account when considering Multi-site network link capacity.

From Release 9.1, it is possible to add IP Office Lines between IP Office Select Expansion Systems. There is a limit of one between each pair of Expansions. This link can be used to increase capacity or resilience. Calls between Expansions will go direct rather than via the Primary/Secondary.

It is not possible to add additional multi-site network links between the Primary/Secondary and Expansions – if the capacity is exhausted an additional Secondary or Expansion system should be considered.

The following occurs if the maximum numbers are exceeded:

- If the configured values are exceeded, additional outgoing calls can be routed via ARS configuration providing an alternative route exists; additional incoming calls are automatically routed, again providing an alternative route exists.
- Alternative routes only exist when a Secondary Server is present.
- If no alternative route, incoming calls remain ringing until a channel is free, outgoing calls indicate busy.

3.5.16 Call Destination Server

When considering Expansion or Server planning from a media perspective it is important to note that communication with any other IP Office Server Edition component will use VoIP and hence is limited by the media, IP Office Line (SCN trunk) and VCM capacities. This includes:

- Calls to/from Primary/Secondary and other Expansions
- Call recording - one VoIP channel per recorded call. Destination will be the location of the active Voicemail Pro.
- Auto Attendants/IVR - one VoIP channel per call when connected to the Auto Attendant/IVR. Destination will be the location of the active Voicemail Pro.
- Conferencing when the conference focus is not the local system - one VoIP channel per local member
- Local conferences involving remote users - one VoIP channel per remote member when connected to the conference
- Voicemail leave and collect - one VoIP channel per VM caller when. Destination will be the location of the active Voicemail Pro.
- Announcements - one VoIP channel per call when generating announcements. Destination will be the location of the active Voicemail Pro.
- Centralised Music on Hold – one VoIP channel per central MOH source when playing to held calls. Destination will be the location of the Music on Hold source.

For all VoIP connections between systems, the codec used will be according to the IP Office Line settings of those two nodes.

Consideration should also be given to intermediate destinations to ensure adequate capacity is present. For example a consultation call will open a secondary channel for the consultation whilst keeping the initial call connected.

Lastly, any call on the IP Office Line will take into consideration administered channel limits and Call Admission Control (CAC) if active. Please refer to the CAC documentation for behaviours when CAC limits are exceeded.

3.5.17 IP Infrastructure, Bandwidth & VoIP QoS

It is not within the scope of this document to cover detailed aspects of Ethernet and IP infrastructure.

- IP500 V2 supports two 10/100 Mbit/s, Full/Half duplex 802.3 Ethernet interfaces with DSCP/ToS support.
- Avaya IP Office Linux servers support two 10/100/1000 Mbit/s, Full/Half duplex 802.3 Ethernet interfaces with DSCP/ToS and static 802.1Q VLAN support.
- Subject to IP infrastructure: All supported IP Office traffic can be routed via a single LAN interface: All supported IP Office traffic can be routed between the LAN interfaces, however this may lead to inefficiencies and limit performance for the IP500 V2 platform.

For more information on LAN interface support, see the IP Office Server Edition LAN Support chapter of *"Deploying IP Office™ Platform Server Edition Solution"*: http://marketingtools.avaya.com/knowledgebase/businesspartner/ipoffice/mergedProjects/manuals/manuals/servereditio n/Deploying%20IP%20Office%20Server%20Edition%20Solution_en.pdf.

Avaya VoIP Quality of Service requirements are contained in the document AVAYA IP VOICE QUALITY NETWORK REQUIREMENTS available at: https://downloads.avaya.com/css/P8/documents/100018203.

Note that secure VoIP (SRTP) can increase the required bandwidth by up to 8%, see the 'VoIP Security' chapter of *"Avaya IP Office Platform Security Guidelines"*.

In addition to the network requirements for VoIP calls, additional bandwidth should be reserved for the corresponding inter-node signalling and management paths. This should include any access via SSLVPN (IPOSS). The following suggested minimum bandwidths should be made available for these additional paths:

Traffic	Suggested Minimum Bandwidth	Comments
Inter-node Signalling/Status	256 kbit/s	Between Primary and each Expansion Between Primary and Secondary Between Secondary and each Expansion. Limited signalling/status directly between Expansions Bursty traffic, peaking after start-up or restoration of node to node connectivity.
one-X Portal CTI	96 kbit per call (or 192 kbit/s @ 7,200 BHCC)	Between one-X Portal server location and Expansion when one-X Portal server active.
Web Management	512 kbit/s	Between Web Manager PC and Primary (or Secondary under failover conditions) when a Web Management session is active
IP Office Server Edition Manager	512 kbit/s	Between SE Manager PC and each node when a IP Office Server Edition Manager session is active
Upgrade	512 kbit/s	Between Primary and each node when upgrade is being performed
Backup/Restore	256 – 2048 kbit/s	Between Backup Server and each Expansion Between Backup Server and Primary Between Backup Server and Secondary An IP Office Linux platform may be designated as the backup server. Bandwidth will only be required when a backup or restore operation is active, and only between participating nodes. The bandwidth required will be dependent upon backup/restore content.
Voicemail Pro Client	512 kbit/s	Between Voicemail Pro Client PC and Primary (or Secondary under failover conditions) when a Voicemail Pro server management session is active
Voicemail Pro Server <> Voicemail Pro Server	1024 kbit/s	Bursty traffic, peaking after start-up or restoration of Server to Server connectivity
	32 kbit/s per active channel	Extra traffic between Secondary and Primary when Dual Voicemail Pro active
Voicemail Pro Server <> Contact Recorded Server	32 kbit/s per active channel	Bursty SFTP traffic, between Primary and external server running Contact Recorder Typically Contact Recorder runs co-resident with Voicemail Pro. For dual active Voicemail Pro, the Secondary Voicemail Pro will send all recordings to the server running Contact Recorder
Web Collaboration Client	128 – 256 kbit/s	Between each active Web Collaboration client and the Web Collaboration server
WebRTC Client	6 – 256 kbit/s	Between each active Avaya Communicator for Web client and the WebRTC Gateway

Traffic	Suggested Minimum Bandwidth	Comments
one-X Server < > one-X Server	1–500 users: 512 kbit/s 500–1500 users: 1024 kbit/s 1500–3000 users: 2048 kbit/s	Bursty traffic, peaking after start-up or restoration of Server to Server connectivity
SoftConsole	64 –1024 kbit/s	Bursty traffic, peaking after start-up. Higher figure for maximum 3000 user deployment. Between each SoftConsole application and the IP Office server.

Note:

- These figures are for general guidance only as they do not reflect the specific requirements for a given installation. For example management operations are typically session based; backup/restore content and frequency are administrable; many are bursty in nature and may or may not coincide with others.
- Only the major signalling and management paths are included here, further network bandwidth may be required for SSA, SysMonitor, syslog, SNMP etc.
- An IP Office port matrix document that covers all possible IP communications should also be consulted. It is available via the Avaya Support site (https://support.avaya.com), under Avaya Product Port Matrix Documents (https://support.avaya.com/helpcenter/getGenericDetails?detailId=C201082074362003)
- Server internal communications do not require bandwidth assessment

3.5.18 Call Traffic Profile

General Traffic Engineering is outside the scope of this document, however the following IP Office Server Edition factors should be considered:

Platform		Maximum Server Call Rate, BHCC	Maximum Solution Call Rate, BHCC
IP Office Server Edition	Primary/Secondary: Dell R220	7,200	7,200
	Primary/Secondary: HP DL360G7	18,000/9,000[3]	18,000/9,000[3]
	Primary/Secondary: Dell R630	18,000/9,000[3]	18,000/9,000[3]
	Primary/Secondary: OVA[1]	18,000/9,000[3]	18,000/9,000[3]
IP Office Select	Primary/Secondary: Dell R630[2]	20,000/10,000[3]	20,000/10,000[3]
	Primary/Secondary: OVA[1][2]	20,000/10,000[3]	20,000/10,000[3]
All	Linux Expansion	7,200	-
	V2 Expansion	3,600	-

1. Assumes sufficient VM resources assigned.
2. Requires IP Office Select.
3. Lower call rate when any one-X Portal user active.

Note:

- The quoted Busy Hour Call Completion (BHCC) rates assumes a Normal call distribution.
- The Avaya-supplied HP DL120, Dell R210 and Dell R220 can be considered equivalent.
- Total solution BHCC must not exceed 9,000/10,000 BHCC when one-X Portal users are active
- Continuously running at the maximum supported solution call rate when one-X Portal users are active should not exceed 24 hours.
- one-X Portal users include: Web Client, Call Assistant, Outlook Integration, Lync Integration, one-X preferred Mobile Clients
- Maximum rate for call recording and Voicemail leave combined is 7,200/9,000/10,000 BHCC.
- Maximum Solution Call Rate can be further reduced by the presence of Call recording, CTI or Contact Center application such as IPOCC or ACCS. See Avaya Contact Center Applications 13.

The following occurs if these figures are exceeded:

- If the call rate is exceeded, the may be disruption to call voice quality, recordings, or a general slowdown in other operation such as UC or management clients.

3.5.19 Resilience and Failover

If IP Office Server Edition resilience is supported and failover is active, various traffic and other loadings can change and must be considered in the capacity planning phase:

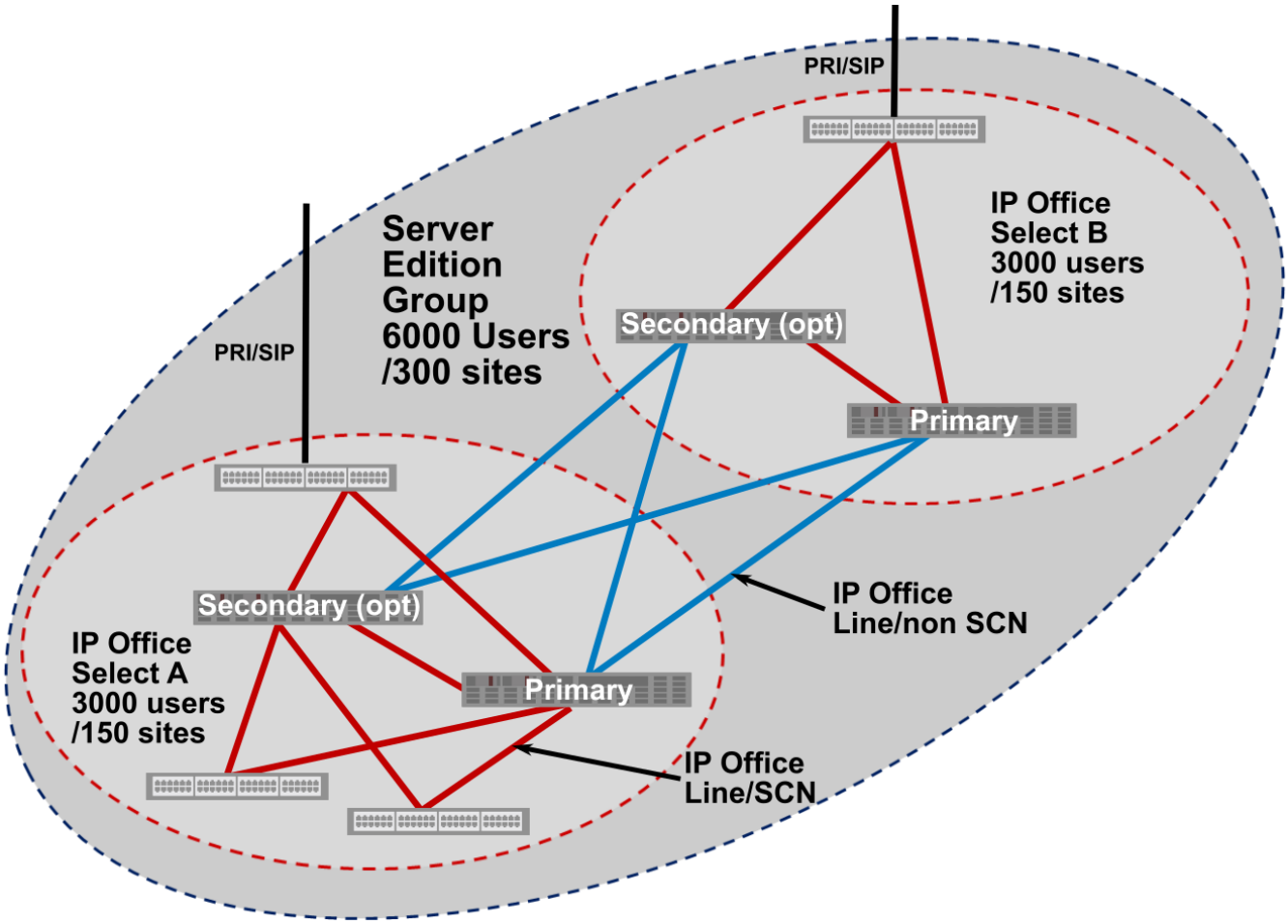
- The total extensions/users on any single Primary, Secondary or Expansion must not be configured to exceed their supported limits under any circumstances.
- Primary failure when Secondary present will route all non-local Expansion calls, Voicemail leave + collect, IVR and Auto Attendants to the Secondary
- Primary failure when Secondary present will move Hunt group processing and management access to the Secondary. This will increase the management bandwidth from the Secondary to the Expansion systems.
- Any Basic, Power User, Office Worker or Receptionist licenses associated with fail-over users will move with that user; no separate license provision on the fall back server is required.
- Any Voicemail channel licenses (real or virtual) associated with the Primary will move to the Secondary on fail-over; no separate license provision on the fall back server is required – unless the dual active Voicemail Pro feature is enabled.

Chapter 4.

Capacity Planning Beyond 3000 Users

4. Capacity Planning Beyond 3000 Users

To provide a cost effective solution of more than 3000 users or 150 sites to larger customers, two IP Office Select systems may be linked together to support a total of 6000 users/extensions:



This construct may also be used when other per-solution capacities are exceeded, for example one-X Portal users, hunt groups or Voicemail/recording channels.

You can create a group by linking two separate IP Office Select systems via IP Office lines to provide a single system view to users.

Each IP Office Server Edition system has its own Primary and Applications, and optional Secondary Server and Expansion Systems; each IP Office Server Edition system needs to be managed separately. The systems are set up through configuration to share a common dial plan and directory.

Feature	IP Office Select	Grouped SE	Comment
Maximum Users/Extensions	3000	6000	3000 per system
Directory	Single Directory	Common directory with manual synchronisation between the two systems	Can use auto synchronisation for system directory
Directory Size	10000	10000	
Dial Plan	Single dial plan	Single dial plan	e.g. 21xxxx is on A and 22xxxx is on B
Trunk Sharing across nodes	Yes	Yes	Requires additional ARS and ICR setup
Dial by name	Yes	Yes	Requires common directory
Hold/Transfer	Yes	Yes	
Internal dialling and calling user name	Yes	Yes	
Direct Media	Yes	Yes	
Busy and Presence Indicators	System Wide	Limited to local SE	
Hot Desking	System Wide	Limited to local SE	Partial resolution with multiple accounts
Hunt Groups	Fully Networked	Partially Networked	Hunt groups are limited to one SE system but can be linked between systems
Music On Hold	4 per node, either local or from Primary	4 per node, either local or from local Primary	Cannot stream MOH from other Primary
SMDR	Single stream per node	Single stream per node	
Voicemail	Single/Dual	Single/Dual VM per SE	
one-X Portal	Single	Single one-X server per SE	
SCN telephony features	System Wide	Limited to local SE	

4.1 Inter Server Edition Link

The links between the two IP Office Server Edition systems are achieved using IP Office Lines with the following settings:

- Transport Type: WebSocket Client/Server
- Security: Medium or High
- Networking Level: None
- Allow Direct Media Path: Active
- Out Of Band DTMF: Active

One trunk should be added between each Primary and each Secondary. This allows calls from one system to appear as though internally dialled on the other. The WebSocket Server end for all lines should be the same IP Office Selectsystem.

4.2 Directory

To enable users of one system to be visible in the directory of the other, each Primary's directory configuration requires a copy of the other's:

- Export each node's users as CSV using IP Office Server Edition Manager.
- Extract Full Name and Extension fields from each file into a single CSV directory file. See 'Importing and Exporting Settings' in the *"Deploying Avaya IP Office Platform IP500 V2"* manual for more information on the file formats.
- Hunt groups or common system directory entries can also be added to the directory file at this time if required.
- Import the resultant CSV directory file into the other Primary (only) using IP Office Server Edition Manager.

- Ensure the total central directory on each SE does not exceed 10,000 entries. See Directory & Call Log.

The centralised system directory mechanism will distribute to all other nodes

If an external LDAP directory is also used, one Primary can be configured with the LDAP source, and the other using the first as the HTTP source.

For more information on directory options and capacities see Directory & Call Log and ‘Centralized System Directory’ in *"Administering Avaya IP Office Platform with Manager"*.

4.3 Dial plan

Each user and hunt group of the cluster must have a unique name and number.

Branch prefix should not be used as this will conflict with the internal routing.

4.4 Outgoing Call routing

The default outgoing call routing provides a fall-back ARS on every Expansion to Primary then Secondary. When creating a cluster it is recommended that a further fall-back ARS is added between each Primary and each Secondary.

PSTN/SIP trunks on one system can be accessed from the other using ARS and/or dial short codes, along with additional Incoming Call Routes.

4.5 Hunt Groups

Each IP Office Server Edition System has separate hunt groups. It is not possible to configure hunt groups with members of both systems. It is possible to support limited overflow between systems by the use of an overflow group with local users that have hunt group call forwarding enabled to a remote user. This is only supported on rotary and sequential ring types and must not be used to link hunt groups.

4.6 Administration

Each IP Office Server Edition System is managed as a separate entity although both solutions can be managed from the same workstation if required.

4.7 Versions\Upgrades

Both IP Office Select Systems should be the same software version. Each should be upgraded separately from their respective Primary Server.

Chapter 5.
Document History

5. Document History

Date	Issue	Change Summary
16th May 2017	02a	• First release for IP Office R10.1. Based on CID172294 Issue 0.6.
17th May 2017	02b	• Update for IP Office R10.1 General Availability. Based on CID172294 Issue 0.7.
5th July 2017	02c	• Clarification to maximum appearances[38] text.
4th September 2017	02d	• Clarification on Media Manager call recording[34] rates.
6th September 2017	02e	• General updates based on CID172294 Issue 0.8. • Further clarification on call recording capacities[34]. • Clarification on WebRTC clients capacity[36].
6th November 2017	02f	• Update of publishing output template.
27th February 2018	02g	• Minor spelling corrections. • Addition of new links. • HMv7 Authoring tool conversion.
8th March 2018	02h	• Correct missing image files. • Correct wrong table of contents being used in HTML output.