



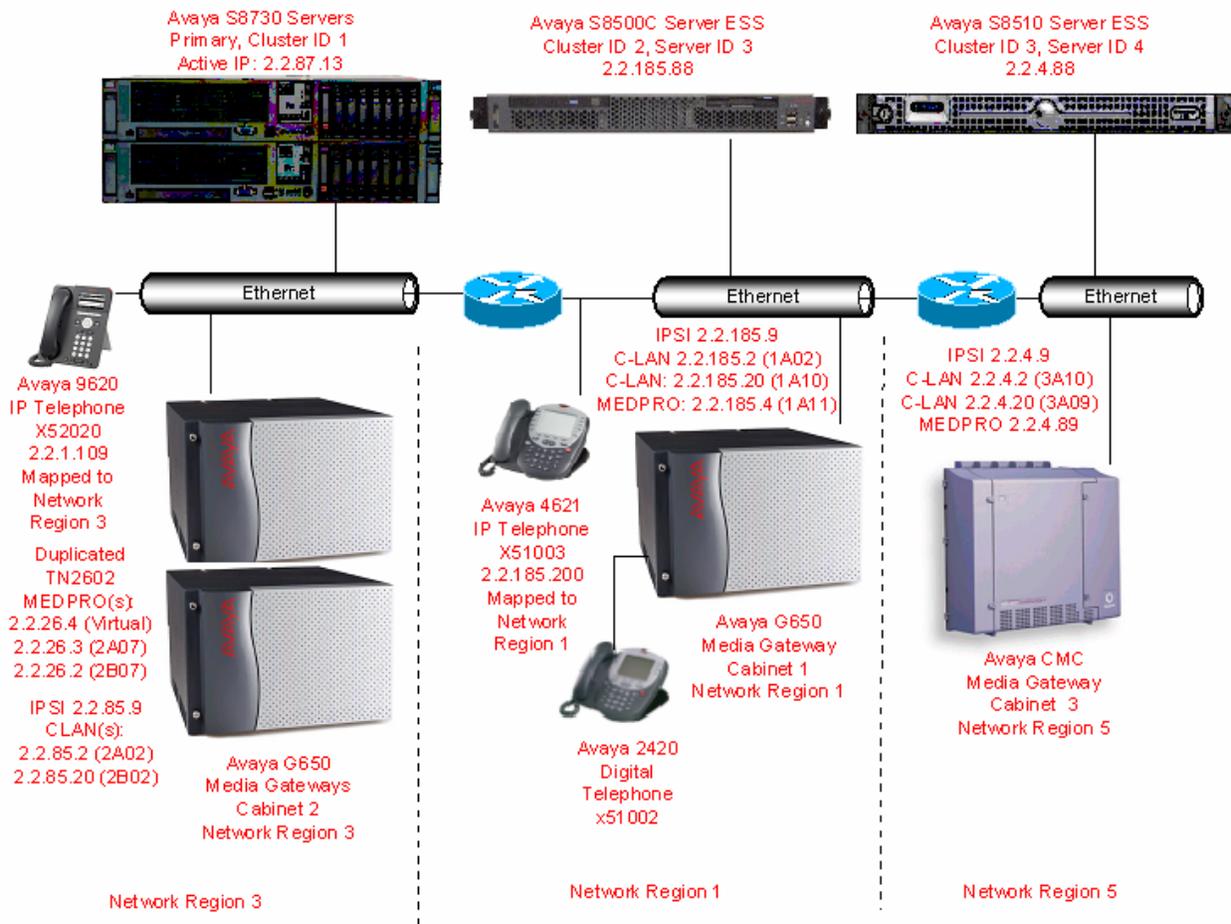
## Administrable Alternate Gatekeeper List for IP Endpoints using Avaya Communication Manager – Issue 1.0

### Abstract

These Application Notes illustrate a sample configuration using Avaya 9600-Series and Avaya 4600-Series IP Telephones and Avaya Communication Manager. As part of the registration process for H.323 IP Telephones, Avaya Communication Manager can provide a list of alternate points of registration, known as “alternate gatekeepers”. If the IP Telephone loses connectivity to its current point of registration, or gatekeeper, the telephone can use the alternate gatekeeper list for automatic recovery of service. In Avaya Communication Manager Release 5.1, greater administrative control over the contents of the alternate gatekeeper list is possible, compared to prior releases. In a sample configuration that includes C-LAN interfaces in multiple network regions and Avaya S8300C Local Survivable Processors, these Application Notes first illustrate the alternate gatekeeper list served to IP Telephones using Avaya Communication Manager Release 5.0. Control of the configuration is then turned over to an S8510 Server configured as an Enterprise Survivable Server running Avaya Communication Manager Release 5.1. After confirming the default alternate gatekeeper behavior remains the same, the new administrative controls available in Avaya Communication Manager Release 5.1 are exercised to refine the alternate gatekeeper list. The greater administrative control of the alternate gatekeeper list can benefit customers with large numbers of C-LAN interfaces, where it may be desirable to limit the size of the alternate gatekeeper list, or any customer desiring more explicit control over the alternate gatekeeper list and IP Telephone recovery.

# 1. Introduction and Scope

**Figure 1** illustrates a portion of the network used to verify these Application Notes. In addition to the three IPSI-connected port networks shown in **Figure 1**, the configuration also includes several Avaya H.248 Gateways with Avaya S8300C Server Local Survivable Processors (LSP). Although not shown in **Figure 1**, the IP addresses of the LSPs are shown in the configuration in Section 3, and are part of the verifications. The intent of these Application Notes is to illustrate the alternate gatekeeper list provided by Avaya Communication Manager to the H.323 IP Telephones under a variety of conditions. The recovery behavior of the IP Telephones using the alternate gatekeeper list is outside the intended scope of these Application Notes.



**Figure 1: Network Overview**

## 1.1. Summary of Base Configuration, Variations, and Approach

To simplify the presentation, the contents of the alternate gatekeeper list using a “base configuration” is illustrated first. The bullet list below summarizes aspects of the base configuration:

- Each IPSI-connected port-network or “cabinet” is assigned a unique network region.
- Each IPSI-connected port-network has two TN799DP C-LAN cards assigned to the same region as the cabinet housing the C-LAN.
- Each C-LAN has the same gatekeeper priority and ability to accept IP Telephone registrations (i.e., default values as defined by the ip-interface screen)
- The network regions used by the C-LAN interfaces are “directly connected” (i.e., as defined by the inter-region connectivity configuration of the ip-network-region screen)
- The IP Addresses of all H.323 IP Telephones are explicitly mapped to a network region (as configured in the ip-network-map)
- All network regions are enabled for the “Time to Service” (TTS) behaviors first introduced with Avaya Communication Manager 4.0 (i.e., the default value of “y” is retained for the “Near End Establishes TCP Connection field” on the ip-network-region form). These Application Notes do not provide details on the TTS algorithm (e.g., do not focus on C-LAN socket usage or change default target C-LAN socket load or warning levels). However, aspects of the TTS behaviors, where Avaya Communication Manager can initiate the TCP signaling to an IP endpoint separate from the RAS registration, can be observed in the examples provided in these Application Notes. One noteworthy interaction is that the TCP signaling to the IP endpoint must use one of the gatekeepers in the alternate-gatekeeper list.

In Section 3, details of the base configuration are illustrated. In Section 4, the alternate gatekeeper list served to the IP Telephones during registration is illustrated using the base configuration and Avaya Communication Manager Release 5.0 running on the main S8730 Server cluster. Next, control of the system is transitioned to the S8510 Server running Avaya Communication Manager Release 5.1, licensed as an Enterprise Survivable Server (ESS). Initially, the ESS has the same Avaya Communication Manager configuration (synchronized from the main cluster). Assuming the same configuration, an ESS generates the alternate gatekeeper list in the same way (i.e., using the same algorithm) as the main cluster. In Section 5, the appearance of changed screens, such as the ip-network-region form, are illustrated in Avaya Communication Manager Release 5.1, before any changes are made to the configuration. The alternate gatekeeper list served to the IP Telephones upon registration with the ESS running Avaya Communication Manager 5.1 is verified to be consistent with the algorithm used in Avaya Communication Manager Release 5.0. Next, in Section 6, while the system is under the control of the ESS running Avaya Communication Manager 5.1, local changes are made to the ESS to illustrate the new controls. Note that the use of an ESS running a newer release in this fashion is atypical, and was done simply for expedience in comparing and contrasting Avaya Communication Manager Release 5.0 and 5.1 behaviors.

Select variations to the base configuration are then introduced in Section 7. Additional examples showing the alternate gatekeeper list are provided for cases where:

- the C-LANs do not have the same gatekeeper priority (i.e., within a region, some C-LANs have higher priority than others as defined on the C-LAN ip-interface screen).
- the IP address of the registering telephone does not appear in the ip-network-map.
- changes to the Avaya Communication Manager configuration update the alternate gatekeeper list during an active registration, without requiring the phone to re-register.
- IP network regions are not directly connected, and use “intervening regions” to connect.
- A survivable gatekeeper is defined for the extension of the registering station.
- the TTS behaviors are disabled for a network region, so that the IP Telephone initiates the TCP signaling connection towards Avaya Communication Manager (i.e., “Near-end establishes TCP connection” field on p.2 of ip-network-region form is changed to “n”). Although all IP Telephones used in the verification of these Application Notes run generally-available IP Telephone firmware capable of the “Time to Service” (TTS) behaviors, the examples in Section 7.6 illustrate the behavior when TTS behaviors do not apply due to the network region configuration.

These Application Notes illustrate three approaches to examining the alternate gatekeeper list:

- Network traces using ethereal to examine the contents of the alternate gatekeeper list in:
  - the Registration Confirm (RCF) message during the registration process
  - the LoginInfoUpdate message that can update the alternate gatekeeper list for an already registered telephone, without requiring the phone to re-register.
- MIB Walks, using SNMP, of the two IP Telephones shown in **Figure 1**. Example screen captures of the relevant portions of MIB Walks for the Avaya 4600-Series and 9600-Series IP Telephones are included, since the area of the MIB where the alternate gatekeeper list can be observed is different for Avaya 4600-Series and 9600-Series IP Telephones. Configuration steps to securely enable the MIB Walks are not covered in these Application Notes. Reference [3] is a guide to such configuration. Reference [4] is a link to the MIB description for Avaya 4600-Series IP Telephones. Reference [5] is a link to the MIB description for Avaya 9600-Series IP Telephones.
- Use of the enhanced “status station” output in Avaya Communication Manager Release 5.1, which includes an additional page of alternate gatekeeper information, when the new administrative controls available in 5.1 are utilized for the network region of the registered station.

In most cases, these methods of examining the alternate gatekeeper list yield the same result with respect to the C-LANs in the list. However, there are cases where this will not be true. An example of a case where the MIB Walk of an IP Telephone shows an alternate gatekeeper list that does not match the ethereal trace and “status station” output is provided in Section 7.4.

## 1.2. Simplified Summary of Legacy Algorithm and Rationale for New Administrable Control of Alternate Gatekeeper List

Avaya Communication Manager has long had the capability to provide an ordered list of alternate gatekeepers to IP Telephones upon registration. The IP Telephones can autonomously follow the list to restore service, should there be a failure of the signaling connection associated with the present registration. In a network such as the one shown in **Figure 1**, prior to the new controls in Avaya Communication Manager Release 5.1, the alternate gatekeeper list would typically include **all** C-LANs in the native region of the phone, as well as **all** C-LANs in directly connected regions. In general, the order of this roster of alternate C-LANs can vary, based on interface priority and load balancing considerations. Following the roster of C-LANs, the list would continue with up to six survivable servers configured for the network region (e.g., LSPs), followed by zero or one survivable gatekeeper configured specifically for the extension of the registering station. Depending on the capabilities of the registering device, and the capabilities of the C-LAN used to source the registration confirm (RCF) message containing the alternate gatekeeper list, the portion of the list containing the roster of C-LANs can be truncated. See Notes 2 and 3 in Section 2 for more information related to list truncation.

For many customers implementing Avaya Communication Manager Release 5.1 and beyond, this default legacy algorithm will remain sufficient. As such, unless changes are made to the new administrative fields on the ip-network-region form, Avaya Communication Manager Release 5.1 will produce the same type of alternate gatekeeper list as the legacy algorithm summarized above.

Other customers may prefer to exercise greater control over the alternate gatekeeper list. For example, customer environments with large numbers of C-LANs, or large network regions, may prefer to limit the number of C-LANs in the alternate gatekeeper list. A smaller alternate gatekeeper list may be desirable to limit the number of primary gatekeepers (e.g., C-LANs, processor Ethernet interfaces) to be tried by an IP Telephone before the IP Telephone registers with one of the survivable servers in the alternate gatekeeper list. Reducing the number of C-LANs in the alternate gatekeeper list may speed recovery of the IP Telephones at a branch site to the branch LSP, in the event of a WAN failure that isolates the branch from other sites. Avaya Communication Manager Release 5.1 allows control over how many C-LANs from the native region of the phone are included in the alternate gatekeeper list, as well as separate control over how many C-LANs are included from each connected region. Limiting the number of C-LANs in the list may also be desirable due to the use of older telephone firmware, or older C-LAN firmware. To achieve similar measures of control over the alternate gatekeeper list in prior releases, some customers had created complex inter-region connectivity models, introducing indirectly connected regions that would not otherwise have been required by the network topology. The new administrative controls provide a more straightforward way to manage the alternate gatekeeper lists, which ultimately influence failover behavior for IP Telephony.

## 2. Equipment and Software Validated

Table 1 shows the equipment and version information used in the sample configuration.

Network Component	Version Information
Avaya S8730 Server Pair	Avaya Communication Manager Release 5.0 load 825.4
Avaya S8510 Server	Avaya Communication Manager Release 5.1 load 410.0 (Note 1)
Avaya TN799DP C-LAN	Various (Note 2)
Avaya 9600-Series IP Telephones (H.323)	1.5 (Note 3)
Avaya 4600-Series IP Telephones (H.323)	2.8 (Note 3)
Ethereal Network Protocol Analyzer	Avaya Edition 2.3.5b

**Table 1 – Equipment and Version Information**

Note 1: The Avaya Communication Manager Release 5.1 load used for testing and screen captures was beta load 410.0. Minor differences in configuration screens may be observed in the final Release 5.1 load.

Note 2: The C-LAN need not be the latest revision to exercise the additional controls over the alternate gatekeeper list using Avaya Communication Manager Release 5.1. However, in general, the type of C-LAN board can impact the total number of entries in the alternate gatekeeper list. The TN799DP used in these Application Notes can include up to 72 gatekeepers. With the legacy algorithm, the number of C-LANs in the list would be truncated at 72 minus any configured survivable servers (i.e., up to six Local Survivable Processors configured via the ip-network-region form, and one survivable gatekeeper from the station form). Only the C-LAN (or primary server) portion of the list is subject to truncation; the survivable servers will always be included. Older C-LANs such as the TN799A, TN799B, and TN799C Version 3 or lower can include up to 15 total gatekeepers, with the number of C-LANs truncated at 15 minus any configured survivable servers as described above. When the new controls are exercised in Avaya Communication Manager Release 5.1, the maximum number of C-LANs in the alternate gatekeeper list is 16 (see Section 6.3), and the maximum length of the list is 23 (up to 16 C-LANs plus the seven possible survivable servers).

Note 3: IP Telephones need not be the latest revision to make use of the new administrative controls available in Avaya Communication Manager Release 5.1. Avaya Communication Manager Release 5.1 can provide finer control over the contents of the alternate gatekeeper list, but the list is provided in the same manner. The new feature may help limit the list sent to older phones that can not properly consume a long list. If a network region is using the legacy algorithm rather than the new algorithm, Avaya Communication Manager uses fixed total length maximums to limit the list sent to older phones. For phones that are incapable of TTS, Avaya

Communication Manager will include a list of maximum length 30, with up to seven survivable servers, and the rest C-LANs.

### 3. Avaya Communication Manager Base Configuration

This section illustrates the relevant configuration screens describing the base configuration summarized in Section 1.1. These configuration screens are captured from the Avaya S8730 Servers running Avaya Communication Manager Release 5.0. Reference [1] and [2] provide detailed information on configuring IP Telephony using Avaya Communication Manager.

#### 3.1. Summary of Physical Configuration

##### 3.1.1. Cabinets

The following list command output shows the three physical cabinets.

```
list cabinet
```

CABINET REPORT									
No	Layout/ Room	Rack/ Floor	Building	Loc	A	B	C	D	E
1	G650 demo	right	Demo-Room	1	PN 01				
2	G650 demo	center	Demo-Room	3	PN 02	PN 02			
3	5-cmc 3C-208		Main-Lab	5	PN 03				

##### 3.1.2. IPSI Interfaces

The following list command output shows the IPSI configuration and health.

```
list ipserver-interface
```

IP SERVER INTERFACE INFORMATION									
Port Ntwk Num	Pri/ Sec Bd	Primary/ Secondary Loc	Primary/ Secondary IP Address	Primary/ Secondary Host Name	Primary/ Secondary DHCP ID	Serv State	Control State	State Of Health C P E G	
1	1A01		2.2.185.9	2.2.185.9	ipsi-A01a	IN	actv-aa	0.0.0.0	
2	2A01		2.2.85.9	2.2.85.9	ipsi-A02a	IN	actv-aa	0.0.0.0	
3	3A02		2.2.4.9	2.2.4.9	ipsi-A03a	IN	actv-aa	0.0.0.0	

### 3.1.3. Survivable Processors

The list output shown in the following screen illustrates the existence of two Enterprise Survivable Servers (ESS) and two Local Survivable Processors (LSP). Although the two LSPs were omitted from the **Figure 1** diagram, the address of an LSP will be served to IP Telephones in network region 3, to illustrate how survivable servers can be appended to the list of C-LANs in the alternate gatekeeper list.

```
list survivable-processor
```

SURVIVABLE PROCESSORS										
Name	Type	IP Address				Reg	LSP	Translations		Net
							Act	Updated	Rgn	
S83LSP-in-G250	LSP	2	.2	.25	.88	y	n	14:34 4/24/2008	2	
S83LSP-in-G700	LSP	2	.2	.1	.88	y	n	14:34 4/24/2008	4	
ESSCid002sid003	ESS	2	.2	.185	.88	y		14:34 4/24/2008	1	
S8510ESScl3svr4	ESS	2	.2	.4	.88	y		14:34 4/24/2008	5	

The status output below shows the three port networks are being controlled by cluster 1, the main S8730 Servers running Avaya Communication Manager 5.0. The IPSIs in each of the port networks are aware of the ESS, as can be seen by the presence of the “2” and the 3” in the column **Connected Clus(ter) IDs**

```
status ess port-networks
```

Cluster ID 1												ESS PORT NETWORK INFORMATION			
Com	Intf	Intf	Port	IPSI	Pri/	Pri/	Cntl		Connected						
PN Num	Loc	Type	Ntwk Ste	Gtway Loc	Sec Loc	Sec State	Clus ID	Clus ID	Clus(ter) IDs						
1	1	1A01	IPSI up	1A01	1A01	actv-aa	1	1	2	3					
2	2	2A01	IPSI up	2A01	2A01	actv-aa	1	1	2	3					
3	1	3A02	IPSI up	3A02	3A02	actv-aa	1	1	2	3					

The status command below shows the software version and date of the last Avaya Communication Manager configuration file (translations) update. As can be observed, the ESS with Cluster ID 3 is running a beta load (410.0) of Avaya Communication Manager Release 5.1, whereas the primary S8730 Servers with Cluster ID 1 are running the generally available Avaya Communication Manager Release 5.0 load (825.4). The ESS running Avaya Communication Manager 5.1 is able to receive and understand the Release 5.0 configuration, facilitating the verification in Section 5 that by default, the same alternate gatekeeper results will apply when Release 5.1 takes over the three port networks. The new administrable controls available in Release 5.1 will then be utilized from the ESS in Section 6 to illustrate the new capabilities.

```
status ess clusters
```

Cluster ID 1										ESS CLUSTER INFORMATION			
Cluster		Active Server		Translations		Software							
ID	Enabled?	ID	Registered?	Updated	Version								
1	y	1	y	14:34 4/24/2008	R015x.00.0.825.4								
2	y	3	y	14:34 4/24/2008	R015x.00.0.825.4								
3	y	4	y	14:34 4/24/2008	R015x.01.0.410.0								

### 3.1.4. List of C-LAN Interfaces

The following screen shows a list of the C-LAN interfaces. Observe the two C-LANs in each of the three port networks. The two C-LANs in a given port network are configured in the same network region.

```
list ip-interface clan
```

IP INTERFACES									
ON	Slot	Code	Sfx	Node Name/ IP-Address	Subnet Mask	Gateway Address	Num Skts	Net Warn Rgn	VLAN
y	01A02	TN799	D	c-lan 2.2.185.2	255.255.255.0	2.2.185.1	400	1	n
y	02A02	TN799	D	c-lan2a02 2.2.85.2	255.255.255.0	2.2.85.1	400	3	n
y	02B02	TN799	D	c-lan2b02 2.2.85.20	255.255.255.0	2.2.85.1	400	3	n
y	03A10	TN799	D	clan1-cmc 2.2.4.2	255.255.255.0	2.2.4.1	400	5	n
y	01A10	TN799	D	c-lan1A10 2.2.185.20	255.255.255.0	2.2.185.1	400	1	n
y	03A09	TN799	D	c-lan3A09 2.2.4.20	255.255.255.0	2.2.4.1	400	5	n

### 3.1.5. Example C-LAN Interface

An individual C-LAN ip-interface screen is included below to highlight the default configuration of the **Allow H.323 Endpoints**, **Gatekeeper Priority**, and **Target socket load and Warning level** fields that apply to all of the C-LAN interfaces in the “base configuration”. Section 6 presents an example where the **Gatekeeper Priority** is different from the default value. Each C-LAN card is assigned a network region, matching the information in **Figure 1**.

```
display ip-interface 2a02
```

IP INTERFACES		Page 1 of 2
Type:	C-LAN	
Slot:	02A02	
Code/Suffix:	TN799 D	
Node Name:	c-lan2a02	
IP Address:	2 .2 .85 .2	
Subnet Mask:	255.255.255.0	Link: 2
Gateway Address:	2 .2 .85 .1	
Enable Ethernet Port?	y	<b>Allow H.323 Endpoints? y</b>
<b>Network Region:</b>	<b>3</b>	Allow H.248 Gateways? y
VLAN:	n	<b>Gatekeeper Priority: 5</b>
<b>Target socket load and Warning level:</b>	<b>400</b>	
Receive Buffer TCP Window Size:	8320	

### 3.2. Node Names

The following abbreviated list command output shows a subset of the node-names used in the configuration. The node-names for the C-LAN interfaces are in bold.

list node-names			Page 1
NODE NAMES			
Type	Name	IP Address	
IP	ESSCid002Sid003	2.2.185.88	
IP	S83LSP-in-G250	2.2.25.88	
IP	S83LSP-in-G700	2.2.1.88	
IP	S8510ESScl3svr4	2.2.4.88	
IP	<b>c-lan</b>	<b>2.2.185.2</b>	
IP	<b>c-lan1A10</b>	<b>2.2.185.20</b>	
IP	<b>c-lan2a02</b>	<b>2.2.85.2</b>	
IP	<b>c-lan2b02</b>	<b>2.2.85.20</b>	
IP	<b>c-lan3A09</b>	<b>2.2.4.20</b>	
IP	<b>clan1-cmc</b>	<b>2.2.4.2</b>	
IP	medpro1-cmc	2.2.4.89	
IP	tn2602-1a11	2.2.185.4	
IP	tn2602-2a07	2.2.26.3	
IP	tn2602-2b07	2.2.26.2	
IP	val-1a07	2.2.185.25	

### 3.3. Association of IP Telephones with Network Regions

IP telephones can be assigned a network region based on an IP address mapping. The following screen illustrates a subset of the IP network map configuration used to verify these Application Notes. If the IP address of a registering IP Telephone does not appear in the ip-network-map, the phone is assigned the network region of the C-LAN to which it registers, and the list of alternate gatekeepers sent by Avaya Communication Manager (in the RCF message) will only include C-LANs from this one region. When the IP address of a registering IP telephone is in the ip-network-map, the phone is assigned the network region assigned by the form shown below, and the list of alternate gatekeepers sent by Avaya Communication Manager can include C-LANs in the phone's region, as well as C-LAN in other connected regions. In the verifications associated with the base configuration and **Figure 1**, each IP Telephone has an IP address that appears in the ip-network-map (in the range of the rows in bold). Section 7.3 illustrates the registration of a phone whose IP address is not in the network map.

display ip-network-map							Page 1 of 32
IP ADDRESS MAPPING							Emergency Location Extension
From IP Address	(To IP Address	Subnet or Mask)	Region	VLAN			
<b>2 .2 .1 .100</b>	<b>2 .2 .1 .110</b>		<b>3</b>	<b>n</b>			
2 .2 .4 .100	2 .2 .4 .201		5	n			
2 .2 .25 .100	2 .2 .25 .200		2	n			
<b>2 .2 .185.200</b>	<b>2 .2 .185.250</b>		<b>1</b>	<b>n</b>			

### 3.4. Network Region Configuration

The following screens illustrate relevant aspects of the network region configuration. Looking at the regions left to right in **Figure 1**, the relevant configuration for network region 3 is shown below. On page 2, under the heading **BACKUP SERVERS (IN PRIORITY ORDER)**, the node name of an S8300C Local Survivable Processor is configured for network region 3. Any servers configured in this list will be included in the alternate gatekeeper list sent to the IP Telephone, after the primary C-LAN interfaces. The “S83LSP-in-G700” node name is included here as a backup server for phones registering to region 3. In the verifications in Sections 4, 5, and 6, the corresponding IP Address (2.2.1.88) will be observed in the alternate gatekeeper list sent to IP Telephones in network region 3. As stated in Section 1.1, the **Near End Establishes TCP Signaling Socket** field associated with TTS will remain set to the default “y” for all regions, for the base configuration.

```

display ip-network-region 3                                     Page 2 of 19
                                IP NETWORK REGION

INTER-GATEWAY ALTERNATE ROUTING / DIAL PLAN TRANSPARENCY
Incoming LDN Extension: 52111
Conversion To Full Public Number - Delete: 1  Insert: 732852
Maximum Number of Trunks to Use for IGAR: 2
Dial Plan Transparency in Survivable Mode? y

BACKUP SERVERS(IN PRIORITY ORDER)      H.323 SECURITY PROFILES
1      S83LSP-in-G700                   1      pin-eke
2                                           2      any-auth
3                                           3
4                                           4
5
6                                           Allow SIP URI Conversion? y

TCP SIGNALING LINK ESTABLISHMENT FOR AVAYA H.323 ENDPOINTS
Near End Establishes TCP Signaling Socket? y
Near End TCP Port Min: 61440
Near End TCP Port Max: 61444

```

The following screen illustrates Page 3 for network region 3. The connectivity between network regions is specified under the **Inter Network Region Connection Management** heading, beginning on Page 3. In the base configuration, regions 1, 3, and 5 are all directly connected, as illustrated by the bolded rows below. Two regions are considered directly connected if there is a non-blank value in the **codec set** field and the corresponding **direct WAN** column is “y” for the pair of regions.

```

display ip-network-region 3                                     Page 3 of 19
                                Inter Network Region Connection Management

src dst codec direct WAN-BW-limits Video Dyn
rgn rgn set WAN Units Total Norm Prio Shr Intervening-regions CAC IGAR
3 1 1 y Calls 1
3 2
3 3 1
3 4 1 y NoLimit n
3 5 1 y NoLimit n

```

The relevant configuration for network region 1 is shown below. For region 1, for variation in illustration purposes only, no backup servers are specified.

```

display ip-network-region 1                                     Page 2 of 19
                                IP NETWORK REGION

INTER-GATEWAY ALTERNATE ROUTING / DIAL PLAN TRANSPARENCY
Incoming LDN Extension: 51777
Conversion To Full Public Number - Delete: 1  Insert: 732851
Maximum Number of Trunks to Use for IGAR: 2
Dial Plan Transparency in Survivable Mode? y

BACKUP SERVERS(IN PRIORITY ORDER)      H.323 SECURITY PROFILES
1                                         1  pin-eke
2                                         2  any-auth
3                                         3
4                                         4
5
6                                         Allow SIP URI Conversion? y

TCP SIGNALING LINK ESTABLISHMENT FOR AVAYA H.323 ENDPOINTS
Near End Establishes TCP Signaling Socket? y
Near End TCP Port Min: 61440
Near End TCP Port Max: 61444

```

The following screen illustrates Page 3 for network region 1. Again, in the base configuration, regions 1, 3, and 5 are directly connected, as illustrated by the bolded rows below.

```

display ip-network-region 1                                     Page 3 of 19
                                Inter Network Region Connection Management

src dst codec direct  WAN-BW-limits  Video                               Dyn
rgn rgn set   WAN  Units      Total Norm  Prio Shr Intervening-regions  CAC IGAR
1  1  1
1  2  6   y   NoLimit
1  3  1   y   Calls      1
1  4  1   y   NoLimit
1  5  1   y   NoLimit

```

Region 5 is similar to region 1 in that no backup servers are specified (page 2 not shown). The concept of backup servers will be illustrated in conjunction with region 3. The following screen illustrates Page 3 for network region 5. Regions 1, 3, and 5 are directly connected.

```

display ip-network-region 5                                     Page 3 of 19
                                Inter Network Region Connection Management

src dst codec direct  WAN-BW-limits  Video                               Dyn
rgn rgn set   WAN  Units      Total Norm  Prio Shr Intervening-regions  CAC IGAR
5  1  1   y   NoLimit
5  2  1   y   NoLimit
5  3  1   y   NoLimit
5  4
5  5  1

```

## **4. Alternate Gatekeeper List with Base Configuration Using Avaya Communication Manager Release 5.0**

This section illustrates the alternate gatekeeper list served to select IP Telephones using the base configuration. The contents of the alternate gatekeeper list can be observed using a network trace capturing the registration process, or by accessing the MIB of the IP Telephone. For more information on performing and understanding a MIB Walk of an IP Telephone, consult references [3], [4], and [5]. In Release 5.0, there is no means to observe the alternate gatekeeper list from Avaya Communication Manager. As shown in Section 5, the enhancements in Avaya Communication Manager Release 5.1 allow the alternate gatekeeper list to also be observed via the “status station” command.

### **4.1. Alternate Gatekeeper List for IP Telephone in Network Region 3**

The Avaya 9620 IP Telephone shown in **Figure 1** is using extension 52020 and IP Address 2.2.1.109. In this case, IP Address 2.2.1.109 is served by a DHCP server. As per standard DHCP procedures for IP Telephones (reference [6] and [7]), the MCIPADD variable included the IP addresses 2.2.85.2 and 2.2.185.2.

### 4.1.1. Example Ethereal Trace for Registration of IP Telephone (x52020)

A portion of an ethereal trace taken as the phone with IP address 2.2.1.109 registers is shown below. This is extension 52020 in **Figure 1**. At the top of this screen capture, the four common messages in the registration process can be observed. A Gatekeeper Request (GRQ) is sent from the IP Telephone to the C-LAN at 2.2.85.2. Avaya Communication Manager responds with a Gatekeeper Confirm (GCF). In this instance, the GCF does not instruct the phone to send its Registration Request (RRQ) to a different C-LAN, which in general is possible (see example in Section 7.6). The phone also sends the RRQ to the C-LAN at 2.2.85.2, and Avaya Communication Manager responds with a Registration Confirm (RCF). In the screen capture, the RCF message is selected so that the more detailed information shows a portion of the contents of the RCF, before expanding key sub-trees to confirm the contents of the alternate gatekeeper list contained in “Item 0” through “Item 6”.

Filter: ip.addr == 2.2.1.109

No.	Time	Source	Destination	Protocol	Info
201	70.063907	2.2.1.109	2.2.85.2	H.225	RAS: gatekeeperRequest
202	70.150074	2.2.85.2	2.2.1.109	H.225	RAS: gatekeeperConfirm
203	70.252621	2.2.1.109	2.2.85.2	H.225	RAS: registrationReques
204	70.280555	2.2.85.2	2.2.1.109	H.225	RAS: registrationConfir

Frame 204 (325 bytes on wire, 325 bytes captured)

- Ethernet II, Src: 2.2.1.1 (00:04:96:1d:83:b0), Dst: 2.2.1.109 (00:04:0d:ec:05:b7)
- Internet Protocol, Src: 2.2.85.2 (2.2.85.2), Dst: 2.2.1.109 (2.2.1.109)
- User Datagram Protocol, Src Port: 1719 (1719), Dst Port: 49300 (49300)
- H.225.0 RAS
  - RasMessage
    - RasMessage: registrationConfirm (4)
      - registrationConfirm
        - requestSeqNum: 3
        - protocolIdentifier: 0.0.8.2250.0.5
        - nonStandardData
          - callSignalAddress
            - gatekeeperIdentifier:
            - endpointIdentifier: ..
      - alternateGatekeeper
        - Item 0
        - Item 1
        - Item 2
        - Item 3
        - Item 4
        - Item 5
        - Item 6

In the following series of screens from the same trace, the sub-trees of the alternate gatekeeper items are expanded to view the contents of the alternate gatekeeper list. Item 0 contains 2.2.85.2, and Item 1 contains 2.2.85.20, the two C-LANs in network region 3, the same region as the IP Telephone (i.e., region 3 from the ip-network-map configuration in Section 3). The Avaya Communication Manager version can also be observed at the top of this capture.

```
switchRelease: R015x.00.0.825.4
setType: 0
▶ callSignalAddress
  gatekeeperIdentifier:
  endpointIdentifier: ..
  ▼ alternateGatekeeper
    ▼ Item 0
      ▼ Item
        ▼ TransportAddress
          ▼ rasAddress: ipAddress (0)
            ▼ ipAddress
              ip: 2.2.85.2 (2.2.85.2)
              port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
          ▼ Item 1
            ▼ Item
              ▼ TransportAddress
                ▼ rasAddress: ipAddress (0)
                  ▼ ipAddress
                    ip: 2.2.85.20 (2.2.85.20)
                    port: 1719
                  gatekeeperIdentifier:
                  1... .... needToRegister: True
                  priority: 0
```

In the following screen from the same trace, the next two items in the alternate gatekeeper list are shown. Item 2 contains 2.2.185.2, and Item 3 contains 2.2.185.20, the two C-LANs in directly connected network region 1. As will be observed in a subsequent trace, after the C-LANs in the native region of the phone, Avaya Communication Manager can vary the order of the network regions for directly connected regions. In this case, the C-LANs in directly connected region 1 appear first. Upon a reset of the same IP Telephone, it is possible that the C-LANs in directly connected region 5 would appear before the C-LANs in directly connected region 1.

```

  ▾ Item 2
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ipAddress (0)
          ▾ ipAddress
            ip: 2.2.185.2 (2.2.185.2)
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
  ▾ Item 3
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ipAddress (0)
          ▾ ipAddress
            ip: 2.2.185.20 (2.2.185.20)
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
```

In the following screen from the same trace, the next two items in the alternate gatekeeper list are shown. Item 4 contains 2.2.4.2, and Item 5 contains 2.2.4.20, the two C-LANs in directly connected network region 5.

```

  ▾ Item 4
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ipAddress (0)
          ▾ ipAddress
            ip: 2.2.4.2 (2.2.4.2)
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
      ▾ Item 5
        ▾ Item
          ▾ TransportAddress
            ▾ rasAddress: ipAddress (0)
              ▾ ipAddress
                ip: 2.2.4.20 (2.2.4.20)
                port: 1719
                gatekeeperIdentifier:
                1... .... needToRegister: True
                priority: 0

```

In the following screen from the same trace, the last item, item 6, in the alternate gatekeeper list is shown. Item 6 contains 2.2.1.88, the IP Address of the LSP that was configured as a “backup server” for network region 3. See Section 3.4 for the relevant configuration. Although it can be observed that the “priority” field for the LSP is different (50) than the priority value for the C-LANs in the list, the priority value in this message is not influenced by the gatekeeper priority configured on the ip-interface screen, nor used by the Avaya IP Telephones.

```

  ▾ Item 6
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ipAddress (0)
          ▾ ipAddress
            ip: 2.2.1.88 (2.2.1.88)
            port: 1719
            gatekeeperIdentifier: \035
            1... .... needToRegister: True
            priority: 50
            timeToLive: 25200
      ▾ tokens

```

In the following screen from the same trace, a portion of the message flow following the RCF is shown. Although not the focus of these Application Notes, this screen is included to show that although the RAS procedures were completed with the C-LAN at 2.2.85.2, this IP Telephone will ultimately have a TCP connection to 2.2.85.20, another C-LAN in the same region as 2.2.85.2 and the phone. Avaya Communication Manager will consider the phone registered to the C-LAN used for the TCP connection, as reported by commands such as “status station”, as illustrated in the next section.

No. .	Time	Source	Destination	Protocol	Info
225	73.023223	2.2.85.20	2.2.1.109	TCP	61440 > 1720 [SYN] Seq=
226	73.023720	2.2.1.109	2.2.85.20	TCP	1720 > 61440 [SYN, ACK]
227	73.025401	2.2.85.20	2.2.1.109	TCP	61440 > 1720 [ACK] Seq=
228	73.053123	2.2.1.109	2.2.85.20	Q.931	SETUP[Short Frame]
229	73.053129	2.2.1.109	2.2.85.20	TCP	1720 > 61440 [PSH, ACK]
230	73.055164	2.2.85.20	2.2.1.109	TCP	61440 > 1720 [ACK] Seq=
231	73.118568	2.2.85.20	2.2.1.109	H.225	CS: callProceeding
232	73.122727	2.2.85.20	2.2.1.109	H.225	CS: connect OpenLogical
233	73.123264	2.2.1.109	2.2.85.20	TCP	1720 > 61440 [ACK] Seq=
234	73.127613	2.2.85.20	2.2.1.109	H.225	CS: empty

#### 4.1.2. Example Status Station Output for Registered IP Telephone (x52020)

The following screen shows an example “status station” output for station 52020 after it had registered. The IP Telephone is shown registered to the C-LAN with IP address 2.2.85.20. As has been observed via the ethereal trace, although the GRQ, GCF, RRQ, and RCF messages used the C-LAN at 2.2.85.2, Avaya Communication Manager ultimately established call control signaling to the IP Telephone using an alternate C-LAN (2.2.85.20) in the same region.

status station 52020		Page 4 of 7	
CALL CONTROL SIGNALING			
Port: S00046	Switch-End IP Signaling Loc: 02B0217	H.245 Port:	
	IP Address	Port	Node Name Rgn
Switch-End:	2. 2. 85. 20	61440	c-lan2b02 3
Set End:	2. 2. 1.109	1720	3

### 4.1.3. Example MIB Walk of Avaya 9620 IP Telephone (x52020)

The following shows a portion of the results of a MIB Walk of the IP Telephone following the registration illustrated via network trace in Section 4.1.1. The IP addresses in the alternate gatekeeper list can be observed in the rows containing ipEndpointMIBs.2.6.4.1.1.X where X=1-7 (beginning just below the extension 52020). The alternate gatekeeper list begins with the two C-LANs in network region 3 (2.2.85.2, 2.2.85.20), the same region as the phone. The C-LANs in directly connected region 1 (2.2.185.2, 2.2.185.20) are next in the list. The C-LANs in directly connected region 5 are next (2.2.4.2, 2.2.4.20). Lastly, any IP addresses of survivable servers configured to be included in the alternate gatekeeper list appear. Recall from Section 3 that the node name “S83LSP-in-G700” was configured to be included in the alternate gatekeeper list for region 3. This node name corresponds to IP Address 2.2.1.88, ending the alternate gatekeeper list. The telephone is currently registered to 2.2.85.20, as shown by the entry in the row before the extension (ipEndpointMIBs.2.6.2.0). The DHCP-provided list is 2.2.85.2 followed by 2.2.185.2 (which can be observed via ipEndpointMIBs.2.6.1.0).

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.4.8.0	ipEndpointMIBs.2.4.8.0	
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.4.9.0	ipEndpointMIBs.2.4.9.0	8000
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.4.10.0	ipEndpointMIBs.2.4.10.0	0.0.0.0
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.5.1.0	ipEndpointMIBs.2.5.1.0	0
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88

In the preceding example, the C-LANs from directly connected regions appearing in the alternate gatekeeper list started with the C-LANs in region 1. The two directly connected C-LANs from region 1 appeared before the two directly connected region C-LANs from region 5. In general, Avaya Communication Manager will choose the order of the connected regions in a round-robin fashion. For example, the following MIB Walk shows the alternate gatekeeper list following a reset and re-registration of IP Telephone 52020. In this case, the two C-LANs in region 5 (2.2.4.2, 2.2.4.20) appear before the two C-LANs in region 1 (2.2.185.2, 2.2.185.20). Once again, the IP Address of the LSP (2.2.1.88) appears at the end of the list.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

## 4.2. Alternate Gatekeeper List for IP Telephone in Network Region 1

An ethereal trace for a registration of the Avaya 4621 IP Telephone (2.2.185.200, x51003 in **Figure 1**) would be similar to the one shown in Section 4.1 and would not offer new insight. However, since the location of the alternate gatekeeper list within the MIB for a 9600-Series Telephone and 4600-Series Telephone are different, a MIB Walk result is included below.

The following shows a portion of the results of a MIB Walk of the Avaya 4621 IP Telephone, which is mapped using the ip-network-map to network region 1. In the screen below, the IP addresses in the alternate gatekeeper list can be observed in the rows containing endptDEFINITY.28.1.1.X where X=1-6. The alternate gatekeeper list begins with the two C-LANs in network region 1, the region of the phone (2.2.185.2, 2.2.185.20). The C-LANs in directly connected region 3 (2.2.85.20, 2.2.85.2) are next in the list. The C-LANs in directly connected region 5 are next (2.2.4.2, 2.2.4.20). Since no IP addresses of survivable servers were configured to be included in the alternate gatekeeper list for phones in network region 1, the alternate gatekeeper list ends with the last C-LAN. From this example, it can be observed that the Avaya Communication Manager load spreading algorithm can vary the order of the C-LANs within any given network region as well. That is, in this case, IP Address 2.2.85.20 appears before IP Address 2.2.85.2 within the list of C-LANs for directly connected network region 3.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.26.0	endptDEFINITY.26.0	1
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.27.0	endptDEFINITY.27.0	1
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.1	endptDEFINITY.28.1.1.1	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.2	endptDEFINITY.28.1.1.2	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.3	endptDEFINITY.28.1.1.3	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.4	endptDEFINITY.28.1.1.4	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.5	endptDEFINITY.28.1.1.5	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.6	endptDEFINITY.28.1.1.6	2.2.4.20

For a different registration of the same telephone, the next screen shows additional portions of the MIB Walk. In this case, although the initial GRQ was sent to 2.2.185.2 (endptMCIPADD), the telephone is registered to 2.2.185.20 (endptMCIPINUSE). This is another example to illustrate the load balancing of the TCP signaling connection that can occur, for telephones capable of TTS, in regions allowing TTS.

```
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.2.0      endptMODEL.0          4621D01A
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.3.0      endptMCIPADD.0       2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.4.0      endptMCIPINUSE.0     2.2.185.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.5.0      endptMCIPORT.0       1719
```

Below, a portion of the MIB Walk pertaining to the alternate gatekeeper list for this same registration is shown. The TCP signaling connection has been initiated by Avaya Communication Manager from one of the items (2.2.185.20) in the alternate gatekeeper list.

```
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.27.0      endptDEFINITY.27.0   1
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.1      endptDEFINITY.28.1.1.1 2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.2      endptDEFINITY.28.1.1.2 2.2.185.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.3      endptDEFINITY.28.1.1.3 2.2.85.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.4      endptDEFINITY.28.1.1.4 2.2.85.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.5      endptDEFINITY.28.1.1.5 2.2.4.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.6      endptDEFINITY.28.1.1.6 2.2.4.20
```

## 5. Avaya Communication Manager Release 5.1 Default Behavior

The intent of this section is to show the appearance of the Avaya Communication Manager Release 5.1 screens upon an upgrade from the base configuration described in Section 3, and to confirm that the alternate gatekeeper list served to the IP Telephones by Avaya Communication Manager Release 5.1 is consistent with the algorithm used by Avaya Communication Manager Release 5.0, before any changes are made to the configuration. The method used was to have the S8510 Server ESS running Release 5.1 take control over the configuration.

The following status screen, taken from the “cluster 3” ESS, shows that the S8510 running Release 5.1 has control over the IPSIs in the configuration. The **Cntl Clus ID** column representing the controlling cluster ID contains a 3 for all port networks.

```
status ess port-networks
```

Cluster ID 3												
ESS PORT NETWORK INFORMATION												
Com		Intf	Intf	Port	IPSI	Pri/	Pri/	Cntl	Connected			
PN	Num	Loc	Type	Ntwk	Gtway	Sec	Sec	Clus	Clus	(ter)		
				Ste	Loc	Loc	State	ID	IDs			
1	1	1A01	IPSI	up	1A01	1A01	actv-aa	3	1	2	3	
2	2	2A01	IPSI	up	2A01	2A01	actv-aa	3	1	2	3	
3	1	3A02	IPSI	up	3A02	3A02	actv-aa	3	1	2	3	

The following series of screens shows the appearance of page 3 of the ip-network-region screens, starting with ip-network-region 3. Note the new AGL column on the right, and the word “all” in the row where the destination region matches the source region. If the word “all” appears, Avaya Communication Manager will use the algorithm applied previously in Avaya Communication Manager 5.0, for phones registering to this source region. For other regions, observe that the AGL column is blank by default.

```
display ip-network-region 3                                     Page 3 of 19
Inter Network Region Connection Management

src dst codec direct  WAN-BW-limits  Video  Intervening  Dyn
rgn rgn set   WAN  Units    Total Norm  Prio Shr  Regions    CAC IGAR AGL
3  1  1  y   Calls    1
3  2
3  3  1
3  4  1  y   NoLimit
3  5  1  y   NoLimit
                                     n
                                     n
                                     all
                                     n
                                     n
```

The following screen shows the appearance of page 3 of network region 1.

```
display ip-network-region 1                                   Page 3 of 19
Inter Network Region Connection Management

src dst codec direct  WAN-BW-limits  Video  Intervening  Dyn
rgn rgn set   WAN  Units    Total Norm  Prio Shr  Regions    CAC IGAR AGL
1  1  1
1  2  6  y   NoLimit
1  3  1  y   Calls    1
1  4  1  y   NoLimit
1  5  1  y   NoLimit
                                     n
                                     n
                                     n
                                     n
                                     all
```

The following screen shows the appearance of page 3 of network region 5.

```
display ip-network-region 5                                   Page 3 of 19
Inter Network Region Connection Management

src dst codec direct  WAN-BW-limits  Video  Intervening  Dyn
rgn rgn set   WAN  Units    Total Norm  Prio Shr  Regions    CAC IGAR AGL
5  1  1  y   NoLimit
5  2  1  y   NoLimit
5  3  1  y   NoLimit
5  4
5  5  1
                                     n
                                     n
                                     n
                                     all
```

The following screen shows a portion of the list of registered stations after the takeover of the system by the S8510 ESS running Avaya Communication Manager 5.1. As expected, the phone in network region 3, x52020, has recovered to a C-LAN in network region 3, while the phone in network region 1, has recovered to a C-LAN in network region 1.

```
list registered-ip-stations
REGISTERED IP STATIONS
Station Ext/  Set   Product  Prod  Station  Net Gatekeeper  TCP
Orig Port   Type  ID       Rel   IP Address  Rgn IP Address     Skt
51003       4621  IP_Phone 2.8000 2.2.185.200 1 2.2.185.20    y
52020       9620  IP_Phone 1.5000 2.2.1.109  3 2.2.85.2      y
```

The following screen shows an example “status station” output. Observe that the output contains 7 pages, the same as in Avaya Communication Manager Release 5.0. This is included to emphasize that the additional page of alternate gatekeeper information available with Avaya Communication Manager Release 5.1 is provided only if the new “AGL” field is changed from the default values, indicating the use of the new alternate gatekeeper algorithm for the region.

status station 52020		Page 4 of 7	
CALL CONTROL SIGNALING			
Port: S00046	Switch-End IP Signaling Loc: 02A0217	H.245 Port:	
	IP Address	Port	Node Name Rgn
Switch-End:	2. 2. 85. 2	61442	c-lan2a02 3
Set End:	2. 2. 1.109	1720	3

The following is the relevant portion of a MIB Walk for station 52020. As can be observed, by default, the alternate gatekeeper list served by Avaya Communication Manager Release 5.1 is consistent with the Avaya Communication Manager Release 5.0 algorithm. That is, the first two list items are the two C-LANs in region 3, the region of the phone. The next two items are two C-LANs from directly connected region 1, followed by the two C-LANs in directly connected region 5. The IP address (2.2.1.88) of the LSP configured for region 3 ends the list.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

The following is the relevant portion of a MIB Walk for station 51003 in network region 1. Again, the alternate gatekeeper list served by Avaya Communication Manager Release 5.1 is consistent with the Avaya Communication Manager Release 5.0 algorithm. By default, all C-LANs have the same priority, and therefore the order of the C-LANs within any given region can be different. For example, here, 2.2.185.20 precedes 2.2.185.2 and 2.2.85.20 precedes 2.2.85.2, whereas the opposite order can be observed in the preceding MIB Walk.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.1	endptDEFINITY.28.1.1.1	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.2	endptDEFINITY.28.1.1.2	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.3	endptDEFINITY.28.1.1.3	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.4	endptDEFINITY.28.1.1.4	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.5	endptDEFINITY.28.1.1.5	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.6	endptDEFINITY.28.1.1.6	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.5.1.0	endptCIBURL.0	Obsolete

Extension 51003 is registered to 2.2.185.20, as can be seen from the list of registered stations shown previously, as well as the following portion of the MIB Walk (endptMCIPINUSE).

```
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.2.0      endptMODEL.0      4621D01A
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.3.0      endptMCIPADD.0    2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.4.0      endptMCIPINUSE.0  2.2.185.20
```

## 6. Administrable Alternate Gatekeeper Lists in Avaya Communication Manager Release 5.1

In this section, some of the new behaviors made possible by Avaya Communication Manager Release 5.1 are illustrated. While the S8510 ESS running 5.1 has control, changes are made to the new AGL field of the ip-network-region screen, and the results are observed.

### 6.1. Effect of Changing the New AGL Field from “All” to a Number

In the following screen, the cursor was positioned on the AGL field, and the help key was pressed. The help message for the AGL field is shown at the bottom of the screen.

```
change ip-network-region 3                               Page 3 of 19
      Inter Network Region Connection Management

src dst codec direct  WAN-BW-limits  Video  Intervening  Dyn
rgn rgn set   WAN  Units   Total Norm  Prio Shr Regions  CAC IGAR AGL
3  1  1   y   Calls    1
3  2
3  3  1
3  4  1   y   NoLimit
3  5  1   y   NoLimit
... ..
Enter number between 0 and 16, 'all', or blank
```

As an example, assume the AGL field is changed for network region 3 from the default “all” to the number 2, as shown below. No other change is made.

```
change ip-network-region 3                               Page 3 of 19
      Inter Network Region Connection Management

src dst codec direct  WAN-BW-limits  Video  Intervening  Dyn
rgn rgn set   WAN  Units   Total Norm  Prio Shr Regions  CAC IGAR AGL
3  1  1   y   Calls    1
3  2
3  3  1
3  4  1   y   NoLimit
3  5  1   y   NoLimit
```

Upon submitting the form, network region 3 changes to using the new Avaya Communication Manager Release 5.1 algorithm. With the new algorithm, the administrator explicitly lists the number of alternate gatekeepers to be included from a given region. Note that setting the AGL field to 2 for network region 3 also means that the administrator must explicitly specify the number of alternate gatekeepers to be served to telephones in region 3 from other regions. In this example, since the default “blank” is left in the AGL field for the rows for other regions, the only

alternate gatekeepers that will be served to phones in network region 3 are the 2 explicitly configured for network region 3, and the LSP from page 2 in the base configuration (screen not repeated here, see Section 3).

Since the new algorithm is now in effect for network region 3, the “status station” command includes the additional page of alternate gatekeeper information as shown below. The status station output is intended to show the C-LANs chosen by the new algorithm, not the survivable servers configured on page 2, nor the survivable gatekeeper configured on the station form. That is, these survivable servers continue to be part of the list served to the phone, but are not reported by the “status station” command.

status station 52020		ALTERNATE GATEKEEPER LIST				Page 7 of 8
Main	Region	Shared Control Ports	Region	Shared Control Ports	Region	
Node Name	Region	Node Name	Region	Node Name	Region	
c-lan2a02	3					
c-lan2b02	3					

The following is the relevant portion of a MIB Walk of station 52020, confirming the alternate gatekeeper list contains the two C-LANs in region 3, no C-LANs in any other region, and the IP address of the LSP (2.2.1.88) configured as a backup server on page 2 of ip-network-region 3.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.5.1.0	ipEndpointMIBs.2.5.1.0	0
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

In this example, the changes to the AGL field were made while station 52020 was already registered, and therefore the new alternate gatekeeper list was sent to the phone in a message (Login-info-update), without requiring the phone to re-register. See Section 7.2 for additional information on updating the alternate gatekeeper list for a phone that is already registered.

The following ethereal screen capture shows a re-registration of x52020 after the phone was reset. At the top, the RCF is highlighted to expand this message containing the alternate gatekeeper list. The pane below shows the list as well as the software release version used.

No.	Time	Source	Destination	Protocol	Info
378	67.195699	2.2.85.2	2.2.1.109	H.225	RAS: registrationConfir

```

switchRelease: R015x.01.0.410.0
setType: 0
▷ callSignalAddress
  gatekeeperIdentifier: \001\003
  endpointIdentifier: ..
▽ alternateGatekeeper
  ▽ Item 0
    ▽ Item
      ▽ TransportAddress
        ▽ rasAddress: ipAddress (0)
          ▽ ipAddress
            ip: 2.2.85.2 (2.2.85.2)
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
          ▽ Item 1
            ▽ Item
              ▽ TransportAddress
                ▽ rasAddress: ipAddress (0)
                  ▽ ipAddress
                    ip: 2.2.85.20 (2.2.85.20)
                    port: 1719
                    gatekeeperIdentifier:
                    1... .... needToRegister: True
                    priority: 0
              ▽ Item 2
                ▽ Item
                  ▽ TransportAddress
                    ▽ rasAddress: ipAddress (0)
                      ▽ ipAddress
                        ip: 2.2.1.88 (2.2.1.88)
                        port: 1719
                        gatekeeperIdentifier: \035
                        1... .... needToRegister: True
                        priority: 50

```

## 6.2. Including, but Limiting C-LANs from Directly Connected Regions

In the previous section, the only change made to the AGL field was to change from “all” to a specific number for the region being updated. This led to explicit control over the number of C-LANs in the updated region, but no C-LANs were included in the alternate gatekeeper list from other regions. In this example, C-LANs from directly connected regions will also be included, but specifically limited in number by the AGL field.

The following screen shows a change to network region 3. Three rows contain changes to the AGL field relative to the base (upgraded) configuration. With this configuration, a phone in region 3 will be served an alternate gatekeeper list that contains two C-LANs from region 3, and one C-LAN from each of region 1 and region 5 (followed by the LSP).

```
change ip-network-region 3
```

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Inter Network Region Connection Management

src rgn	dst rgn	codec set	direct WAN	WAN-BW-limits Units	Video Norm	Intervening Prio Shr Regions	Dyn CAC	IGAR	AGL
3	1	1	y	Calls	1		n		1
3	2								
3	3	1							2
3	4	1	y	NoLimit			n		
3	5	1	y	NoLimit			n		1

Unlike other types of changes to the Inter Network Region Connection Management page, note that changes to the AGL field are not “symmetric”. For example, changing the codec set or bandwidth limits in the row for a directly connected source-destination pair automatically makes the equivalent change to the destination region. However, submitting a change to network region 3 that includes a change to the AGL field for row 1 representing destination region 1 has no effect on the behavior of phones registering to region 1 (or the value of the AGL field in region 1). A change to the AGL column using “change ip-network-region 3” affects only phones registering to region 3. To emphasize this point, the following screen shows ip-network-region 1 after submitting the change previously applied to network region 3. Observe there has been no change compared to the network region 1 form shown in Section 5.

```
display ip-network-region 1
```

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Inter Network Region Connection Management

src rgn	dst rgn	codec set	direct WAN	WAN-BW-limits Units	Video Norm	Intervening Prio Shr Regions	Dyn CAC	IGAR	AGL
1	1	1							all
1	2	6	y	NoLimit			n		
1	3	1	y	Calls	1		n		
1	4	1	y	NoLimit			n		
1	5	1	y	NoLimit			n		

Similarly, changing region 3 for the region 3-5 source-destination row had no effect on region 5.

```
display ip-network-region 5
```

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Inter Network Region Connection Management

src rgn	dst rgn	codec set	direct WAN	WAN-BW-limits Units	Video Norm	Intervening Prio Shr Regions	Dyn CAC	IGAR	AGL
5	1	1	y	NoLimit			n		
5	2	1	y	NoLimit			n		
5	3	1	y	NoLimit			n		
5	4								
5	5	1							all

The following screen shows a status station output for a telephone in network region 3 after making the change to network region 3. The new page showing the alternate gatekeeper list includes the two C-LANs from network region 3 and one each from network region 5 and network region 1. The change to the network region form causes the alternate gatekeeper list for already registered phones to be updated without requiring re-registration (see Section 7.2).

status station 52020		Page 7 of 8	
ALTERNATE GATEKEEPER LIST			
Main	Region	Shared Control Ports	Shared Control Ports
Node Name	Region	Node Name	Region
c-lan2a02	3		
c-lan2b02	3		
clan1-cmc	5		
c-lan1A10	1		

The following portion of a MIB Walk for extension 52020 shows that the phone's stored alternate gatekeeper list matches the C-LANs shown in the new status station page. Recall that the new status station page does not show the survivable servers configured for the region. (The IP addresses corresponding to the node names shown in status station are given in Section 3).

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

In general, the order of the two C-LANs in region 3 can vary, the order of the directly connected regions can vary, and the one C-LAN chosen from region 1 and region 5 can vary. The following shows a status station output after station 52020 was reset and re-registered. In this case, observe that a different C-LAN was chosen from region 1.

status station 52020		Page 7 of 8	
ALTERNATE GATEKEEPER LIST			
Main	Region	Shared Control Ports	Shared Control Ports
Node Name	Region	Node Name	Region
c-lan2a02	3		
c-lan2b02	3		
clan1-cmc	5		
c-lan	1		

The following shows the relevant section of the MIB Walk after the phone re-registered.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

To emphasize that a change to network region 3, in the AGL column for the row for destination region 1, has no effect on telephones registered to region 1, the following screen shows a MIB Walk for a telephone in region 1 after the changes to region 3 in this section were completed. Note that the region 1 phone continues to get all the C-LANs (2 in this case) from each region, the same as illustrated in Section 6.1 before any changes were made.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.1	endptDEFINITY.28.1.1.1	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.2	endptDEFINITY.28.1.1.2	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.3	endptDEFINITY.28.1.1.3	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.4	endptDEFINITY.28.1.1.4	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.5	endptDEFINITY.28.1.1.5	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.4.28.1.1.6	endptDEFINITY.28.1.1.6	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.1.5.1.0	endptCIBURL.0	Obsolete

### 6.3. Maximum of 16 C-LANs Using New Algorithm

When using the new algorithm with numerical values in the AGL field, the maximum number of primary alternate gatekeepers is 16. To illustrate, in the screen below, the number 15 is typed into the AGL column in the row for network region 3, and an attempt to submit the change is made. The error message at the bottom of the screen appears, since the total (15 + 1 + 1) is greater than 16. Note that the maximum of 16 does not include survivable servers. That is, the alternate gatekeeper list under the new algorithm can include up to 16 primary gatekeepers plus up to seven survivable servers (e.g., 6 LSPs configured for the network region, and 1 survivable gatekeeper for the registering station).

change ip-network-region 3										Page 3 of 19		
Inter Network Region Connection Management												
src rgn	dst rgn	codec set	direct WAN	WAN-BW-limits Units	Video Total Norm	Intervening Prio Shr Regions	Dyn CAC IGAR AGL					
3	1	1	y	Calls	1				n	1		
3	2											
3	3	1								15		
3	4	1	y	NoLimit					n			
3	5	1	y	NoLimit					n	1		

Sum of numeric values in all AGL fields cannot exceed 16

### 6.4. Can Not Mix Old and New Algorithm AGL Values in Same Region

When a region uses the old algorithm with “all” in the AGL field for the region, other destination regions must also contain “all” or “blank”. It is not possible to mix “all”, indicative of the old algorithm, with numerical values in the AGL field for other destination regions. To illustrate, in the screen below for network region 5, the region 5 row contains “all” in the AGL column. The administrator is attempting to submit the form with the number 1 in the AGL field corresponding to destination regions 1 and 3. The error message at the bottom of the screen appears. In the sample network, to submit the form with these objectives, “All” could be changed to “2”.

change ip-network-region 5											Page 3 of 19			
Inter Network Region Connection Management														
src rgn	dst rgn	codec set	direct WAN	WAN Units	WAN-BW-limits Total	Video Norm	Video Prio	Intervening Shr	Intervening Regions	Dyn CAC	IGAR	AGL		
5	1	1	y	NoLimit							n	1		
5	2	1	y	NoLimit							n			
5	3	1	n					1:	:	:	n	1		
5	4													
5	5	1											all	

Cannot mix numeric AGL with 'all'; change to 'all', numeric values or blank

## 7. Variations of the Base Configuration

In this section, the effects of selected changes to the base configuration are illustrated.

### 7.1. Example Showing Gatekeeper Priority Differences

In the “base configuration”, all of the C-LANs used the default gatekeeper priority. No changes were made to the **Gatekeeper Priority** field on the ip-interface forms for the C-LANs. In this section, using Avaya Communication Manager Release 5.0, the priority of some of the gatekeepers is changed to illustrate the effect. Prior to running the tests in this section, one C-LAN in each region was changed to a higher priority (lower numerical value in the **Gatekeeper Priority** field). The other C-LAN in each region retained the default priority. For ease of visual inspection of the result, the C-LANs whose IP Address ends in “.20” will be made higher priority than the C-LANs whose IP Address ends in “.2”. No changes are made to the default socket level parameters (which do not appear in the abbreviated screen captures below).

The following screen shows the changed C-LAN priority in region 3.

display ip-interface 2b02													
IP INTERFACES													
Type: C-LAN													
Slot: 02B02													
Code/Suffix: TN799 D													
Node Name: c-lan2b02													
IP Address: 2 .2 .85 .20													
Subnet Mask: 255.255.255.0													
Gateway Address: 2 .2 .85 .1													
Link: 4													
Enable Ethernet Port? y													
Allow H.323 Endpoints? y													
<b>Network Region: 3</b>													
Allow H.248 Gateways? y													
VLAN: n													
<b>Gatekeeper Priority: 1</b>													

The following screen shows the changed C-LAN priority in region 1.

```

display ip-interface 1a10
                                IP INTERFACES
                                Type: C-LAN
                                Slot: 01A10
                                Code/Suffix: TN799 D
                                Node Name: c-lan1A10
                                IP Address: 2 .2 .185.20
                                Subnet Mask: 255.255.255.0
                                Gateway Address: 2 .2 .185.1
                                Enable Ethernet Port? y
                                Network Region: 1
                                VLAN: n
                                Link: 6
                                Allow H.323 Endpoints? y
                                Allow H.248 Gateways? y
                                Gatekeeper Priority: 1

```

The following screen shows the changed C-LAN priority in region 5.

```

display ip-interface 3a09
                                IP INTERFACES
                                Type: C-LAN
                                Slot: 03A09
                                Code/Suffix: TN799 D
                                Node Name: c-lan3A09
                                IP Address: 2 .2 .4 .20
                                Subnet Mask: 255.255.255.0
                                Gateway Address: 2 .2 .4 .1
                                Enable Ethernet Port? y
                                Network Region: 5
                                VLAN: n
                                Link: 7
                                Allow H.323 Endpoints? y
                                Allow H.248 Gateways? y
                                Gatekeeper Priority: 1

```

After making these changes, the IP Telephones with extension 52020 in region 3 and extension 51003 in region 1 were reset to force a new registration.

### 7.1.1. Using Communication Manager Release 5.0 Algorithm

The following portion of the MIB Walk output for extension 52020 illustrates the alternate gatekeeper list after the phone had registered. As can be observed, for the C-LANs within a region, the C-LAN with the higher priority (lower numerical **Gatekeeper Priority**) appears before the C-LAN with the lower (default) priority. Recall that region 3 includes the IP Address of the LSP, 2.2.1.88, which can be observed at the end of the list.

Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.4.10.0	ipEndpointMIBs.2.4.10.0	0.0.0.0
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.5.1.0	ipEndpointMIBs.2.5.1.0	0
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.185.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.4.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.4.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

The following portion of an ethereal trace for this registration is included simply to show that the Gatekeeper Priority as administered on the ip-network-region form affects the order of the alternate gatekeeper list, but does not affect the “priority” field in the message.

	Time	Source	Destination	Protocol	Info
197	68.240458	2.2.1.109	2.2.85.2	H.225	RAS: gatekeeperRequest
198	68.336228	2.2.85.2	2.2.1.109	H.225	RAS: gatekeeperConfirm
199	68.438834	2.2.1.109	2.2.85.2	H.225	RAS: registrationRequest
200	68.466366	2.2.85.2	2.2.1.109	H.225	RAS: registrationConfirm

```

▽ alternateGatekeeper
  ▽ Item 0
    ▽ Item
      ▽ TransportAddress
        ▽ rasAddress: ipAddress (0)
          ▽ ipAddress
            ip: 2.2.85.20 (2.2.85.20)
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
  ▽ Item 1
    ▽ Item
      ▽ TransportAddress
        ▽ rasAddress: ipAddress (0)
          ▽ ipAddress
            ip: 2.2.85.2 (2.2.85.2)
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0

```

The following portion of the MIB Walk output for extension 51003 illustrates the alternate gatekeeper list after the phone had registered. Again, for the C-LANs within a region, the C-LAN with the higher priority (lower numerical **Gatekeeper Priority**) appears before the C-LAN with the lower (default) priority. Recall that region 1 does not include the IP Address of the LSP, so the alternate gatekeeper list terminates with a C-LAN interface.

```

Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.1   endptDEFINITY.28.1.1.1   2.2.185.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.2   endptDEFINITY.28.1.1.2   2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.3   endptDEFINITY.28.1.1.3   2.2.85.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.4   endptDEFINITY.28.1.1.4   2.2.85.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.5   endptDEFINITY.28.1.1.5   2.2.4.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.4.28.1.1.6   endptDEFINITY.28.1.1.6   2.2.4.2

```

In the following portion of the MIB Walk output for extension 51003, it can be observed that the IP Telephone is registered to 2.2.185.20 (endptMCIPINUSE), although the IP Telephone sent its GRQ to 2.2.185.2 (endptMCIPADD).

```

Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.2.0   endptMODEL.0   4621D01A
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.3.0   endptMCIPADD.0   2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.4.0   endptMCIPINUSE.0   2.2.185.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.1.1.5.0   endptMCIPORT.0   1719

```

## 7.1.2. Using Communication Manager Release 5.1

When the new AGL field of the ip-network-region remains set to its default value “all”, the effect of gatekeeper priorities is identical to that illustrated in the previous section.

If the new AGL field is changed from the default value “all” to a number less than the total number of C-LANs in the region, the priority field on the ip-interfaces form is not taken into account when selecting the subset of C-LANs from the region to be included in the alternate gatekeeper list. With the new algorithm, the subset of C-LANs included in the alternate gatekeeper list from a given network region is intentionally randomized.

## 7.2. Example Showing Phone Getting Update to Alternate-Gatekeeper List for an Active Registration

To this point, the illustrations have mainly focused on how a telephone receives an alternate gatekeeper list during the registration process, in the RCF message. However, it is also possible for Avaya Communication Manager to send an update to the alternate gatekeeper list to an endpoint that has already registered. For example, if the ip-network-region form for region Y is changed, IP telephones currently registered in region Y can be sent a message from Avaya Communication Manager to update the phone’s alternate gatekeeper list.

### 7.2.1. Example Using Communication Manager Release 5.0 – Changing the Backup Servers via the IP Network Region Form

In the “base configuration”, network region 3 is configured with one “Backup Server” on page 3 of the ip-network-region form. As has been already demonstrated, the IP address 2.2.1.88, associated with the node name for an S8300C Server Local Survivable Processor (LSP), appears at the end of the alternate gatekeeper list for phones in region 3. Assume the network administrator wants to add another LSP to the alternate gatekeeper list stored in telephones in region 3. When the list of Backup Servers on page 2 of the ip-network-region screen is changed, Avaya Communication Manager will send a message (login-info-update) to the currently registered telephones in region 3. This message allows the telephone to update its alternate gatekeeper list, without requiring the phone to re-register.

The relevant portion of a MIB Walk of extension 52020 in network region 3 is shown below. This MIB Walk was performed just before the change to the ip-network-region shown below.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88

The following screen shows a change to the “base configuration”. A second backup server with node name “S83LSP-in-G250” is added to the list, as shown in bold. This node name is shown in the list output in Section 3, and is associated with IP address 2.2.25.88.

```

change ip-network-region 3                                     Page 2 of 19
                                IP NETWORK REGION

INTER-GATEWAY ALTERNATE ROUTING / DIAL PLAN TRANSPARENCY
Incoming LDN Extension: 52111
Conversion To Full Public Number - Delete: 1  Insert: 732852
Maximum Number of Trunks to Use for IGAR: 2
Dial Plan Transparency in Survivable Mode? y

BACKUP SERVERS(IN PRIORITY ORDER)      H.323 SECURITY PROFILES
1   S83LSP-in-G700                      1   pin-eke
2   S83LSP-in-G250                    2   any-auth
3
4
5
6
                                Allow SIP URI Conversion? y

TCP SIGNALING LINK ESTABLISHMENT FOR AVAYA H.323 ENDPOINTS
Near End Establishes TCP Signaling Socket? y
                                Near End TCP Port Min: 61440
                                Near End TCP Port Max: 61444

```

A portion of an ethereal trace is shown below. In this screen capture, the overall message structure is illustrated, before expanding key sub-trees to confirm the contents of the alternate gatekeeper list contained in the “loginInfoUpdate” message.

```

Filter: ip.addr == 2.2.1.109
+ Expression... Clear Apply
No. Time Source Destination Protocol Info
9 4.577481 2.2.1.109 2.2.85.20 TCP 1720 > 61440 [ACK] Seq=
10 4.578534 2.2.85.20 2.2.1.109 TCP [TCP ACKed lost segment]
24 12.527112 2.2.85.20 2.2.1.109 H.225. CS: empty
25 12.528374 2.2.1.109 2.2.85.20 TCP 1720 > 61440 [ACK] Seq=
.....
Frame 24 (260 bytes on wire, 260 bytes captured)
Ethernet II, Src: ExtremeN_1d:83:b0 (00:04:96:1d:83:b0), Dst: Avaya_ec:05:b7 (00:04:
Internet Protocol, Src: 2.2.85.20 (2.2.85.20), Dst: 2.2.1.109 (2.2.1.109)
Transmission Control Protocol, Src Port: 61440 (61440), Dst Port: 1720 (1720), Seq:
TPKT
Q.931
H.225.0 CS
  H323_UserInformation
    h323-uu-pdu
      T_h323_message_body
        0... .... h245Tunneling: False
      nonStandardControl
        Item 0
          Item
            NonStandardIdentifier
              data: 94 octets
            NonStandardDataMessage
              loginInfoUpdate

```

In this screen capture of the same trace, the sub-trees of the “loginInfoUpdate” message are expanded to view the contents of the alternate gatekeeper list. The “ip” value is shown in

hexadecimal with Item 0 containing “02025502” (corresponding to 2.2.85.2) and Item 1 containing “02025514” (corresponding to 2.2.85.20). These are the two C-LANs in network region 3.

```

  ▾ alternateGatekeeper
    ▾ Item 0
      ▾ Item
        ▾ TransportAddress
          ▾ rasAddress: ip4Address (0)
            ▾ ip4Address
              ip: 02025502
              port: 1719
            gatekeeperIdentifier:
              1... .... needToRegister: True
              priority: 0
          ▾ Item 1
            ▾ Item
              ▾ TransportAddress
                ▾ rasAddress: ip4Address (0)
                  ▾ ip4Address
                    ip: 02025514
                    port: 1719
                  gatekeeperIdentifier:
                    1... .... needToRegister: True
                    priority: 0

```

In this screen capture of the same trace, Item 2 in the alternate gatekeeper list is shown. Item 2 corresponds to 2.2.4.2, a C-LAN in network region 5, which is directly connected to region 3.

```

  ▾ Item 2
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ip4Address (0)
          ▾ ip4Address
            ip: 02020402
            port: 1719
          gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0

```

In this screen capture of the same trace, Item 3 in the alternate gatekeeper list is shown. Item 3 corresponds to 2.2.4.20, another C-LAN in network region 5.

```

  ▾ Item 3
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ip4Address (0)
          ▾ ip4Address
            ip: 02020414
            port: 1719
          gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0

```

In this screen capture of the same trace, Items 4 and 5 in the alternate gatekeeper list are shown. Item 4 and 5 corresponds to 2.2.185.2 and 2.2.185.20 respectively, the two C-LANs in network region 1, which is directly connected to region 3.

```

  ▾ Item 4
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ip4Address (0)
          ▾ ip4Address
            ip: 0202B902
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
      ▾ Item 5
        ▾ Item
          ▾ TransportAddress
            ▾ rasAddress: ip4Address (0)
              ▾ ip4Address
                ip: 0202B914
                port: 1719
                gatekeeperIdentifier:
                1... .... needToRegister: True
                priority: 0

```

In this screen capture of the same trace, Item 6 in the alternate gatekeeper list is shown. Item 6 corresponds to 2.2.1.88, the IP address of the first LSP in the list of backup servers for network region 3.

```

  ▾ Item 6
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ip4Address (0)
          ▾ ip4Address
            ip: 02020158
            port: 1719
            gatekeeperIdentifier: \035
            1... .... needToRegister: True
            priority: 50

```

In this screen capture of the same trace, Item 7 in the alternate gatekeeper list is shown. Item 7 corresponds to 2.2.25.88, the IP address of the second LSP in the list of backup servers for network region 3. This is the LSP that was added to the list via “change ip-network-region 3”, to alter the base configuration, and trigger the login-info-update message. As can be seen, this item terminates the list of alternate gatekeepers.

```

    ▾ Item 7
      ▾ Item
        ▾ TransportAddress
          ▾ rasAddress: ip4Address (0)
            ▾ ip4Address
              ip: 02021958
              port: 1719
              gatekeeperIdentifier: \032
              1... .... needToRegister: True
              priority: 50
        ▸ genericData
  
```

The relevant portion of a MIB Walk of extension 52020 in network region 3 is shown below. This MIB Walk was performed soon after the change to the ip-network region form. Observe the IP address 2.2.25.88, corresponding to the node name “S83LSP-in-G250” now appears at the end of the alternate gatekeeper list stored in the telephone.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.8	ipEndpointMIBs.2.6.4.1.1.8	2.2.25.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

Next, the ip-network-region 3 form was changed again, removing the “S83LSP-in-G250” node name, to restore the original “base configuration”. This also triggers the update message to currently registered telephones in region 3. The following MIB Walk was performed just after the change to the ip-network region that restored the original base configuration. Observe that not only has the IP address 2.2.25.88 been removed from the end of the alternate gatekeeper list, but also the order of the C-LANs in directly connected regions has also changed. Previously, the C-LANs in directly connected region 5 (2.2.4.2, 2.2.4.20) appeared before the C-LANs in directly connected region 1 (2.2.185.2, 2.2.185.20). After the change to the backup server list, the C-LANs in region 1 appear before the C-LANs in region 5. This example is included to illustrate that changes to the “Backup Servers” can influence the entire alternate gatekeeper list for a given phone, not only the survivable server entries portion of the list.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

## 7.2.2. Updating the Backup Servers Using Communication Manager Release 5.1

As in Avaya Communication Manager Release 5.0, changes to the Backup Server list in the ip-network-region form trigger an update message to change a registered telephone's alternate gatekeeper list using Avaya Communication Manager Release 5.1. In addition, changes to the new AGL field on the ip-network-region form in Communication Manager Release 5.1 trigger login-info-update messages to registered telephones, allowing dynamic updates to the C-LAN contents in the alternate gatekeeper list.

In Section 6.1, the AGL field was changed from "all" to "2" for network region 3, while phones such as extension 52020 were registered in region 3. A MIB Walk of an already registered phone was illustrated. The following screen from an ethereal trace shows the message that updated the already registered phone's alternate gatekeeper list.

```
173 36.559498 2.2.85.2          2.2.1.109          H.225. CS: empty
174 36.565508 2.2.1.109          2.2.85.2          TCP 1720 > 61442 [ACK] Seq=1
-----
  ▾ alternateGatekeeper
    ▾ alternateGatekeeper
      ▾ Item 0
        ▾ Item
          ▾ TransportAddress
            ▾ rasAddress: ip4Address (0)
              ▾ ip4Address
                ip: 02025502
                port: 1719
                gatekeeperIdentifier:
                1... .... needToRegister: True
                priority: 0
          ▾ Item 1
            ▾ Item
              ▾ TransportAddress
                ▾ rasAddress: ip4Address (0)
                  ▾ ip4Address
                    ip: 02025514
                    port: 1719
                    gatekeeperIdentifier:
                    1... .... needToRegister: True
                    priority: 0
          ▾ Item 2
            ▾ Item
              ▾ TransportAddress
                ▾ rasAddress: ip4Address (0)
                  ▾ ip4Address
                    ip: 02020158
                    port: 1719
                    gatekeeperIdentifier: \035
                    1... .... needToRegister: True
                    priority: 50
    ▸ genericData
```

### 7.2.3. Other Changes Triggering or Not Triggering an Update to Currently Registered Telephones

Another example of a condition that can update the phone's alternate gatekeeper list for an active registration is the addition of a C-LAN to a phone's region.

Examples of changes that do not update the phone's alternate gatekeeper during an active registration are a change to the ip-network-map form, a change to the survivable gatekeeper administered on the station form (see Section 7.5), or a change to the ip-network-region inter-region connectivity in Avaya Communication Manager Release 5.0. A phone would need to re-register following such changes to re-acquire an alternate gatekeeper list that reflected the change.

### 7.3. Example Registration from IP Telephone NOT in ip-network-map

To this point, IP Address 2.2.1.109 has been mapped explicitly to network region 3 via the ip-network-map (Section 3). For the examples in this section, IP Address 2.2.1.109 is removed from any IP address range appearing in the ip-network-map. The IP Telephone that has been assigned this IP address via DHCP is reset. The telephone re-acquires the same IP Address, and will attempt to register to the C-LAN that is first in the list served via DHCP. The order of the DHCP list is varied below to illustrate different cases.

A telephone that is not in the network map will only be served alternate C-LANs in the same region as the C-LAN to which it registers. The list of alternate C-LANs can include all C-LANs in the phone's region, using Avaya Communication Manager Release 5.0, or using the default behavior of Avaya Communication Manager Release 5.1. In this example, to illustrate that a telephone that is not in the ip-network-map is still subject to the new AGL controls for the region to which it registers, network region 3 and network region 1 are changed such that the AGL field for the native region is set to 1.

The following ethereal trace illustrates an example behavior. The IP Telephone sends its GRQ to 2.2.85.2, the first gatekeeper IP Address specified via the DHCP Option 242 string. The RCF in the trace below is highlighted, and the alternate gatekeeper portion of the message is expanded. In this case, the alternate gatekeeper list contains one C-LAN, 2.2.85.20, a C-LAN in region 3, and the LSP 2.2.1.88 that is configured as a backup server for region 3. Although not shown in this trace, the TCP signaling connection is also established via 2.2.85.20.

No. .	Time	Source	Destination	Protocol	Info
180	63.647595	2.2.1.109	2.2.85.2	H.225.RAS:	gatekeeperRequest
181	63.745676	2.2.85.2	2.2.1.109	H.225.RAS:	gatekeeperConfirm
182	63.849663	2.2.1.109	2.2.85.2	H.225.RAS:	registrationReques
183	63.871380	2.2.85.2	2.2.1.109	H.225.RAS:	registrationConfir

```

  ▾ alternateGatekeeper
    ▾ Item 0
      ▾ Item
        ▾ TransportAddress
          ▾ rasAddress: ipAddress (0)
            ▾ ipAddress
              ip: 2.2.85.20 (2.2.85.20)
              port: 1719
              gatekeeperIdentifier:
                1... .... needToRegister: True
                priority: 0
        ▾ Item 1
          ▾ Item
            ▾ TransportAddress
              ▾ rasAddress: ipAddress (0)
                ▾ ipAddress
                  ip: 2.2.1.88 (2.2.1.88)
                  port: 1719
                  gatekeeperIdentifier: \035
                  1... .... needToRegister: True
                  priority: 50
              timeToLive: 25200
            ▸ tokens
  
```

The following screen shows the status station output corresponding to this registration. Note that the phone is in region 3, and has a TCP signaling connection to the C-LAN with IP Address 2.2.85.20 in region 3.

status station 52020				Page	4 of	8
CALL CONTROL SIGNALING						
Port: S00046	Switch-End IP Signaling Loc: 02B0217		H.245 Port:			
	IP Address		Port	Node Name	Rgn	
Switch-End:	2. 2. 85. 20		61444	c-lan2b02	3	
Set End:	2. 2. 1.109		1720		3	

Recall that the C-LAN contacted 2.2.85.2 (with GRQ). In this example, Avaya Communication Manager initiated the TCP process from a different C-LAN in the same region. Recall also that the number of alternate C-LANs was limited by setting the AGL field to 1 for network region 3.

The following screen shows the additional page of alternate gatekeeper information available in Avaya Communication Manager Release 5.1, when the new algorithm is being used. Note that the list includes only one C-LAN entry, matching the ethereal trace shown above.

status station 52020				Page	7 of	8
ALTERNATE GATEKEEPER LIST						
	Main		Shared Control Ports		Shared Control Ports	
Node Name	Region	Node Name	Region	Node Name	Region	
c-lan2b02	3					

Although the alternate gatekeeper list in the RCF contained only one C-LAN (2.2.85.20), a MIB Walk of this phone will include both the C-LAN to which the GRQ was sent (2.2.85.2) as well as the one served by Avaya Communication Manager. In this example, the IP Telephone inserted 2.2.85.2 into its stored alternate gatekeeper list (observe ipEndpointMIBs.2.6.4.1.1.2). In general, the MIB Walk may not match the list sent by Avaya Communication Manager, in cases where the IP Telephone initially contacts C-LANs that are absent from the alternate gatekeeper list in RCF from Avaya Communication Manager. From looking at the MIB Walk alone, it could have falsely appeared that Avaya Communication Manager failed to enforce the configured maximum of "1" in the AGL column, since two C-LANs appear in the phone's alternate gatekeeper list.

```

Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.1.0      ipEndpointMIBs.2.6.1.0      2.2.85.2,2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.2.0      ipEndpointMIBs.2.6.2.0      2.2.85.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.3.0      ipEndpointMIBs.2.6.3.0      52020
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1      ipEndpointMIBs.2.6.4.1.1.1  2.2.85.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2      ipEndpointMIBs.2.6.4.1.1.2  2.2.85.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3      ipEndpointMIBs.2.6.4.1.1.3  2.2.1.88
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.5.0      ipEndpointMIBs.2.6.5.0      20

```

As another similar example, assume the order of the C-LANs in the DHCP list is reversed such that IP Address 2.2.185.2 appears before IP Address 2.2.85.2. After a reset of the IP Telephone, the IP Telephone contacts 2.2.185.2 first (via GRQ). In this example, the IP Telephone registered with IP Address 2.2.185.20, a different C-LAN in the same region as 2.2.185.2. The following screen shows the status station output for the registered station. Note that the phone is considered to be in region 1, and has a TCP signaling connection to the C-LAN with IP Address 2.2.185.20 in region 1. Since the IP Address 2.2.1.109 is not in the ip-network-map (in the examples of this section), observe that the network region of the phone will be based on the C-LAN to which it registers, and not the IP address of the telephone itself.

status station 52020		CALL CONTROL SIGNALING		Page 4 of 8	
Port: S00046	Switch-End IP Signaling Loc: 01A1017	H.245 Port:			
	IP Address	Port	Node Name	Rgn	
Switch-End:	2. 2.185. 20	61443	c-lan1A10	1	
Set End:	2. 2. 1.109	1720		1	

As in the previous example, assume that region 1 has been configured such that a 1 appears in the AGL field. The following screen shows the additional page of alternate gatekeeper information available in Avaya Communication Manager Release 5.1, when the new algorithm is being used. Note that the list includes only one entry, and the entry matches the C-LAN used for the TCP signaling connection.

status station 52020		ALTERNATE GATEKEEPER LIST		Page 7 of 8	
Main	Region	Shared Control Ports	Region	Shared Control Ports	Region
Node Name	Region	Node Name	Region	Node Name	Region
c-lan1A10	1				

Although Avaya Communication Manager 5.1 set up TCP signaling using 2.2.185.20, and included only 2.2.185.20 in the alternate gatekeeper list in RCF (as confirmed via an omitted ethereal trace), the IP Telephone inserts 2.2.185.2 into its stored copy of the alternate gatekeeper list, as shown in the following MIB Walk. Since the telephone is considered to be in region 1, by virtue of registering with a C-LAN in region 1 (i.e., since there is no explicit ip-network-map entry), observe that there is no LSP entry in the alternate gatekeeper list (since no LSP has been configured for network region 1 in the example in these Application Notes). The change to the DHCP list can also be observed by comparing ipEndpointMIBs.2.6.1.0 with prior traces.

```

Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.1.0      ipEndpointMIBs.2.6.1.0      2.2.185.2,2.2.85.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.2.0      ipEndpointMIBs.2.6.2.0      2.2.185.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.3.0      ipEndpointMIBs.2.6.3.0      52020
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1      ipEndpointMIBs.2.6.4.1.1.1  2.2.185.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2      ipEndpointMIBs.2.6.4.1.1.2  2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.5.0      ipEndpointMIBs.2.6.5.0      20
  
```

## 7.4. Example Showing Effect of Indirectly Connected Regions

To this point, the examples have focused on the contents of the alternate gatekeeper list when network regions are directly connected. In this section, some network region connectivity will be changed from directly connected to indirectly connected through an intervening region. Specifically, the connectivity between network region 3 and network region 5 is changed to be indirect, with network region 1 as the intervening region.

### 7.4.1. Communication Manager 5.0 Example – Indirectly Connected Regions

The following screen illustrates a change to the base configuration for ip-network-region 3 inter-region connectivity. The **direct WAN** field for the last row shown below has been changed to “n”, and the **Intervening-regions** field for this row now contains region 1 as an intervening region.

change ip-network-region 3											Page 3 of 19	
Inter Network Region Connection Management												
src rgn	dst rgn	codec set	direct WAN	WAN-BW-limits Units	Video Total Norm	Prio Shr	Intervening-regions	Dyn CAC	IGAR			
3	1	1	y	Calls	1				n			
3	2											
3	3	1										
3	4	1	y	NoLimit								
3	5	1	n				1 : : :					

After making these changes, the IP Telephone with extension 52020 in region 3 was reset, forcing new registration. (This type of change does not trigger a login-info-update to an already registered station) The following portion of the MIB Walk output for extension 52020 illustrates the alternate gatekeeper list after the phone had registered. As can be observed, the alternate gatekeeper list includes the C-LANs in network region 3 and network region 1, followed by the LSP. The C-LANs in network region 5 are no longer included in the alternate-gatekeeper list, since the regions are not directly connected.

```

Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.5.1.0      ipEndpointMIBs.2.5.1.0      0
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.1.0      ipEndpointMIBs.2.6.1.0      2.2.85.2,2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.2.0      ipEndpointMIBs.2.6.2.0      2.2.85.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.3.0      ipEndpointMIBs.2.6.3.0      52020
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1      ipEndpointMIBs.2.6.4.1.1.1  2.2.85.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2      ipEndpointMIBs.2.6.4.1.1.2  2.2.85.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3      ipEndpointMIBs.2.6.4.1.1.3  2.2.185.2
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4      ipEndpointMIBs.2.6.4.1.1.4  2.2.185.20
Avaya-46xxIP... 1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5      ipEndpointMIBs.2.6.4.1.1.5  2.2.1.88

```

### 7.4.2. Communication Manager 5.1 Example – Indirectly Connected Regions

In Release 5.1, if there is an “All” in the AGL column indicating use of the legacy algorithm, the behavior for indirectly connected regions will be the same as described in the previous section. That is, C-LANs in indirectly connected regions will not be included in the alternate gatekeeper list.

However, when using the new algorithm with numeric values in the AGL column, it is possible to include C-LANs from indirectly connected regions in the alternate gatekeeper list. For example, consider the following configuration of ip-network-region 3. Observe that network region 3 is indirectly connected to network region 5 via intervening region 1, as in the example above. The AGL column for a row gives the administrator the option of including C-LANs from indirectly connected regions in the alternate gatekeeper list. As shown below, two C-LANs from indirectly connected region 5 should be sent to phones registering in region 3.

change ip-network-region 3										Page 3 of 19		
Inter Network Region Connection Management												
src rgn	dst rgn	codec set	direct WAN	WAN-BW-limits Units	Video Total Norm	Intervening Prio Shr Regions	Dyn CAC IGAR AGL					
3	1	1	y	Calls	1			n	1			
3	2											
3	3	1							1			
3	4	1	y	NoLimit				n				
3	5	1	n			1: : :		n	2			

Upon submitting the form with the changes in the AGL column, stations already registered in network region 3 receive a login-info-update message to update the alternate gatekeeper list. The following is a portion of the MIB Walk of extension 52020 in region 3 after the above changes were made. Observe the alternate gatekeeper list begins with one C-LAN from network region 3, the region of the phone (2.2.85.2). The next entry in the list is one C-LAN (2.2.185.2) from directly connected network region 1. The next two entries are the two C-LANs (2.2.4.2, 2.2.4.20) from indirectly connected region 5. The next entry observed in the list, 2.2.85.20, is

autonomously put in the list by the telephone. IP Address 2.2.85.20 was not in the Login-info-update message sent by Avaya Communication Manager, but since the IP Telephone has its TCP connection for the current registration from 2.2.85.20 (ipEndpointMIBs.2.6.2.0), the IP Telephone appends this IP address to the C-LAN portion of the list. The final entry in the list is the LSP configured as a backup server for network region 3.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

The following screen shows the new status station output from Avaya Communication Manager matching the login-info-update content, but differing from the MIB Walk, for the reasons explained previously.

status station 52020				Page 7 of 8	
ALTERNATE GATEKEEPER LIST					
Main		Shared Control Ports		Shared Control Ports	
Node Name	Region	Node Name	Region	Node Name	Region
c-lan2a02	3				
c-lan	1				
clan1-cmc	5				
c-lan3A09	5				

Note that the explicit alternate gatekeeper list content in the login-info-update did not include 2.2.85.20, but since the existing TCP connection uses 2.2.85.20, the telephone includes 2.2.85.20 in its copy of the alternate gatekeeper list

status station 52020				Page 4 of 8	
CALL CONTROL SIGNALING					
Port: S00046	Switch-End IP Signaling Loc: 02B0217		H.245 Port:		
	IP Address		Port	Node Name	Rgn
Switch-End:	2. 2. 85. 20		61442	c-lan2b02	3
Set End:	2. 2. 1.109		1720		3

## 7.5. Example with Survivable Gatekeeper from Station Form

To this point, the examples that included survivable servers used LSPs translated as backup servers on page 2 of the ip-network-region form. It is also possible to configure an individual station extension with a survivable gatekeeper to be included in the alternate gatekeeper list when that specific station registers. This can be useful in cases where it is not desirable to define a unique network region for a station, but it is desirable to serve the station a survivable server. The following screen shows the relevant configuration, where the **Survivable GK Node Name** field in bold has been changed from blank to a node name. Although the example in this section uses Avaya Communication Manager Release 5.1, the bold field and the behavior is not new to

Release 5.1. Unlike changes to the backup servers listed on page 2 of the ip-network-region form, changes to the **Survivable GK Node Name** field do not trigger a login-info-update message to update the alternate gatekeeper list of the station being changed. The phone must register anew to acquire an alternate gatekeeper list that includes a new or changed **Survivable GK Node Name**.

change station 52020		Page 1 of 6
STATION		
Extension: 52020	Lock Messages? n	BCC: 0
Type: 9620	Security Code: 1234	TN: 1
Port: S00046	Coverage Path 1:	COR: 1
Name: John Public	Coverage Path 2:	COS: 3
	Hunt-to Station:	
STATION OPTIONS		
Loss Group: 19	Time of Day Lock Table:	
	Personalized Ringing Pattern: 1	
	Message Lamp Ext: 52020	
Speakerphone: 2-way	Mute Button Enabled? y	
Display Language: english		
<b>Survivable GK Node Name: S83LSP-in-G250</b>		
Survivable COR: internal	Media Complex Ext:	
Survivable Trunk Dest? y	IP SoftPhone? n	

Avaya Communication Manager will include the IP address that corresponds to the **Survivable GK Node Name** at the end of the alternate gatekeeper list in the RCF message, after any primary gatekeepers (e.g., C-LANs) and after any backup servers (e.g., LSPs) configured for the phone's network region. The following shows a portion of a MIB Walk for station 52020, after the phone had re-registered following the configuration of the **Survivable GK Node Name** above. In this example, taken for an ip-network-region that included "all" in the AGL column, the list contains six C-LANs, corresponding to the total of six C-LANs in the phone's region and the connected regions, followed by the LSP for network region 3 at 2.2.1.88, followed by IP address 2.2.25.88, which corresponds to node name "S83LSP-in-G250" added to the **Survivable GK Node Name** field for station 52020. Had the ip-network-region configuration not included LSPs, the IP address 2.2.25.88 would have appeared immediately following the last C-LAN.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.8	ipEndpointMIBs.2.6.4.1.1.8	2.2.25.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

## 7.6. Example with Region Configured To Prevent TTS Behaviors

To this point, the default ip-network-region configuration that enables the TTS behaviors has been used. That is, the value of the **Near End Establishes TCP Signaling Socket** field on the ip-network-region form has been “y”, enabling Avaya Communication Manager to set up the TCP signaling channel towards the IP endpoint. The following screen shows a change to the base configuration, where the **Near End Establishes TCP Signaling Socket** field in bold has been changed from “y” to “n” for network region 3. Changes to the **Near End Establishes TCP Signaling Socket** field take effect for subsequent registrations, as the message at the bottom of the screen warns.

```
change ip-network-region 3                                     Page 2 of 19
                                                             IP NETWORK REGION

INTER-GATEWAY ALTERNATE ROUTING / DIAL PLAN TRANSPARENCY
Incoming LDN Extension: 52111
Conversion To Full Public Number - Delete: 1  Insert: 732852
Maximum Number of Trunks to Use for IGAR: 2
Dial Plan Transparency in Survivable Mode? y

BACKUP SERVERS(IN PRIORITY ORDER)      H.323 SECURITY PROFILES
1   S83LSP-in-G700                     1   pin-eke
2                                       2   any-auth
3                                       3
4                                       4
5
6                                       Allow SIP URI Conversion? y

TCP SIGNALING LINK ESTABLISHMENT FOR AVAYA H.323 ENDPOINTS
Near End Establishes TCP Signaling Socket? n
Near End TCP Port Min: 61440
Near End TCP Port Max: 61444

WARNING: IP-stations in this region must be reset for changes to take effect
```

### 7.6.1. Communication Manager 5.0 Example Registration – Non-TTS Region

In the trace shown in Section 4.1, the IP Telephone sent a GRQ to the C-LAN whose IP Address was 2.2.85.2, and the GCF message received back from Avaya Communication Manager contained this same address to be used for the RRQ. The phone sent the RRQ to the same C-LAN as the GRQ. This will generally be the case when the phone is capable of TTS, and the network region is configured for TTS. The TTS algorithm balances the TCP signaling channel establishment (from Avaya Communication Manager toward the telephone) taking into account actual socket usage vs. configurable target socket load and warning level. When TTS is not used, upon receipt of the RCF, the IP Telephone establishes the TCP socket toward Avaya Communication Manager, using the same C-LAN from which the RCF was received. Therefore, when TTS is not used, Avaya Communication Manager can direct the telephone (using GCF) to a different C-LAN than the one the phone used for GRQ, to spread the registration load across multiple C-LANs.

For illustration, the following trace shows an example of such a registration sequence. After the change to region 3 to “disable TTS” was submitted, the telephone with extension 52020 was restarted to force re-registration. Observe the GRQ is sent to 2.2.85.2, the first IP address

provided by the DHCP server. The GCF returned by Avaya Communication Manager is highlighted so that the additional details apply to the GCF message. The IP Address (2.2.85.20) the IP Telephone uses for its subsequent RRQ is shown.

No. .	Time	Source	Destination	Protocol	Info
380	67.415067	2.2.1.109	2.2.85.2	H.225. RAS:	gatekeeperRequest
381	67.509435	2.2.85.2	2.2.1.109	H.225. RAS:	gatekeeperConfirm
382	67.611378	2.2.1.109	2.2.85.20	H.225. RAS:	registrationRequest
383	67.639847	2.2.85.20	2.2.1.109	H.225. RAS:	registrationConfirm

Filter: ip.addr == 2.2.1.109

- ▼ RasMessage
  - ▼ RasMessage: gatekeeperConfirm (1)
    - ▼ gatekeeperConfirm
      - requestSeqNum: 2
      - protocolIdentifier: 0.0.8.2250.0.5
      - ▼ TransportAddress
        - ▼ rasAddress: ipAddress (0)
          - ▼ ipAddress
            - ip: 2.2.85.20 (2.2.85.20)
            - port: 1719

In frame 382, the IP Telephone sends the RRQ to 2.2.85.20, as directed by the GCF. In frame 383, Avaya Communication Manager responds with RCF. In the portion of the trace below, the RCF is highlighted, and the first two items in the alternate gatekeeper list are shown. These are the two C-LANs in network region 3, the region of the telephone.

No. .	Time	Source	Destination	Protocol	Info
380	67.415067	2.2.1.109	2.2.85.2	H.225. RAS:	gatekeeperRequest
381	67.509435	2.2.85.2	2.2.1.109	H.225. RAS:	gatekeeperConfirm
382	67.611378	2.2.1.109	2.2.85.20	H.225. RAS:	registrationRequest
383	67.639847	2.2.85.20	2.2.1.109	H.225. RAS:	registrationConfirm

- ▼ alternateGatekeeper
  - ▼ Item 0
    - ▼ Item
      - ▼ TransportAddress
        - ▼ rasAddress: ipAddress (0)
          - ▼ ipAddress
            - ip: 2.2.85.20 (2.2.85.20)
            - port: 1719
        - gatekeeperIdentifier:
        - 1... .... needToRegister: True
        - priority: 0
      - ▼ Item 1
        - ▼ Item
          - ▼ TransportAddress
            - ▼ rasAddress: ipAddress (0)
              - ▼ ipAddress
                - ip: 2.2.85.2 (2.2.85.2)
                - port: 1719
            - gatekeeperIdentifier:
            - 1... .... needToRegister: True
            - priority: 0

The next screen shows the next two items in the alternate gatekeeper list in the RCF message. These are the two C-LANs in network region 5, a directly connected region.

```

  ▾ Item 2
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ipAddress (0)
          ▾ ipAddress
            ip: 2.2.4.20 (2.2.4.20)
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
  ▾ Item 3
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ipAddress (0)
          ▾ ipAddress
            ip: 2.2.4.2 (2.2.4.2)
            port: 1719
            gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
```

The next screen shows the next two items in the alternate gatekeeper list in the RCF message. These are the two C-LANs in network region 1, a directly connected region, followed by the LSP (2.2.1.88) configured as a backup server for network region 3. As expected, the alternate gatekeeper list is consistent with the algorithm illustrated previously for regions where TTS was enabled. That is, the list contains a full set of native region C-LANs, then directly connected region C-LANs, followed by the LSP configured for region 3.

```

  ▾ Item 4
    ▾ Item
      ▾ TransportAddress
        ▾ rasAddress: ipAddress (0)
          ▾ ipAddress
            ip: 2.2.185.20 (2.2.185.20)
            port: 1719
          gatekeeperIdentifier:
            1... .... needToRegister: True
            priority: 0
      ▾ Item 5
        ▾ Item
          ▾ TransportAddress
            ▾ rasAddress: ipAddress (0)
              ▾ ipAddress
                ip: 2.2.185.2 (2.2.185.2)
                port: 1719
              gatekeeperIdentifier:
                1... .... needToRegister: True
                priority: 0
          ▾ Item 6
            ▾ Item
              ▾ TransportAddress
                ▾ rasAddress: ipAddress (0)
                  ▾ ipAddress
                    ip: 2.2.1.88 (2.2.1.88)
                    port: 1719
                  gatekeeperIdentifier: \035
                  1... .... needToRegister: True
                  priority: 50

```

The following portion of the trace shows the TCP signaling that immediately follows the RCF. Observe that in frame 384, the IP Telephone establishes TCP towards the C-LAN from which the RCF was received. For contrast, an example portion of a trace showing TCP establishment from Avaya Communication Manager toward the telephone is shown in Section 4.1, where TTS is enabled as per the description of the base configuration in Section 1.1.

No. .	Time	Source	Destination	Protocol	Info
380	67.415067	2.2.1.109	2.2.85.2	H.225.	RAS: gatekeeperRequest
381	67.509435	2.2.85.2	2.2.1.109	H.225.	RAS: gatekeeperConfirm
382	67.611378	2.2.1.109	2.2.85.20	H.225.	RAS: registrationRequest
383	67.639847	2.2.85.20	2.2.1.109	H.225.	RAS: registrationConfirm
384	67.702976	2.2.1.109	2.2.85.20	TCP	4117 > 1720 [SYN] Seq=0
385	67.704463	2.2.85.20	2.2.1.109	TCP	1720 > 4117 [SYN, ACK] S
386	67.704847	2.2.1.109	2.2.85.20	TCP	4117 > 1720 [ACK] Seq=1
387	67.850523	2.2.1.109	2.2.185.232	TCP	1025 > http [SYN] Seq=0
390	67.883901	2.2.1.109	2.2.1.10	TCP	33472 > 81 [SYN] Seq=0 A
391	67.883904	2.2.1.10	2.2.1.109	TCP	81 > 33472 [SYN, ACK] Se
392	67.884579	2.2.1.109	2.2.1.10	TCP	33472 > 81 [ACK] Seq=1 A
393	67.885446	2.2.1.109	2.2.1.10	TCP	33472 > 81 [PSH, ACK] Se
394	67.939205	2.2.1.109	2.2.85.20	Q.931	SETUP[Short Frame]
395	67.973305	2.2.85.20	2.2.1.109	TCP	1720 > 4117 [ACK] Seq=1
396	67.973753	2.2.1.109	2.2.85.20	TCP	4117 > 1720 [PSH, ACK] S
397	67.974915	2.2.85.20	2.2.1.109	TCP	1720 > 4117 [ACK] Seq=1
398	67.997986	2.2.85.20	2.2.1.109	H.225.	CS: callProceeding
399	68.005007	2.2.1.109	2.2.85.20	TCP	4117 > 1720 [ACK] Seq=18
400	68.009466	2.2.85.20	2.2.1.109	H.225.	CS: connect OpenLogicalC

The following shows a portion of a MIB Walk after the above registration. The telephone is registered to 2.2.85.20 (ipEndpointMIBs.2.6.2.0), and the alternate gatekeeper list matches the order of the alternate gatekeeper items in the network trace.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

The following screen illustrates the status station output. Note that the Switch-end port is 1720. With TTS disabled, the Avaya IP Telephone established the TCP channel towards the C-LAN at 2.2.85.20, port 1720. In prior screens (e.g., see Section 4.1.2) where TTS is used, observe that port 1720 is used at the Set End, since in those prior cases, Avaya Communication Manager established the TCP signaling channel towards the IP Telephone IP address and port 1720.

status station 52020		Page 4 of 7	
CALL CONTROL SIGNALING			
Port: S00046	Switch-End IP Signaling Loc: 02B0217	H.245 Port:	
	IP Address	Port	Node Name Rgn
Switch-End:	2. 2. 85. 20	1720	c-lan2b02 3
Set End:	2. 2. 1.109	4117	3

In the example just illustrated, the initial GRQ was sent to a C-LAN in the same region as the telephone, and Avaya Communication Manager directed the telephone to a different C-LAN in the same region via GCF. In the following example, the initial GRQ is sent to a C-LAN in a different region than the mapped network region of the telephone. (For the next example, the order of the IP addresses provided by DHCP was reversed so that 2.2.185.2 was before 2.2.85.2, and the phone was restarted.)

The following screen shows another command that can be useful in understanding the behavior. In the first bold row, the telephone sends its GRQ to the C-LAN at 2.2.185.2. In the next bold row, the telephone sends its RRQ to 2.2.85.20. It can not be explicitly observed via this command, but it can be inferred that the GCF message directed the telephone to send its RRQ to a C-LAN in the phone's region. In the final bold row, the trace output shows that TCP is connected by the far-end "(fe)" telephone towards the C-LAN.

list trace station 52020		Page 1	
LIST TRACE			
time	data		
14:15:53	rcv GRQ endpt 2.2.1.109:49300	switch 2.2.185.2:1719	ext 52020
14:15:53	snd GCF endpt 2.2.1.109:49300	switch 2.2.185.2:1719	ext 52020
14:15:53	rcv RRQ endpt 2.2.1.109:49300	switch 2.2.85.20:1719	ext 52020
14:15:53	snd RCF endpt 2.2.1.109:49300	switch 2.2.85.20:1719	ext 52020
14:15:54	<b>TCP connected (fe)</b>	<b>endpt:2.2.1.109:2220</b>	<b>switch:2.2.85.20:1720</b>
14:15:54	Q.931 Setup received	endpt:2.2.1.109:2220	switch:2.2.85.20:1720
14:15:54	Q.931 CallProc sent	endpt:2.2.1.109:2220	switch:2.2.85.20:1720
14:15:54	Q.931 Connect sent	endpt:2.2.1.109:2220	switch:2.2.85.20:1720

The overall flow shown by "list trace station" matches the network trace shown below. When collecting a network trace is impractical, Avaya Communication Manager tracing tools can be used to obtain much of the relevant information.

No. .	Time	Source	Destination	Protocol	Info
363	64.178218	2.2.1.109	2.2.185.2	H.225	RAS: gatekeeperRequest
364	64.276959	2.2.185.2	2.2.1.109	H.225	RAS: gatekeeperConfirm
367	64.379614	2.2.1.109	2.2.85.20	H.225	RAS: registrationRequest
368	64.406286	2.2.85.20	2.2.1.109	H.225	RAS: registrationConfirm
369	64.467629	2.2.1.109	2.2.85.20	TCP	2220 > 1720 [SYN] Seq=0 A
370	64.469112	2.2.85.20	2.2.1.109	TCP	1720 > 2220 [SYN, ACK] Se
371	64.469534	2.2.1.109	2.2.85.20	TCP	2220 > 1720 [ACK] Seq=1 A
372	64.615096	2.2.1.109	2.2.185.232	TCP	1025 > http [SYN] Seq=0 A
375	64.647924	2.2.1.109	2.2.1.10	TCP	33246 > 81 [SYN] Seq=0 Ac
376	64.647927	2.2.1.10	2.2.1.109	TCP	81 > 33246 [SYN, ACK] Sec
377	64.648396	2.2.1.109	2.2.1.10	TCP	33246 > 81 [ACK] Seq=1 Ac
378	64.649294	2.2.1.109	2.2.1.10	TCP	33246 > 81 [PSH, ACK] Sec
380	64.703141	2.2.1.109	2.2.85.20	Q.931	SETUP [Short Frame]

The following screen shows a portion of a MIB Walk taken after registration. Although the phone contacted a C-LAN in a different region, the phone's registration is with a C-LAN in its own region (from the ip-network-map), and the alternate gatekeeper list is consistent with the list illustrated for the base configuration throughout these Application Notes.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.185.2,2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

### 7.6.2. Communication Manager 5.1 Example Registration – Non-TTS Region

The changes made in the previous section were verified to have the same effect in Avaya Communication Manager Release 5.1. When network region 3 retained the default “all” in the new AGL field, and the “Near End Establishes TCP Socket” field is “n”, Avaya Communication Manager Release 5.1 balanced the registration using GCF and constructed the alternate gatekeeper list in the same manner as Avaya Communication Manager Release 5.0. The following screen shows an example trace output, where the GRQ was sent to 2.2.85.2, and Avaya Communication Manager Release 5.1 directed the telephone to send the RRQ to 2.2.85.20. The phone initiates the TCP connection to the C-LAN at 2.2.85.20, as described in the examples in the preceding section.

```
list trace station 52020                                     Page 1
LIST TRACE
time      data
14:39:16  rcv GRQ endpt 2.2.1.109:49300 switch 2.2.85.2:1719 ext 52020
14:39:16  snd GCF endpt 2.2.1.109:49300 switch 2.2.85.2:1719 ext 52020
14:39:16  rcv RRQ endpt 2.2.1.109:49300 switch 2.2.85.20:1719 ext 52020
14:39:16  snd RCF endpt 2.2.1.109:49300 switch 2.2.85.20:1719 ext 52020
14:39:16  TCP connected (fe)  endpt:2.2.1.109:5483 switch:2.2.85.20:1720
14:39:17  Q.931 Setup received endpt:2.2.1.109:5483 switch:2.2.85.20:1720
14:39:17  Q.931 CallProc sent  endpt:2.2.1.109:5483 switch:2.2.85.20:1720
14:39:17  Q.931 Connect sent  endpt:2.2.1.109:5483 switch:2.2.85.20:1720
```

The following portion of a MIB Walk for station 52020 after the above registration confirms the alternate gatekeeper list is consistent with the algorithm illustrated throughout these Application Notes.

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.185.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.6	ipEndpointMIBs.2.6.4.1.1.6	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.7	ipEndpointMIBs.2.6.4.1.1.7	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

Next, network region 3 was changed to use the new algorithm as shown in the following screen. The “Near End Establishes TCP Socket” field on page 2 remains set to “n” per the changes applied previously in this section (screen not repeated).

```

change ip-network-region 3                                     Page 3 of 19
      Inter Network Region Connection Management

src dst codec direct  WAN-BW-limits  Video  Intervening  Dyn
rgn rgn set   WAN  Units    Total Norm  Prio Shr Regions  CAC IGAR AGL
3  1  1  y  Calls    1
3  2
3  3  1
3  4  1  y  NoLimit
3  5  1  y  NoLimit
  
```

Recall that a change from “All” to a numeric value in the AGL field triggers a login-info-update (see Section 7.3) and also enables the status station command with the page of additional information.

```

status station 52020                                         Page 4 of 8
      CALL CONTROL SIGNALING
Port: S00046          Switch-End IP Signaling Loc: 02B0217  H.245 Port:
      IP Address          Port  Node Name      Rgn
Switch-End:  2.  2.  85.  20      1720  c-lan2b02     3
Set End:    2.  2.  1.109      5483   3
  
```

The new page of output shows one C-LAN in each region, as expected from the change to the ip-network-region 3 configuration.

```

status station 52020                                         Page 7 of 8
      ALTERNATE GATEKEEPER LIST
Main      Shared Control Ports  Shared Control Ports
Node Name  Region  Node Name  Region  Node Name  Region
c-lan2a02  3
clan1-cmc  5
c-lan      1
  
```

A MIB Walk of the IP Telephone immediately after the login-info-update reveals that this is a case where the MIB Walk did not match the “status station” output. Since the phone is registered to 2.2.85.20, but 2.2.85.20 is not in the alternate gatekeeper list in the login-info-update message, the phone has inserted 2.2.85.20 into the alternate gatekeeper list after the last C-LAN in the login-info-update message (prior to the LSP at 2.2.1.88).

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.85.2,2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.4.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

As another example, the following screen shows an example output after restarting the phone to force a new registration attempt, when the DHCP server list was such that 2.2.185.2 preceded 2.2.85.2.

<b>list trace station 52020</b>		Page 1
LIST TRACE		
time	data	
15:19:36	<b>rcv GRQ endpt 2.2.1.109:49300 switch 2.2.185.2:1719 ext 52020</b>	
15:19:36	snd GCF endpt 2.2.1.109:49300 switch 2.2.185.2:1719 ext 52020	
15:19:36	<b>rcv RRQ endpt 2.2.1.109:49300 switch 2.2.85.20:1719 ext 52020</b>	
15:19:36	snd RCF endpt 2.2.1.109:49300 switch 2.2.85.20:1719 ext 52020	
15:19:36	<b>TCP connected (fe) endpt:2.2.1.109:4569 switch:2.2.85.20:1720</b>	
15:19:36	Q.931 Setup received endpt:2.2.1.109:4569 switch:2.2.85.20:1720	
15:19:36	Q.931 CallProc sent endpt:2.2.1.109:4569 switch:2.2.85.20:1720	
15:19:36	Q.931 Connect sent endpt:2.2.1.109:4569 switch:2.2.85.20:1720	

The IP Telephone is directed to register with 2.2.85.20 via the GCF, and the TCP establishment is from the telephone towards Avaya Communication Manager, the same as with the legacy algorithm where the AGL field was “all”. However, in this case, since the AGL field for the native region and the two directly connected regions has been changed to 1, the alternate gatekeeper list sent by Avaya Communication Manager in the RCF contains only one C-LAN from each region.

<b>status station 52020</b>		Page 7 of 8			
ALTERNATE GATEKEEPER LIST					
	Main		Shared Control Ports		Shared Control Ports
Node Name	Region	Node Name	Region	Node Name	Region
<b>c-lan2a02</b>	<b>3</b>				
<b>c-lan3A09</b>	<b>5</b>				
<b>c-lan</b>	<b>1</b>				

Once again, the phone is registered to 2.2.85.20 as can be seen from the TCP connection above. However, this C-LAN was not the one from region 3 included in the alternate gatekeeper list, as can be seen from the status station output showing that “c-lan2a02” (2.2.85.2) was included from region 3. Therefore, this is another example where the phone’s copy of the list will be different from the one reported by “status station”. The IP address 2.2.85.20 is inserted by the phone between the last C-LAN explicitly in the Avaya Communication Manager list (2.2.185.2) and the first survivable server (2.2.1.88).

Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.5.1.0	ipEndpointMIBs.2.5.1.0	0
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.1.0	ipEndpointMIBs.2.6.1.0	2.2.185.2,2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.2.0	ipEndpointMIBs.2.6.2.0	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.3.0	ipEndpointMIBs.2.6.3.0	52020
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.1	ipEndpointMIBs.2.6.4.1.1.1	2.2.85.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.2	ipEndpointMIBs.2.6.4.1.1.2	2.2.4.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.3	ipEndpointMIBs.2.6.4.1.1.3	2.2.185.2
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.4	ipEndpointMIBs.2.6.4.1.1.4	2.2.85.20
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.4.1.1.5	ipEndpointMIBs.2.6.4.1.1.5	2.2.1.88
Avaya-46xxIP...	1.3.6.1.4.1.6889.2.69.2.6.5.0	ipEndpointMIBs.2.6.5.0	20

## 8. Conclusion

As illustrated in these Application Notes, Avaya Communication Manager Release 5.1 offers greater administrative control over the alternate gatekeeper list provided to IP Telephones. The new administrative controls can benefit customers wishing to refine the contents of the alternate gatekeeper list, or limit the overall size of the alternate gatekeeper list, resulting in faster recovery of service for Avaya IP Telephones in some failure scenarios. Use of the new administrative controls is optional. When the administrative fields associated with the new controls retain default values, Avaya Communication Manager Release 5.1 will provide an alternate gatekeeper list in the same fashion as Avaya Communication Manager Release 5.0.

## 9. References

The following references are relevant to these Application Notes.

[1] Administrators Guide for Avaya Communication Manager, Document 03-300509, Issue 4.0, Release 5.0, Jan 2008.

[http://support.avaya.com/elmodocs2/comm\\_mgr/r5.0/03-300509\\_4.pdf](http://support.avaya.com/elmodocs2/comm_mgr/r5.0/03-300509_4.pdf)

[2] IP Telephony Deployment Guide, 555-245-600, Issue 6, January 2008

[http://support.avaya.com/elmodocs2/comm\\_mgr/r5.0/245600\\_6.pdf](http://support.avaya.com/elmodocs2/comm_mgr/r5.0/245600_6.pdf)

Reference [3] outlines the steps to enable and restrict SNMP access to Avaya IP Telephones.

[3] Avaya IP Telephone SNMP Security, 7/27/06

[http://support.avaya.com/elmodocs2/security/ipphone\\_snmp\\_secv7.pdf](http://support.avaya.com/elmodocs2/security/ipphone_snmp_secv7.pdf)

Reference [4] contains the MIB for Avaya 4600-Series IP Telephones running Release 2.8.

[4] Avaya 46xx Management Information Base (MIB)

<http://support.avaya.com/elmodocs2/MIB/46xxmib28.txt>

Reference [5] contains the MIB for Avaya 9600-Series IP Telephones running Release 1.5

[5] Avaya 96xx Management Information Base (MIB)

<http://support.avaya.com/elmodocs2/MIB/96xxmib.txt>

[6] 4600-Series IP Telephone LAN Administrator's Guide

[http://support.avaya.com/elmodocs2/4600/233507\\_7.pdf](http://support.avaya.com/elmodocs2/4600/233507_7.pdf)

[7] 9600-Series IP Telephone Administrator's Guide Release 1.5

[http://support.avaya.com/elmodocs2/one-X\\_Deskphone\\_Edition/R1.5/16-300698\\_4.pdf](http://support.avaya.com/elmodocs2/one-X_Deskphone_Edition/R1.5/16-300698_4.pdf)

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