



Avaya Solution & Interoperability Test Lab

Application Notes for Configuring heritage PAETEC Communications SIP Trunking with Avaya Communication Server 1000 Release 7.5 and Avaya Session Border Controller for Enterprise Release 4.0.5 – Issue 1.0

Abstract

These Application Notes illustrate a sample configuration using Avaya Communication Server 1000 Release 7.5, Avaya Session Border Controller for Enterprise (Avaya SBCE) Release 4.0.5 with the PAETEC Communications system.

The PAETEC Communications offer referenced within these Application Notes is designed for business customers with an Avaya SIP trunk solution. The service provides local and/or long distance PSTN calling via standards-based SIP trunks directly, without the need for additional TDM enterprise gateways or TDM cards and the associated maintenance costs.

Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.

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1. Introduction

These Application Notes illustrate a sample configuration using Avaya Communication Server 1000 Release 7.5, Avaya Session Border Controller for Enterprise (Avaya SBCE) Release 4.0.5 with the PAETEC Communications system. The PAETEC Communication Service provides local and/or long-distance calls (with PSTN endpoints) via standards-based SIP trunks.

2. General Test Approach and Test Results

The Communication Server 1000 connects to the SBCE using a SIP connection. Then the SBCE connects to the PAETEC Communications system using SIP signaling. Various call types were made from Communication Server 1000 to and from the PAETEC Communications system to verify the interoperability.

DevConnect Compliance Testing is conducted jointly by Avaya and DevConnect members. The jointly-defined test plan focuses on exercising APIs and/or standards-based interfaces pertinent to the interoperability of the tested products and their functionalities. DevConnect Compliance Testing is not intended to substitute full product performance or feature testing performed by DevConnect members, nor is it to be construed as an endorsement by Avaya of the suitability or completeness of a DevConnect member's solution.

Avaya's formal testing and Declaration of Conformity is provided only on the headsets/handsets that carry the Avaya brand or logo. Avaya may conduct testing of non-Avaya headset/handset to determine interoperability with Avaya phones. However, Avaya does not conduct the testing of non-Avaya headsets/handsets for: Acoustic Pressure, Safety, Hearing Aid Compliance, EMC regulations, or any other tests to ensure conformity with safety, audio quality, long-term reliability or any regulation requirements. As a result, Avaya makes no representations whether a particular non-Avaya headset will work with Avaya's telephones or with a different generation of the same Avaya telephone.

2.1. Interoperability Compliance Testing

Compliance testing scenarios for the configuration described in these Application Notes included the following:

- General call processing between Communication Server 1000 and PAETEC Communications systems including:
 - Codec/time (G.729/20ms, G.711 u-law/20ms)
 - Hold/Retrieve on both ends
 - CLID displayed
 - Ring-back tone
 - Speech path
 - Dialing plan support
 - Advanced features (Call on Mute, Call Park, Call Waiting)
 - Abandoned Call
- Call redirection verification: all supported methods (blind transfer, consultative transfer, call forward, and conference) including CLID. Call redirection is performed from both ends
- Fax is supported only with G.711
- DTMF in both directions
- SIP Transport UDP, TCP
- Thru dialing via the Communication Server 1000 Call Pilot
- Voice Mail Server Call Pilot (hosted on Avaya system)
- Static registration

The following assumptions were made for this lab test configuration:

1. Communication Server 1000 R7.5 software and implementation of latest patches
2. PAETEC Communications provides support to setup, configure and troubleshoot on carrier switch during testing execution.
3. During testing, the following activities were made to each test scenario:
4. Calls were checked for the correct call progress tones and cadences.
5. During the ringing state the ring back tone and destination ringing were checked.
6. Calls were checked in both hands-free and handset mode due to internal Avaya requirement.
7. Calls were checked for speech path in both directions using spoken words to ensure clarity of speech.
8. The display(s) of the sets/clients involved were checked for consistent and expected CLID and redirection information both prior to answer and after call establishment.
9. The speech path and messaging system were observed for timely and quality End to End tone audio path generation and application responses.
10. The call server maintenance terminal window was open during the test cases execution for the monitoring of BUG(s), ERR and AUD messages.
11. Speech path was checked before and after calls were put on/off hold from each end.
12. Applicable files were screened on an hourly basis during the testing for message that may indicate technical issues. This refers to Avaya Communication Server files.

13. Calls were checked to ensure that all resources such as Virtual trunks, TDM trunks, Sets and VGWs are released when a call scenario ends.

2.2. Test Results

The objectives outlined in the Section 2.1 were verified. All the applicable test cases were executed. However, the following observations were noted during the compliance testing:

1. Call is made between a Communication Server 1000 phone and a PSTN phone with CPND (call party name display) restricted. This is a requirement from PAETEC Communications.
2. PAETEC Communications system cannot translate the originating CLID to the wrong number (e.g.: 111-111-1111) for the outbound calls.
3. If the Communication Server 1000 phone holds/retrieves an outbound call, the dialed digits are no longer displayed. This is a Communication Server 1000 known issue.
4. PSTN1 phone calls to Communication Server 1000 phone, then phone does blind transfer to PSTN2 phone. PSTN1 phone could not hear ring-back-tone from PSTN2 phone when Communication Server 1000 phone completed blind transfer. In this particular scenario, the UPDATE support is required on the CS1000 for the ring-back-tone, but the PSTN-to-SIP gateway that PAETEC uses for this Interop testing does not support the UPDATE. In order to fix this ring-back-tone issue, we make sure to enable plug-in 501 on CS1000 to allow blind transfer to work without the UPDATE method and configure Avaya SBCE to translate the SIP 183 with SDP to SIP 180 without SDP (**Section 6.2.1** and **6.3.5**) so that PSTN1 can hear the local ring-back-tone. If we do this translation on SBCE, the early media is not supported in this testing.
5. PSTN1 phone calls to Communication Server 1000 phone, then phone does call forward to PSTN2 phone. In this particular scenario, the call forward is failed because the second SIP Invite from Avaya Communication Server 1000 is sending History Info instead of Diversion Header. PAETEC only supports Diversion Header method. In order to fix it, we make sure to configure SBCE to translate the History Info into Diversion Header so that the call forward works properly. Sipera provided a patch load - ipcs-bin-mvista_debug_20120418143545-1.i386.rpm on top of 4.0.5.Q02. With this patch and using a sigma script (**Section 6.2.9**), we were able to add Diversion header to the INV based on History-Info uri. But the scope is limited with sigma script. We can't add an appropriate reason in Diversion header based on reason in History-Info header. This is a limitation.

It was agreed with PAETEC Communications that the above observations were not severe enough to fail the testing.

2.3. Support

For technical support on the Avaya products described in these Application Notes visit <http://support.avaya.com>

For technical support on PAETEC Communications system, please contact PAETEC Communications technical support at:

- Toll Free: 1-800-967.2233
- <http://www.paetec.com/customer-care/>

3. Reference Configuration

Figure 1 illustrates the test configuration used during the compliance testing event between Communication Server 1000 and PAETEC Communications systems. For confidentiality and privacy purposes, actual public IP addresses used in this testing have been masked out and replaced with fictitious IP addresses throughout the document.

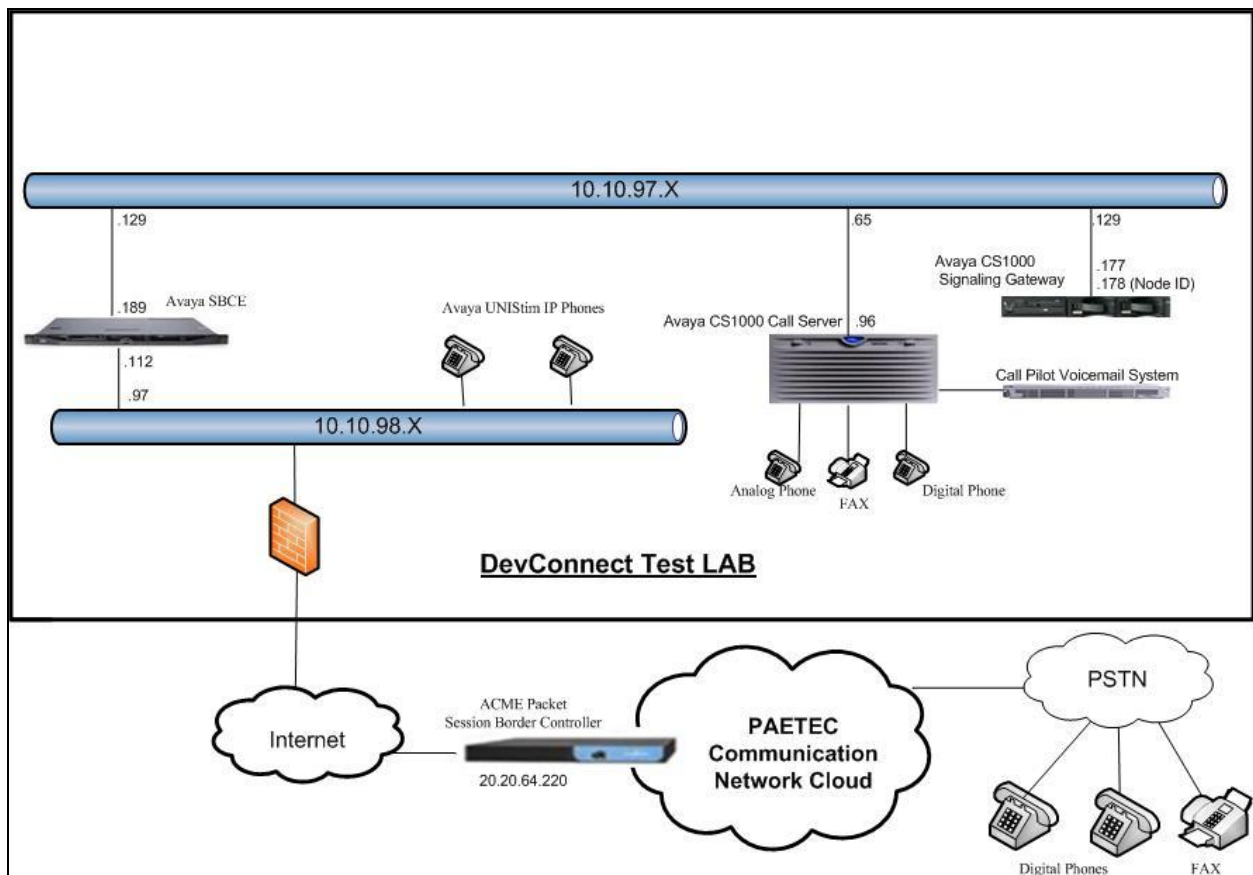


Figure 1- Network diagram for Avaya and PAETEC Communications Systems

4. Equipment and Software Validated

The following equipment and software were used for the sample configuration provided:

Avaya and PAETEC Communication system:

| Equipment/Software | Release/Version |
|---|---|
| Avaya Communication Server 1000 (CPPM) | Call Server: 750 Q+ GA Signaling Server: 7.50.17 GA SIP Line Server: 7.50.17 GA |
| Avaya Session Border Controller for Enterprise (Avaya SBCE) | 4.0.5 Q02 |
| Acme Packet Net-Net 4250 Session Border Controller | Firmware SC6.2.0 Patch 3 (Build 497) Build Date=02/12/10 |
| Broadsoft | Version 14.sp9 |
| LCS Gateway | Version 3.14.4.7 |
| Avaya UNISTim Phone | 2002 p2: 0604DCN 1140: 0625C8D 1120: 0624C8D 2007: 0621C8D |
| Avaya 3904 Digital Phone | N/A |
| Analog Phone | N/A |
| HP OfficeJet 4500 Fax | N/A |

Additional software and patch lineup for the configuration and active patch list on the SIP Signaling Gateway are listed as below:

Call Server: 7.50 Q+ GA plus latest DEPLIST – Deplists_CPL_X21_07_50Q.zip

SSG Server: 7.50.17 GA plus latest DEPLIST – Service_Pack_Linux_7.50_17_20111101.ntl

Avaya SBCE: 4.0.5 Q02 plus a patch - ipcs-bin-mvista_debug_20120418143545-1.i386.rpm

5. Configure Avaya Communication Server 1000

These Application Notes used the Incoming Digit Translation feature to receive the calls and used the Numbering Plan Area Code (NPA), Special Number (SPN) features to route calls from the Communication Server 1000, over the PAETEC Communications SIP trunk to PSTN.

These application notes assume that the basic configuration has already been administered. For further information on Communications Server 1000, please consult the references in **Section 10**.

The below procedures describe the configuration details of Communication Server 1000 with a SIP trunk to the PAETEC Communications system.

5.1. Log in to Communication Server 1000 System

5.1.1. Log in to Unified Communications Management (UCM) and Element Manager (EM)

Open an instance of a web browser and connect to the UCM GUI at the following address: `http://<node IP address>` or `http://<UCM IP address>`. **Log in** using an appropriate **User ID** and **Password**.



This computer system and network is PRIVATE and PROPRIETARY of (company name) and may only be accessed by authorized users. Unauthorized use of this computer system or network is strictly prohibited and may be subject to criminal prosecution, employee discipline up to and including discharge, or the termination of the vendor/service contracts. The owner, or its agents, may monitor any activity or communication on the computer system or network.

User ID: admin
Password:
Log in

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Figure 2 – Login Unified Communications Management

The **Avaya Unified Communications Management** screen is displayed. Click on the **Element Name** of the Communication Server 1000 Element as highlighted in red box as shown in **Figure 3**.

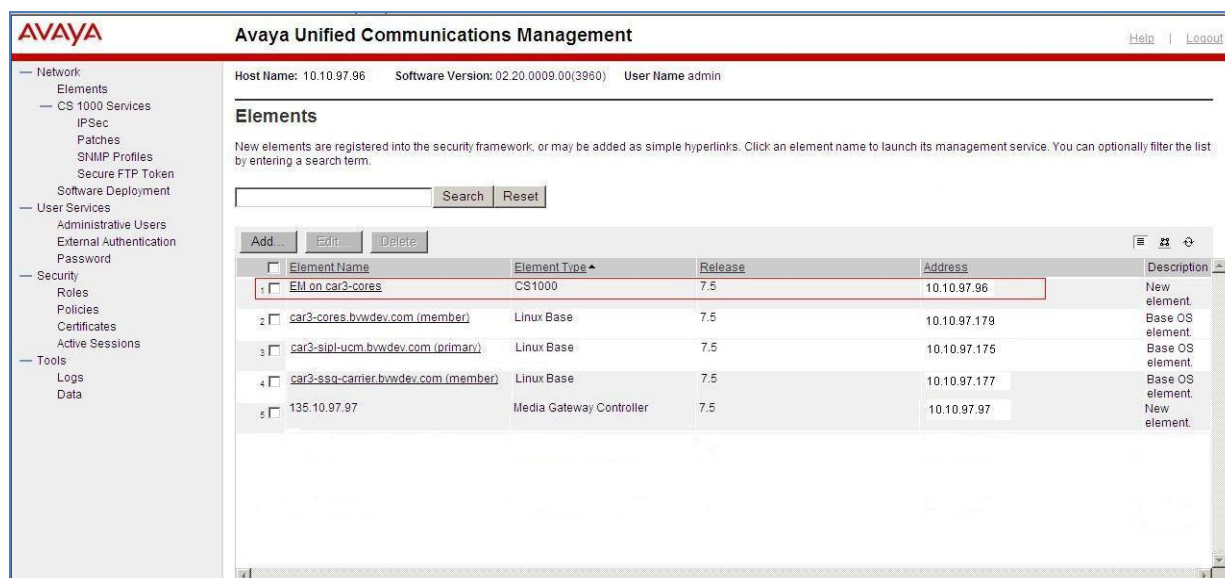


Figure 3 – Unified Communications Management

The Communication Server 1000 Element Manager **System Overview** page is displayed as shown in **Figure 4**.

- **IP Address: 10.10.97.96**
- **Type: Communication Server 1000E CPPM Linux**
- **Version: 4121**
- **Release: 7.50 Q+**



Figure 4 – Element Manager System Overview

5.1.2. Log in to Call Server by using the Overlay Command Line Interface (CLI)

Use Putty, SSH to connect to IP address of SSG Server with the **admin** account. Run the command **cslogin** and log in with the appropriate **admin** account and password. And here are the logs:

```
login as: admin
```

```
Nortel Networks Linux Base 7.50
```

```
The software and data stored on this system are the property of, or licensed to, Nortel Networks and are lawfully available only to authorized users for approved purposes. Unauthorized access to any software or data on this system is strictly prohibited and punishable under appropriate laws. If you are not an authorized user then do not try to login. This system may be monitored for operational purposes at any time.
```

```
admin@10.10.97.177's password: <----enter your password
```

```
Last login: Fri Mar 02 11:42:05 2012 from 10.10.98.78
```

```
[admin@car3-ssg-carrier ~]$ cslogin
```

```
SEC054 A device has connected to, or disconnected from, a pseudo tty without authenticating  
>login
```

```
USERID? admin
```

```
PASS? <----enter your password
```

```
.
```

```
TTY #08 LOGGED IN
```

```
The software and data stored on this system are the property of, or licensed to, Nortel Networks and are lawfully available only to authorized users for approved purposes. Unauthorized access to any software or data on this system is strictly prohibited and punishable under appropriate laws. If you are not an authorized user then log out immediately. This system may be monitored for operational purposes at any time.
```

```
ADMIN 11:43 02/03/2012
```

```
>
```

5.2. Administer an IP Telephony Node

This section describes how to configure an IP Telephony Node on the Communication Server 1000.

5.2.1. Obtain Node IP address

These application notes assume that the basic configuration has already been administered and that Node has already been created. This section describes the steps for configuring a Node (Node ID 3000) in Communication Server 1000 IP network to work with PAETEC Communications system. For further information on Communications Server 1000, please consult the references in **Section 10**.

Select **System IP Network → Nodes: Servers, Media Cards** and then click on the Node ID as shown in **Figure 5**.

AVAYA CS1000 Element Manager

Managing: **10.10.97.96** Username: admin
System » IP Network » IP Telephony Nodes

IP Telephony Nodes
Click the Node ID to view or edit its properties.

Buttons: [Add...](#) [Import...](#) [Export...](#) [Delete](#) [Print](#) [Refresh](#)

| <input type="checkbox"/> Node ID ▲ | Components | Enabled Applications | ELAN IP | Node/TLAN IPv4 | Node/TLAN IPv6 | Status |
|------------------------------------|------------|-------------------------|---------|----------------|----------------|------------------------------|
| <input type="checkbox"/> 3000 | 1 | LTPS, Gateway (SIPGw) | - | 10.10.97.178 | | Synchronized |
| <input type="checkbox"/> 3002 | 1 | SIP Line, LTPS | - | 10.10.97.176 | | Synchronized |

Show: ☒ Nodes ☐ Component servers and cards ☒ IPv6 address

Figure 5 – IP Telephony Nodes

The **Node Details** screen is displayed in **Figure 6** with the IP address of the Communication Server 1000 node. The **Node IP Address 10.10.97.178** is a virtual address which corresponds to the TLAN IP address **10.10.97.177** of the Signaling Server, SIP Signaling Gateway.

AVAYA CS1000 Element Manager

Managing: 10.10.97.96 Username: admin
System » IP Network » IP Telephony Nodes » Node Details

Node Details (ID: 3000 - LTPS, Gateway (SIPGw))

Node ID: 3000 * (0-9999)

Call server IP address: 10.10.97.96 * TLAN address type: ☒ IPv4 only
☐ IPv4 and IPv6

Embedded LAN (ELAN) **Telephony LAN (TLAN)**

Gateway IP address: 10.10.97.65 * Node IPv4 address: 10.10.97.178 *

Subnet mask: 255.255.255.192 * Subnet mask: 255.255.255.192 *

Node IPv6 address:

* Required Value. Save Cancel

Associated Signaling Servers & Cards

Select to add Add Remove Make Leader Print Refresh

| Hostname | Type | Deployed Applications | ELAN IP | TLAN IPv4 | Role |
|---|------------------|--|-------------|--------------|--------|
| <input type="checkbox"/> car3-ssq-carrier | Signaling_Server | LTPS, Gateway, PD, Presence Publisher, IP Media Services | 10.10.97.95 | 10.10.97.177 | Leader |

Show: ☐ IPv6 address

Note: Only server(s) that are not part of any other IP telephony node and deployed application(s) that match the service(s) selected for this node are available in the servers list.

Figure 6 –Node Details

In the **Node Details** screen, scroll down to **IP Telephony Node Properties** (Figure 7) to configure **Voice Gateway (VGW)** and **Codecs**, **Quality of Service (QoS)**, **Terminal Proxy Server (TPS)** and **Gateway (SIPGw)**.

AVAYA CS1000 Element Manager

Managing: 10.10.97.96 Username: admin
System » IP Network » IP Telephony Nodes » Node Details

Node Details (ID: 3000 - LTPS, Gateway (SIPGw))

Subnet mask: 255.255.255.192 * Subnet mask: 255.255.255.192 *
Node IPv6 address:

IP Telephony Node Properties

- Voice Gateway (VGW) and Codecs
- Quality of Service (QoS)
- LAN
- SNTp
- Numbering Zones
- MCDN Alternative Routing Treatment (MALT) Causes

Applications (click to edit configuration)

- SIP Line
- Terminal Proxy Server (TPS)
- Gateway (SIPGw)
- Personal Directories (PD)
- Presence Publisher
- IP Media Services

* Required Value. Save Cancel

Associated Signaling Servers & Cards

Select to add Add Remove Make Leader Print Refresh

| Hostname | Type | Deployed Applications | ELAN IP | TLAN IPv4 | Role |
|---|------------------|--|-------------|--------------|--------|
| <input type="checkbox"/> car3-ssq-carrier | Signaling_Server | LTPS, Gateway, PD, Presence Publisher, IP Media Services | 10.10.97.95 | 10.10.97.177 | Leader |

Show: ☐ IPv6 address

Note: Only server(s) that are not part of any other IP telephony node and deployed application(s) that match the service(s) selected for this node are available in the servers list.

Figure 7 –Node Details

5.2.2. Administer Terminal Proxy Server (TPS)

Continue from **Section 5.2.1**. On the **Node Details** page, select the **Terminal Proxy Server (TPS)** link as shown in **Figure 7**. Check the **UNISTim Line Terminal Proxy Server** check box and then click the **Save** button as shown in **Figure 8**.

AVAYA CS1000 Element Manager

Managing: 10.10.97.96 Username: admin
System » IP Network » IP Telephony Nodes » Node Details » UNISTim Line Terminal Proxy Server (LTPS) Configuration

Node ID: 3000 - UNISTim Line Terminal Proxy Server (LTPS) Configuration Details

Firmware | DTLS | Network Connect Server

UNISTim Line Terminal Proxy Server: ☒ Enable proxy service on this node

Firmware

IP address: 0.0.0.0
Full file path: download/firmwa
Server Account/User ID:
Password:

DTLS

DTLS policy: Off
Options: ☐ Client authentication
☐ Periodic re-keying

Network Connect Server

* Required Value. Note: Changes made on this page will NOT be transmitted until the Node is also saved.

Save Cancel

Note: Only server(s) that are not part of any other IP telephony node and deployed application(s) that maintain the service(s) selected for this node are available in the servers list.

Figure 8 – TPS Configuration Details

5.2.3. Administer Quality of Service (QoS)

Continue from **Section 5.2.1**. On the **Node Details** page, select the **Quality of Service (QoS)** link as shown in **Figure 7**. The default Diffserv values are as shown in **Figure 9**. Click on the **Save** button

The screenshot shows the AVAYA CS1000 Element Manager interface. The left sidebar contains a navigation menu with categories like UCM Network Services, Home, Links, System, Alarms, Maintenance, Core Equipment, Peripheral Equipment, IP Network, Nodes: Servers, Media Cards, Maintenance and Reports, Media Gateways, Zones, Host and Route Tables, Network Address Translation (NAT), QoS Thresholds, Personal Directories, Unicode Name Directory, Interfaces, Engineered Values, Emergency Services, Geographic Redundancy, Software, Customers, Routes and Trunks, Routes and Trunks, D-Channels, Digital Trunk Interface, and Dialing and Numbering Plans. The main content area is titled 'Managing: 10.10.97.96 Username: admin' and shows the breadcrumb 'System » IP Network » IP Telephony Nodes » Node Details » Quality of Service (QoS)'. The page title is 'Node ID: 3000 - Quality of Service (QoS)'. The 'Diffserv Codepoint (DSCP)' section contains the following fields: 'Enable Avaya automatic QoS' (unchecked), 'Control packets' (40, range 0-63), 'Voice packets' (40, range 0-63), 'VLAN tagging' (checked), '802.1Q support' (unchecked), and '802.1Q bits value (802.1P)' (5, range 0-7). A note at the bottom states: 'Note: Changes made on this page will NOT be transmitted until the Node is also saved.' The 'Save' and 'Cancel' buttons are at the bottom right.

Figure 9 – QoS Configuration Details

5.2.4. Synchronize the New Configuration

Continue from **Section 5.2.1** and click on the **Save** button. The **Node Saved** screen is displayed. Click on **Transfer Now** (not shown). The **Synchronize Configuration Files** screen is displayed. Check the Signaling Server check box and click on the **Start Sync** (not shown). When the synchronization completes, check the Signaling Server check box and click on the **Restart Applications** (not shown)

5.3. Administer Voice Codec

5.3.1. Enable Voice Codec G.729, G.711 on IP Telephony Node

Select **IP Network** → **Nodes: Servers, Media Cards** from the left pane, and in the **IP Telephony Nodes** screen displayed, select the **Node ID** of this Communication Server 1000 system. The **Node Details** screen is displayed (See **Section 5.2.1** for more detail). On the **Node Details** page (as shown in **Figure 7**), click on **Voice Gateway (VGW) and Codecs**. The PAETEC Communications system supports **G.729/time 20ms** and **G.711/time 20ms with VAD** unchecked. Then click on the **Save** button.

AVAYA CS1000 Element Manager

Managing: 10.10.97.96 Username: admin
System » IP Network » IP Telephony Nodes » Node Details » VGW and Codecs

Node ID: 3000 - Voice Gateway (VGW) and Codecs

General | Voice Codecs | Fax

Voice Codecs

Codec G711: ☒ Enabled (required)
Voice payload size: 20 (milliseconds per frame)
Voice playout (jitter buffer) delay: 40 80 (milliseconds)
Nominal Maximum
Maximum delay may be automatically adjusted based on nominal settings.
☐ Voice Activity Detection (VAD)

Codec G722: ☐ Enabled
Voice payload size: 20 (milliseconds per frame)
Voice playout (jitter buffer) delay: 40 80 (milliseconds)
Nominal Maximum
Maximum delay may be automatically adjusted based on nominal settings.

Codec G729: ☒ Enabled
Voice payload size: 20 (milliseconds per frame)

* Required Value.

Note: Changes made on this page will NOT be transmitted until the Node is also saved.

Save Cancel

Figure 10 – Voice Gateway and Codec Configuration Details

Synchronize the new configuration (please refer to **Section 5.2.4**)

5.3.2. Enable Voice Codec on Media Gateways

From the left menu of the Element Manager page in **Figure 10**, select **IP Network → Media Gateways** menu item. The Media Gateways page will appear (not shown). Click on the **MGC** which is located on the right of the page. In the following screen, scroll down to the **Codec G.729 and G.711** and uncheck **VAD** as shown in **Figure 11**. Scroll down to the bottom of the page and click on the **Save** button.

AVAYA CS1000 Element Manager Help | Logout

VGW and IP phone codec profile

- Enable echo canceller ☒
- Echo canceller tail delay 128 (milliseconds)
- Enable dynamic attenuation ☒
- Voice activity detection threshold 1 (0 - 4 DBM)
- Idle noise level 0 (0 - 1 DBM)
- R factor calculation ☐
- DTMF tone detection ☒
- Enable low latency mode ☐
- Remove DTMF delay (squell DTMF from TDM to IP) ☒
- Enable modem/fax pass through mode ☒
- Enable V.21 FAX tone detection ☒
- Fax TCF method 2
- FAX maximum rate 9600 (bps)
- FAX playout nominal delay 100 (0 - 300 milliseconds)
- FAX no activity timeout 20 (10 - 32000 milliseconds)
- FAX packet size 30

Codec G711 Select ☒

Codec name G711

Voice payload size 20 (ms/frame)

Voice playback (jitter buffer) nominal delay 40

Modifications may cause changes to dependent settings

Voice playback (jitter buffer) maximum delay 80

Modifications may cause changes to dependent settings

VAD ☐

Codec G729A Select ☒

Codec name G729A

Voice payload size 20 (ms/frame)

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Figure 11 – Media Gateways Configuration Details

5.4. Zones and Bandwidth Management

This section describes the steps to create 2 zones: zone 10 for VGW and IP set, and zone 255 for SIP Trunk.

5.4.1. Create a zone for IP phones (zone 10)

The following figures show how to configure a zone for VGW and IP set for bandwidth management purposes. The bandwidth strategy can be adjusted to preference.

Select **IP Network** → **Zones** configuration from the left pane, click on the **Bandwidth Zones** as shown in **Figure 12**.

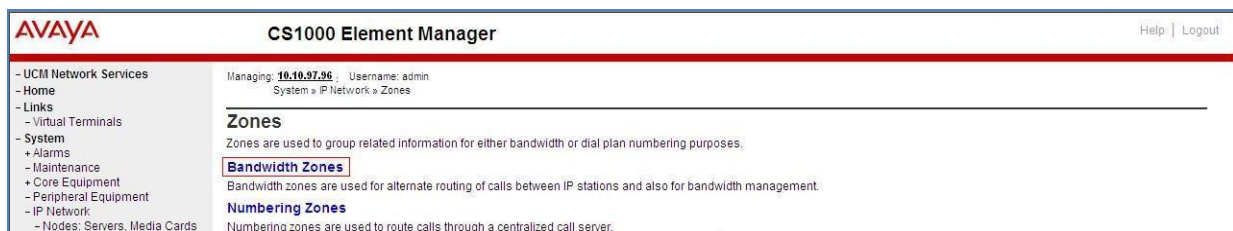


Figure 12 – Zones Page

The **Bandwidth Zones** screen is displayed as shown in **Figure 13**. Click **ADD** to create new zone for IP Phones.

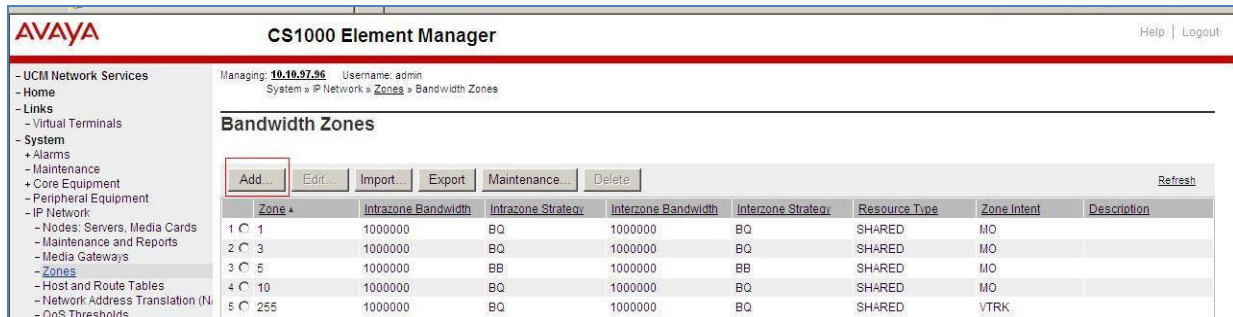


Figure 13 – Bandwidth Zones

Select the values as shown (in red box) in **Figure 14** and click on the **Submit** button.

- **INTRA_STGY**: Codec configuration for local calls. Select **BQ** to set codec G.711 as the first choice and G.729 as the second choice.
- **INTER_STGY**: Codec configuration for the calls over trunk. Select **BQ** to set codec G.711 as the first choice and G.729 as the second choice.
- **Zone Intent**: **MO** is used for IP phones, VGWetc

Figure 14 –Bandwidth Management Configuration Details – IP phone

5.4.2. Create a zone for virtual SIP trunk (zone 255)

Follow **Section 5.4.1** to create a zone for the virtual trunk. The difference is in **Zone Intent (ZBRN)** field. Select **VTRK** for virtual trunk as shown in **Figure 15** and then click on the **Submit** button.

Figure 15 –Bandwidth Management Configuration Details –virtual SIP trunk

5.5. Administer SIP Trunk Gateway

This section describes the steps for establishing a SIP connection between SIP Signaling Gateway (SSG) to SBCE.

5.5.1. Integrated Services Digital Network (ISDN)

Select **Customers** in the left pane. The Customers screen is displayed. Click on the link associated with the appropriate customer, in this case 00. The system can support more than one customer with different network settings and options. The Customer 00 Edit page will appear (not shown). Select the **Feature Packages** option from this page to show a listing of feature packages (**Figure 16**).

AVAYA **CS1000 Element Manager**

Managing: 10.10.97.96 Username: admin
Customers » Customer 00 » Customer Details » Feature Packages

Feature Packages

| | |
|--|--------------|
| + Do Not Disturb Individual | Package: 9 |
| + End-to-End Signaling | Package: 10 |
| + Message Waiting Center | Package: 46 |
| + New Flexible Code Restriction | Package: 49 |
| + Set Relocation | Package: 53 |
| + Network Alternate Route Selection | Package: 58 |
| + Distinctive Ringing | Package: 74 |
| + Departmental Listed Directory Number | Package: 76 |
| + Command Status Link | Package: 77 |
| + Pretranslation | Package: 92 |
| + Dialed Number Identification System | Package: 98 |
| + Malicious Call Trace | Package: 107 |
| + Incoming Digit Conversion | Package: 113 |
| + Directed Call Pickup | Package: 115 |
| + Enhanced Music | Package: 119 |
| + Station Camp-On | Package: 121 |
| + Integrated Digital Access | Package: 122 |
| + Digital Private Network Signaling System 1 | Package: 123 |
| + Flexible Tones and Cadences | Package: 125 |
| + Multifrequency Compelled Signaling | Package: 128 |
| + International Supplementary Features | Package: 131 |
| + Enhanced Night Service | Package: 133 |
| + Integrated Services Digital Network | Package: 145 |
| + Flexible Services | Package: 152 |

Figure 16 –Customer – Feature Packages

Select **Integrated Services Digital Network** to edit its parameters. The screen (**Figure 17**) is updated with parameters populated below **Integrated Services Digital Network**. Click on **Integrated Services Digital Network (ISDN)**, and retain the default values for all remaining fields: **Virtual private network identifier: 1** and **Private network identifier: 1**. Scroll down to the bottom of the screen, and click on the Save button at the bottom of the page (not shown).

AVAYA **CS1000 Element Manager**

Package: 145

- UCM Network Services
- Home
- Links
 - Virtual Terminals
- System
 - + Alarms
 - Maintenance
 - + Core Equipment
 - Peripheral Equipment
 - IP Network
 - Nodes: Servers, Media Cards
 - Maintenance and Reports
 - Media Gateways

- Integrated Services Digital Network

+ Dial Access Prefix on CLID table entry option

Integrated Services Digital Network: ☒

- Virtual private network identifier: (1 - 16383)

- Private network identifier: (1 - 16383)

- Node DN:

Multi-location business group: (0 - 65535)

Business sub group consult-only: (0 - 65535)

Figure 17 – Customer – ISDN Configuration

5.5.2. Administer SIP Trunk Gateway to Avaya SBCE

Select **IP Network** → **Nodes: Servers, Media Cards** configuration from the left pane, and in the **IP Telephony Nodes** screen displayed, select the **Node ID** of this Communication Server 1000 system. The **Node Details** screen is displayed as shown in **Figure 7, Section 5.2.1**. Click **SIP Gateway (SIPGw) → General**

On the **Node Details** screen, select **SIP Gateway (SIPGw)**.

enter the values highlighted in red boxes for the specified fields, and retain the default values for the remaining fields as shown in **Figure 18**

- Check enable gateway service on this node
- Vtrk gateway application: SIP Gateway (SIPGw)
- SIP domain name: bvwdev7.com
- Local SIP port: 5060
- Gateway endpoint name: car3-ssg-carrier
- Application node ID: 3000

The screenshot displays the Avaya CS1000 Element Manager interface. The left sidebar shows a navigation tree with 'Nodes: Servers, Media Cards' selected. The main content area is titled 'Node ID: 3000 - Virtual Trunk Gateway Configuration Details'. The 'General' tab is active, showing the 'Vtrk gateway application' set to 'SIP Gateway (SIPGw)'. The 'SIP domain name' is 'bvwdev7.com', 'Local SIP port' is '5060', 'Gateway endpoint name' is 'car3-ssg-carrier', and 'Application node ID' is '3000'. The 'Enable gateway service on this node' checkbox is checked. The 'Virtual Trunk Network Health Monitor' section is also visible, with a 'Monitor IP addresses' checkbox and a list of 'Monitor addresses'. The bottom of the screen shows a 'Save' button and a 'Cancel' button.

Figure 18 – Virtual Trunk Gateway Configuration Details

Click on the **SIP Gateway Settings** tab, under **Proxy or Redirect Server**, enter the following values (highlighted in red boxes) for the specified fields, and retain the default values for the remaining fields as shown in **Figure 19**. Enter **Primary TLAN IP address** as the internal IP address of Avaya SBCE

AVAYA CS1000 Element Manager

Managing: 10.10.97.96 Username: admin
System » IP Network » IP Telephony Nodes » Node Details » Virtual Trunk Gateway Configuration

Node ID: 3000 - Virtual Trunk Gateway Configuration Details

General | SIP Gateway Settings | SIP Gateway Services

Proxy Or Redirect Server:

Proxy Server Route 1:

Primary TLAN IP address: 10.10.97.189
The IP address can have either IPv4 or IPv6 format based on the value of "TLAN address type"

Port: 5060 (1 - 65535)

Transport protocol: UDP

Options: ☒ Support registration
☐ Primary CDS proxy

Secondary TLAN IP address: 0.0.0.0
The IP address can have either IPv4 or IPv6 format based on the value of "TLAN address type"

Port: 5060 (1 - 65535)

Transport protocol: TCP

* Required Value. Note: Changes made on this page will NOT be transmitted until the Node is also saved.

Save Cancel

Figure 19 – Virtual Trunk Gateway Configuration Details

On the same page as shown in **Figure 19**, scroll down the parameters box to the **SIP URI Map** section.

Under the **Public E.164 Domain Names**, for:

- **National:** leave this SIP URI field as blank
- **Subscriber:** leave this SIP URI field as blank
- **Special Number:** leave this SIP URI field as blank
- **Unknown:** leave this SIP URI field as blank

Under the **Private domain names**, for:

- **UDP:** leave this SIP URI field as blank
- **CDP:** leave this SIP URI field as blank
- **Special Number:** leave this SIP URI field as blank
- **Vacant number:** leave this SIP URI field as blank
- **Unknown:** leave this SIP URI field as blank

The remaining fields can be left at their default values as shown in **Figure 20**. Then click on the **Save** button

AVAYA **CS1000 Element Manager**

Managing: 10.10.97.96 Username: admin
System » IP Network » IP Telephony Nodes » Node Details » Virtual Trunk Gateway Configuration

Node ID: 3000 - Virtual Trunk Gateway Configuration Details

General | SIP Gateway Settings | SIP Gateway Services

SIP URI Map:

Public E.164 domain names

National:

Subscriber:

Special number:

Unknown:

Private domain names

UDP:

CDP:

Special number:

Vacant number:

Unknown:

SIP Gateway Services

SIP Converged Desktop: ☒ Enable CD service

Service DN: Used for making VTRK call from agent.

Converged telephone call forward DN:

RAN route for announce: (route number 0 - 511)

Wait time before RAN queue: (-1 - 32767 msec)

* Required Value. Note: Changes made on this page will NOT be transmitted until the Node is also saved.

Save Cancel

Figure 20 – Virtual Trunk Gateway Configuration Details

Synchronize the new configuration (please refer to **Section 5.2.4**).

5.5.3. Administer Virtual D-Channel

Select **Routes and Trunks** → **D-Channels** from the left pane to display the **D-Channels** screen. In the **Choose a D-Channel Number** field, select an available D-channel from the drop-down list as shown in **Figure 21**. Click the **to Add** button.

| Channel | Type | Card Type | Description | Action |
|--------------|-----------|-----------------|-------------------|--------|
| Channel: 11 | Type: DCH | Card Type: DCIP | Description: sipl | Edit |
| Channel: 100 | Type: DCH | Card Type: DCIP | Description: VoIP | Edit |

Figure 21 – D-Channels

The D-Channels 100 Property Configuration screen is displayed next as shown in **Figure 22**. Enter the following values for the specified fields, and retain the default values for the remaining fields.

- **D channel Card Type (CTYP):** D-Channel is over IP (DCIP)
- **Designator (DES):** A descriptive name
- **User:** Integrated Services Signaling Link Dedicated (ISLD)
- **Interface type for D-channel (IFC):** Meridian Meridian1 (SL1)
- **Meridian 1 node type:** Slave to the controller (USR)
- **Release ID of the switch at the far end (RLS):** 25

Click on the **Advanced options (ADVOPT)**, check on the **Network Attendant Service Allowed** check box as shown in **Figure 22**. Other fields are left as default.

The screenshot displays the Avaya CS1000 Element Manager web interface. The left sidebar contains a navigation menu with categories like UCM Network Services, System, IP Network, Interfaces, Customers, Routes and Trunks, Dialing and Numbering Plans, Phones, Tools, and Security. The main content area is titled 'Basic Configuration' and contains a table with 'Input Description' and 'Input Value' columns. The 'Advanced options (ADVOPT)' section is expanded, showing various configuration fields and checkboxes. The 'Network Attendant Service Allowed' checkbox is checked. The 'Feature Packages' section is also visible.

| Input Description | Input Value |
|--|---|
| Action Device And Number (ADAN): | DCH |
| D channel Card Type: | DCIP |
| Designator: | VoIP |
| Recovery to Primary: | <input type="checkbox"/> |
| PRI loop number for Backup D-channel: | |
| User: | Integrated Services Signaling Link Dedicated (ISLD) |
| Interface type for D-channel: | Meridian Meridian1 (SL1) |
| Country: | ETS 300 =102 basic protocol (ETSI) |
| D-Channel PRI loop number: | |
| Primary Rate Interface: | |
| Secondary PRI2 loops: | |
| Meridian 1 node type: | Slave to the controller (USR) |
| Release ID of the switch at the far end: | 25 |
| Central Office switch type: | 100% compatible with Bellcore standard (STD) |
| Integrated Services Signaling Link Maximum: | 4000 Range: 1 - 4000 |
| Signalling server resource capacity: | 1800 Range: 0 - 3700 |
| + Basic options (BSOFT) | |
| - Advanced options (ADVOPT) | |
| - Layer 3 call control message count per 5 second time interval: | 300 Range: 60 - 350 |
| - Number of Status Enquiry Messages sent within 128 ms: | 1 |
| - Map channel number to timeslots on a PRI2 loop: | <input checked="" type="checkbox"/> |
| + H323 Overlap Signaling Settings (H323) | |
| --Overlap Timer: | |
| - Multilocation Business Group Allowed: | <input type="checkbox"/> |
| - Network Attendant Service Allowed: | <input checked="" type="checkbox"/> |
| + Link Access Protocol for D-channel (LAPD) | |
| + Feature Packages | |

Buttons: Submit, Refresh, Delete, Cancel

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Figure 22 – D-Channels Configuration Details

Click on the **Basic Options** and click on the **Edit** button at the **Remote Capabilities (RCAP)** attribute as shown in **Figure 23**

AVAYA CS1000 Element Manager Help | Logout

- UCM Network Services
 - Home
 - Links
 - Virtual Terminals
- System
 - + Alarms
 - Maintenance
 - + Core Equipment
 - Peripheral Equipment
 - IP Network
 - Nodes: Servers, Media Cards
 - Maintenance and Reports
 - Media Gateways
 - Zones
 - Host and Route Tables
 - Network Address Translation (NAT)
 - QoS Thresholds
 - Personal Directories
 - Unicode Name Directory
- + Interfaces
 - Engineered Values
 - + Emergency Services
 - + Geographic Redundancy
 - + Software
- Customers
 - Routes and Trunks
 - Routes and Trunks
 - D-Channels
 - Digital Trunk Interface
 - Dialing and Numbering Plans
 - Electronic Switched Network
 - Flexible Code Restriction
 - Incoming Digit Translation
- Phones
 - Templates
 - Reports
 - Views
 - Lists
 - Properties
 - Migration
- Tools
 - + Backup and Restore
 - Date and Time
 - Logs and reports
- Security
 - + Passwords
 - + Policies
 - + Login Options

- Basic options (BSCOPT)

Action Device And Number (ADAN): DCH

D channel Card Type: DCIP

Designator: VoIP

Recovery to Primary: ☐

PRI loop number for Backup D-channel:

User: Integrated Services Signaling Link Dedicated (ISLD) *

Interface type for D-channel: Meridian Meridian1 (SL1)

Country: ETS 300 =102 basic protocol (ETSI)

D-Channel PRI loop number:

Primary Rate Interface: more PRI

Secondary PRI2 loops:

Meridian 1 node type: Slave to the controller (USR)

Release ID of the switch at the far end: 25

Central Office switch type: 100% compatible with Bellcore standard (STD)

Integrated Services Signaling Link Maximum: 4000 Range: 1 - 4000

Signalling server resource capacity: 1800 Range: 0 - 3700

Primary D-channel for a backup DCH: Range: 0 - 254

- PINX customer number:

- Progress signal:

- Calling Line Identification:

- Output request Buffers: 32

- D-channel transmission Rate: 56 kb/s when LCMT is AMI (56K)

- Channel Negotiation option: No alternative acceptable, exclusive, (1)

- Remote Capabilities: **Edit**

- B channel Service messaging: ☐

+ Change protocol timer value (TIMR)

+ Advanced options (ADVOPT)

+ Feature Packages

Submit Refresh Delete Cancel

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Figure 23 – D-Channel Configuration Details

The **Remote Capabilities Configuration** page will appear as shown in **Figure 24**. Then check on the **ND2** and the **MWI** checkboxes

AVAYA CS1000 Element Manager

Managing: 10.10.97.96 Username: admin

Routes and Trunks > D-Channels > D-Channels 100 Property Configuration > Remote Capabilities Configuration

- Remote Capabilities Configuration

| Input Description | Input Value |
|---|-------------------------------------|
| Basic rate interface (BRI) | <input type="checkbox"/> |
| Call completion on busy using integer value (CCBI) | <input type="checkbox"/> |
| Call completion on busy using object identifier (CCBO) | <input type="checkbox"/> |
| Call completion on busy for QSIG and EuroSDN BRI (CCBS) | <input type="checkbox"/> |
| Call completion on no response using integer value (CCNI) | <input type="checkbox"/> |
| Call completion on no response using object identifier (CCNO) | <input type="checkbox"/> |
| Call completion to no reply for QSIG and EuroSDN BRI (CCNR) | <input type="checkbox"/> |
| Network call park (CPK) | <input type="checkbox"/> |
| Connected line identification presentation (COLP) | <input type="checkbox"/> |
| Call transfer integer (CTI) | <input type="checkbox"/> |
| Call transfer object (CTO) | <input type="checkbox"/> |
| Diversion info. is sent using integer value (DV1I) | <input type="checkbox"/> |
| Diversion info. is sent using object identifier (DV1O) | <input type="checkbox"/> |
| Rerouting requests processed using integer value (DV2I) | <input type="checkbox"/> |
| Rerouting requests processed using object identifier (DV2O) | <input type="checkbox"/> |
| Diversion info. sent. rerouting requests processed (DV3I) | <input type="checkbox"/> |
| EuroSDN - div. info sent. rerouting req. processed (DV3O) | <input type="checkbox"/> |
| Call transfer notification and invocation to EuroSDN (ECTO) | <input type="checkbox"/> |
| Malicious call identification (MCID) | <input type="checkbox"/> |
| MCDN QSIG conversion (MQC) | <input type="checkbox"/> |
| Remote D-channel is on a MSDL card (MSL) | <input type="checkbox"/> |
| Message waiting interworking with DMS-100 (MWI) | <input checked="" type="checkbox"/> |
| Network access data (NAC) | <input type="checkbox"/> |
| Network call trace supported (NCT) | <input type="checkbox"/> |
| Network name display method 1 (ND1) | <input type="checkbox"/> |
| Network name display method 2 (ND2) | <input checked="" type="checkbox"/> |
| Network name display method 3 (ND3) | <input type="checkbox"/> |
| Name display - integer ID coding (NDI) | <input type="checkbox"/> |
| Name display - object ID coding (NDO) | <input type="checkbox"/> |

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Figure 24 – Remote Capabilities Configuration Details

Click on the Return – Remote Capabilities button (not shown).
Click on the Submit button (not shown).

5.5.4. Administer Virtual Super-Loop

Select **System** → **Core Equipments** → **Superloops** from the left pane to display the **Superloops** screen. If the Superloop does not exist, please click the **Add** button to create a new one as shown in **Figure 25**. In this example, superloop 4, 96, 100 and 124 have been added and are being used.

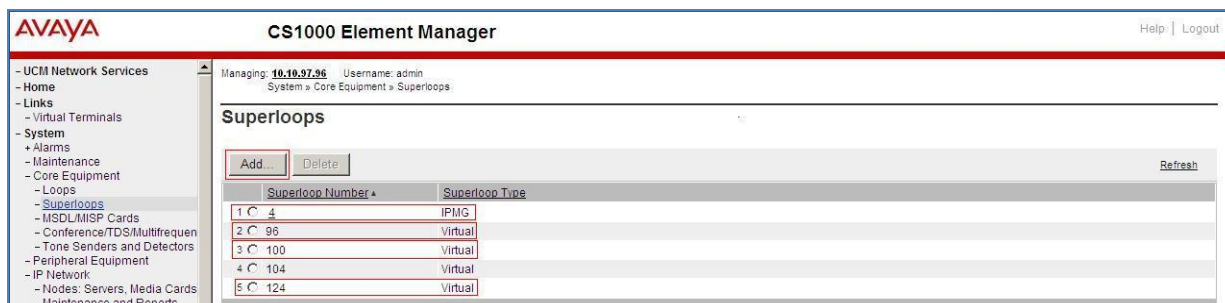


Figure 25 – Administer Virtual Super-Loop Page

5.5.5. Administer Virtual SIP Routes

Select **Routes and Trunks** → **Routes and Trunks** from the left pane to display the **Routes and Trunks** screen. In this example, **Customer 0** is being used. Click on the **Add route** button as shown in **Figure 26**.

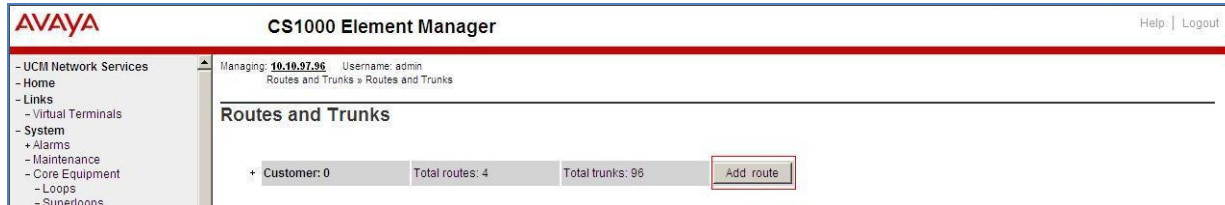
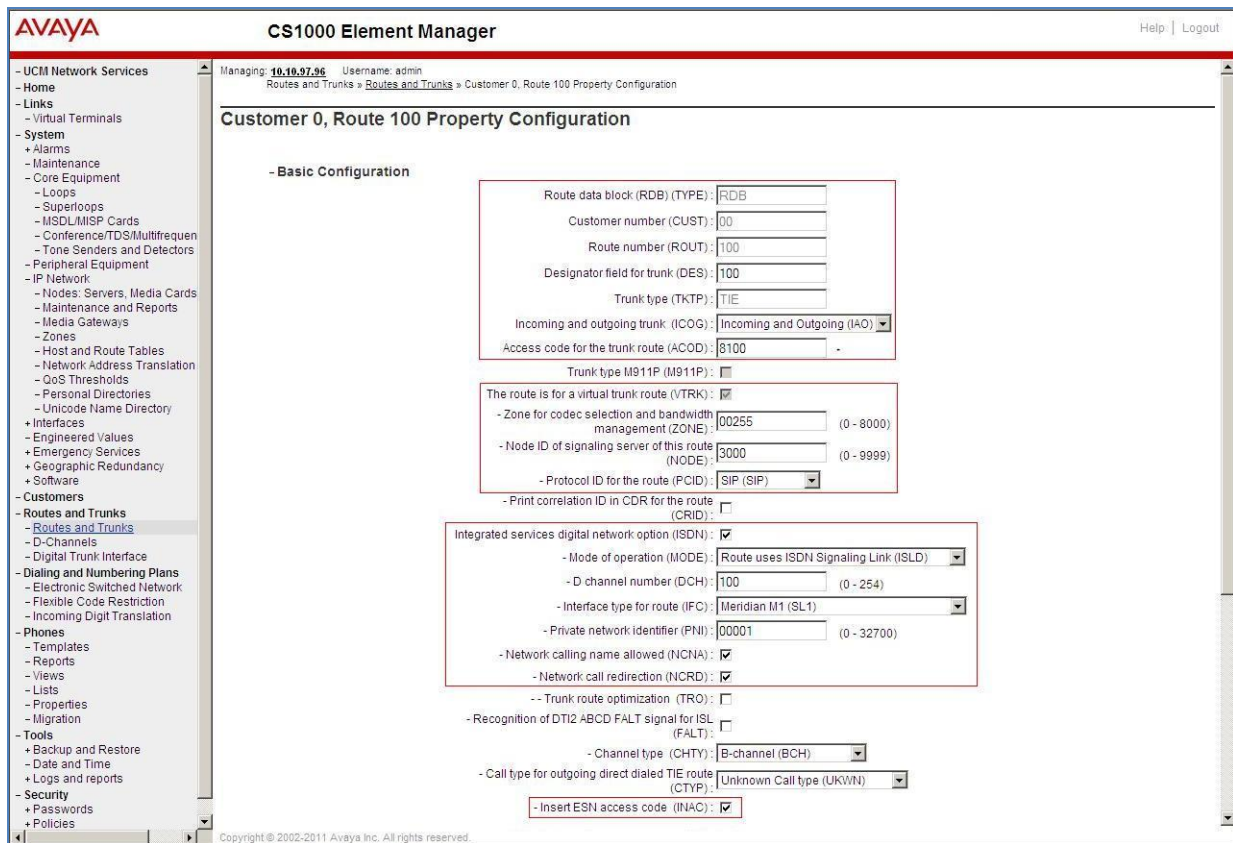


Figure 26 – Add route

The **Customer 0**, **New Route Configuration** screen is displayed next. Scroll down until the **Basic Configuration** Section is displayed and enter the following values for the specified fields, and retain the default values for the remaining fields as shown in **Figures 27**.

- **Route Number (ROUT):** Select an available route number.
- **Designator field for trunk (DES):** A descriptive text.
- **Trunk Type (TKTP):** TIE trunk data block (TIE)
- **Incoming and Outgoing trunk (ICOG):** Incoming and Outgoing (IAO)
- **Access Code for the trunk route (ACOD):** An available access code.
- Check the field **The route is for a virtual trunk route (VTRK)**, to enable four additional fields to appear.
- For the **Zone for codec selection and bandwidth management (ZONE)** field, enter 255 (created in **Section 5.4.2**).

- For the **Node ID of signaling server of this route (NODE)** field, enter the node number 3000 (created in **Section 5.2.1**).
- Select **SIP (SIP)** from the drop-down list for the **Protocol ID for the route (PCID)** field.
- Check the **Integrated Services Digital Network option (ISDN)** checkbox to enable additional fields to appear. Enter the following values for the specified fields, and retain the default values for the remaining fields. Scroll down to the bottom of the screen.
 - **Mode of operation (MODE):** Route uses ISDN Signalling Link (ISLD)
 - **D channel number (DCH):** D-Channel number 100 (created in **Section 5.5.3**)
 - **Network calling name allowed (NCNA):** Check the field
 - **Network call redirection (NCRD):** Check the field
 - **Insert ESN access code (INAC):** Check the field



Avaya CS1000 Element Manager

Managing: 10.10.97.96 Username: admin
Routes and Trunks » Routes and Trunks » Customer 0, Route 100 Property Configuration

Customer 0, Route 100 Property Configuration

- Basic Configuration

Route data block (RDB) (TYPE): RDB

Customer number (CUST): 00

Route number (ROUT): 100

Designator field for trunk (DES): 100

Trunk type (TKTP): TIE

Incoming and outgoing trunk (ICOG): Incoming and Outgoing (IAO)

Access code for the trunk route (ACOD): 8100

Trunk type M911P (M911P): ☐

The route is for a virtual trunk route (VTRK): ☒

- Zone for codec selection and bandwidth management (ZONE): 00255 (0 - 8000)

- Node ID of signaling server of this route (NODE): 3000 (0 - 9999)

- Protocol ID for the route (PCID): SIP (SIP)

- Print correlation ID in CDR for the route (CRID): ☐

Integrated services digital network option (ISDN): ☒

- Mode of operation (MODE): Route uses ISDN Signalling Link (ISLD)

- D channel number (DCH): 100 (0 - 254)

- Interface type for route (IFC): Meridian M1 (SL1)

- Private network identifier (PNI): 00001 (0 - 32700)

- Network calling name allowed (NCNA): ☒

- Network call redirection (NCRD): ☒

-- Trunk route optimization (TRO): ☐

- Recognition of DTI2 ABCD FALT signal for ISL (FALT): ☐

- Channel type (CHTY): B-channel (BCH)

- Call type for outgoing direct dialed TIE route (CTYP): Unknown Call type (UKWN)

- Insert ESN access code (INAC): ☒

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Figure 27 – Route Configuration Details

Click on **Basic Route Options**, check the **North American toll scheme (NATL)** and **Incoming DID digit conversion on this route (IDC)**, input **DCNO 1** for both **Day IDC Tree Number** and **Night IDC Tree Number** as shown in **Figure 28**

AVAYA CS1000 Element Manager Help | Logout

- UCM Network Services
- Home
- Links
- Virtual Terminals
- System
 - + Alarms
 - Maintenance
 - Core Equipment
 - Loops
 - Superloops
 - MSOL/MSP Cards
 - Conference/TDS/Multifrequen
 - Tone Senders and Detectors
 - Peripheral Equipment
 - IP Network
 - Nodes: Servers, Media Cards
 - Maintenance and Reports
 - Media Gateways
 - Zones
 - Host and Route Tables
 - Network Address Translation
 - QoS Thresholds
 - Personal Directories
 - Unicode Name Directory
 - + Interfaces
 - Engineered Values
 - + Emergency Services
 - + Geographic Redundancy
 - + Software
- Customers
 - Routes and Trunks
 - Routes and Trunks
 - D-Channels
 - Digital Trunk Interface
 - Dialing and Numbering Plans
 - Electronic Switched Network
 - Flexible Code Restriction
 - Incoming Digit Translation
 - Phones
 - Templates
 - Reports
 - Views
 - Lists
 - Properties
 - Migration
 - Tools
 - + Backup and Restore
 - Date and Time
 - + Logs and reports
 - Security
 - + Passwords
 - + Policies

- Mobile extension timer (MBXT): (0 - 8000 milliseconds)

Calling number dialing plan (CNDP):

- Basic Route Options

Attendant announcement (ATAN):

Billing number required (BLIN): ☐

Call detail recording (CDR): ☒

- CDR records generated on incoming calls (INC): ☒

- CDR record printing content option for redirected calls (LAST): ☒

- Time to answer output in CDR (TTA): ☐

- CDR ACD Q initial connection records to be generated (QREC): ☒

- CDR on outgoing calls (OAL): ☒

- CDR on outgoing toll calls (OTL): ☐

- Answered call identification allowed (AIA): ☒

- CDR timing starts on answer supervision of outgoing calls (OAN): ☒

- outpulsed digits in CDR (OPD): ☒

- Number of digits printed (NDP):

North American toll scheme (NATL): ☒

Controls or timers (CNTL): ☐

Conventional (Tie trunk only) (CNVT): ☐

Incoming DID digit conversion on this route (IDC): ☒

- Day IDC tree number (DCNO): (0 - 254)

- Night IDC tree number (NDNO): (0 - 254)

- Display external dialed digits (DEXT): ☐

Multifrequency compelled or MFC signalling (MFC):

Process notification networked calls (PNNC): ☐

+ Network Options

+ General Options

+ Advanced Configurations

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Figure 28 – Route Configuration Details

Click on the **Submit** button.

5.5.6. Administer Virtual Trunks

From the EM, select **Routes and Trunks** → **Route and Trunks**, the Route list is now updated with the newly added route. In the example, the Route 100 was being added. Click on the **Add trunk** button next to the newly added route 100 as shown in **Figure 29**



Figure 29 – Route and Trunks Page

The **Customer 0, Route 100, Trunk 1 Property Configuration** screen is displayed. Enter the following values for the specified fields and retain the default values for the remaining fields. The Media Security (sRTP) needs to be disabled at the trunk level by editing the **Class of Service** (CLS) at the bottom of the basic trunk configuration page. Click on the **Edit** button as shown in **Figure 30**.

- The Multiple trunk input number (**MTINPUT**) field may be used to add multiple trunks in a single operation, or repeat the operation for each trunk. In the sample configuration, 32 trunks were created.
- Trunk data block (**TYPE**): IP Trunk (IPTI)
- Terminal Number (**TN**): Available terminal number (created in **Section 5.5.4**)
- Designator field for trunk (**DES**): A descriptive text
- Extended Trunk (**XTRK**): Virtual trunk (VTRK)
- Route number, Member number (**RTMB**): Current route number and starting member
- Card Density: 8D
- Start arrangement Incoming (**STRI**): IMM
- Start arrangement Outgoing (**STRO**): IMM
- Trunk Group Access Restriction (**TGAR**): Desired trunk group access restriction level
- Channel ID for this trunk (**CHID**): An available starting channel ID

Figure 30 – New Trunk Configuration Details

For **Media Security**, select **Media Security Never (MSNV)**. Enter the remaining values for the specified fields as shown in **Figure 31**. Scroll down to the bottom of the screen and click **Return Class of Service** and then click on the Save button (not shown)

AVAYA CS1000 Element Manager Help | Logout

- Class of Service

| Input Description | Input Value |
|---------------------------------------|---|
| - ACD Priority : | ACD Priority not required (APN) |
| - Analog Semi-Permanent Connections : | Analog Semi-Permanent Connections Denied (SPCD) |
| - ARF Supervised COT : | |
| - Barring : | |
| - Battery Supervised COT : | |
| - Busy Tone Supervised COT : | |
| - Calling Line Identification : | |
| - Calling party : | Calling party Denied (CND) |
| - Central Office Ringback : | |
| - Centrex Switchhook Flash : | Centrex Switchhook Flash Denied (THFD) |
| - Dial Pulse : | Digitone (DTN) |
| - DTR PAD value : | |
| - Echo Canceling : | Echo Canceling Denied (ECD) |
| - Hong Kong DTI : | |
| - Loop Break Supervised COT : | |
| - Make-break ratio for dial pulse : | 10 pulses per second (P10) |
| - Manual Incoming : | Manual Incoming Denied (MID) |
| - Media Security : | Media Security Never (MSNV) |
| - Network Hook Flash Over M911P : | |
| - Polarity : | |
| - Priority : | Low Priority (LPR) |
| - Restriction level : | Unrestricted (UNR) |
| - Reversed Ear Piece : | Reversed Ear Piece denied (XREP) |
| - Short or long line : | |
| - Transmission Class of Service : | Non-Transmission Compensated (NTC) |
| - Warning Tone : | Warning Tone Allowed (WTA) |
| - Reversed Ear Piece : | Reversed Ear Piece denied (XREP) |
| - ARF Supervised COT : | |

Return Class of Service Cancel

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Figure 31 – Class of Service Configuration Details Page

5.5.7. Administer Calling Line Identification Entries

Select **Customers** → **00** → **ISDN and ESN Networking**. Click on **Calling Line Identification Entries** as shown in **Figure 32**

Figure 32 – ISDN and ESN Networking

Click on **Add** as shown in **Figure 33**

Figure 33 – Calling Line Identification Entries

Add entry **0** as shown in **Figure 34**:

- **National Code**: leave as blank
- **Local Code**: input prefix digits assigned by Service Provider, in this case it is 6 digits – 713343. This **Local Code** will be used for call display purpose of outbound international call configuration in **Section 5.6.6** in which the **Special Number 011** is associated with Call Type = Unknown.
- **Home Location Code**: input prefix digits assigned by Service Provider, in this case it is 6 digits - 713343. This **Home Location Code** will be used for call display purpose for Call Type = National (NPA).
- **Local Steering Code**: input prefix digits assigned by Service Provider, in this case it is 6 digits - 713343. This **Local Steering Code** will be used for call display purpose for Call Type = Local Subscriber (NXX).
- **Calling Party Name Display**: Uncheck for **Roman characters**.

Click on the **Save** button as shown in **Figure 34**

The screenshot shows the AVAYA CS1000 Element Manager interface. The top header includes the AVAYA logo, 'CS1000 Element Manager', and 'Help | Logout'. The left sidebar contains a navigation tree with categories like UCM Network Services, Home, Links, System, Customers, Routes and Trunks, Dialing and Numbering Plans, Phones, Tools, and Security. The main content area is titled 'Edit Calling Line Identification 0' and contains the following sections:

- General Properties**:
 - National Code: 713 (0 - 999999) [Code for national home number]
 - Local Code: 343 (1-12 digits) [Code for home local number or listed DN]
 - Home Location Code: 713343 (1-7 digits)
 - Local Steering Code: 713343 (1-7 digits)
 - Use DN as DID: YES
- Emergency Services Access**:
 - Emergency Local Code: (1-12 digits) [Code for home local number during Emergency calls]
 - Emergency Options:
 - ☐ Home national number for emergency services access calls
 - ☒ Append the originating directory number for emergency services access calls
- Calling Party Name Display**:
 - Roman characters: ☐
 - CPND Name: [first name, last name]
 - Expected Length: [dropdown menu]
 - Display Format: First name, Last name

At the bottom right, there are 'Save' and 'Cancel' buttons.

Figure 34 – Edit Calling Line Identification 0

5.5.8. Enable External Trunk to Trunk Transferring

This section shows how to enable External Trunk to Trunk Transferring feature which is a mandatory configuration to make call transfer and conference work properly over SIP trunk.

Login Call Server Overlay CLI (please refer to **Section 5.1.2** for more detail)

Allow External Trunk to Trunk Transferring for Customer Data Block by using **LD 15**

```
>ld 15
CDB000
MEM AVAIL: (U/P): 33600126   USED U P: 8345621 954062   TOT: 45579868
DISK SPACE NEEDED: 1722 KBYTES
REQ: chg
TYPE: net

TYPE NET_DATA
CUST 0
OPT
...
TRNX YES
EXTT YES
...
```

5.6. Administer Dialing Plans

5.6.1. Define ESN Access Codes and Parameters (ESN)

Select **Dialing and Numbering Plans** → **Electronic Switched Network** from the left pane to display the **Electronic Switched Network (ESN)** screen as shown in **Figure 35**

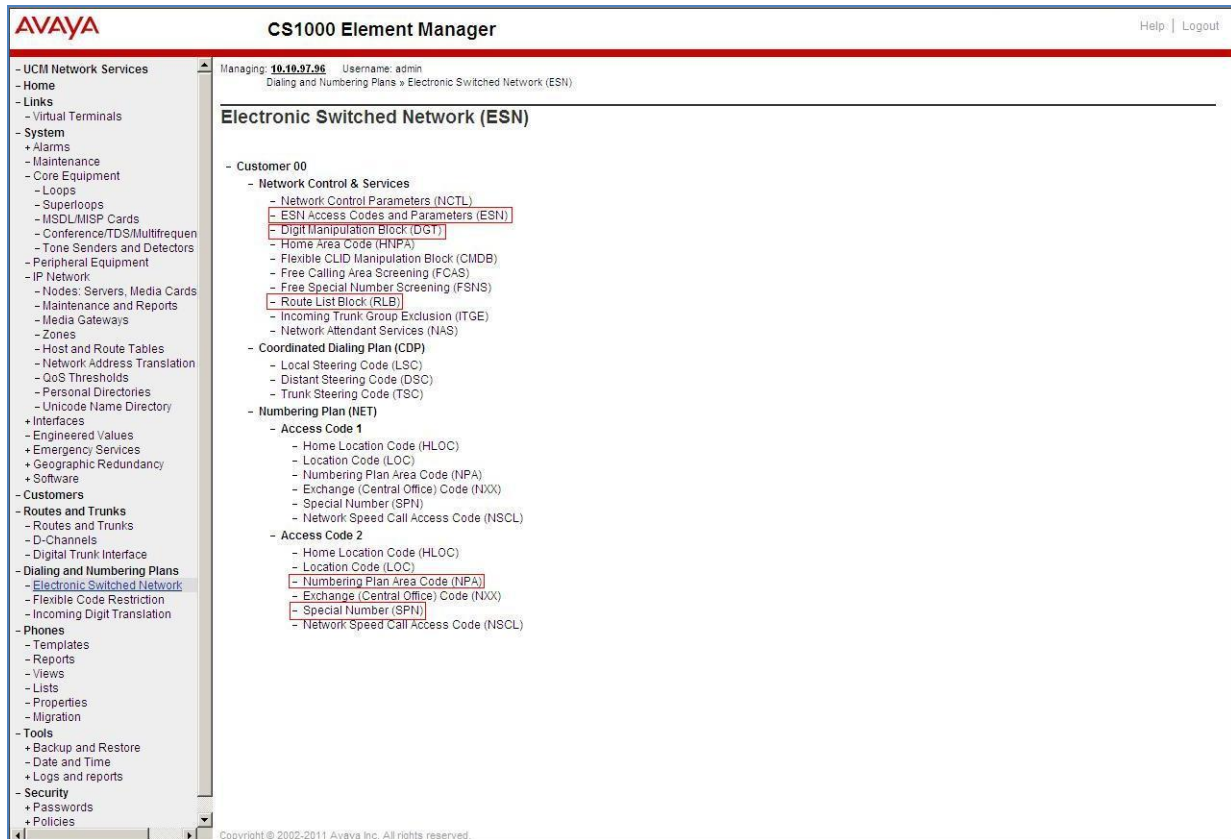


Figure 35 –ESN Configuration Details

In the **ESN Access Codes and Basic Parameters** page, define **NARS Access Code 2** as shown in **Figure 36**.

Click Submit button (not shown).

Figure 36 – ESN Access Codes and Basic Parameters

5.6.2. Associate NPA and SPN call to ESN Access Code 2

Login Call Server CLI (please refer to **Section 5.1.2** for more detail), change Customer Net Data block by using **LD 15**

```
>ld 15
CDB000
MEM AVAIL: (U/P): 35600086   USED U P: 8325631 954152   TOT: 44879869
DISK SPACE NEEDED: 1722 KBYTES
REQ: chg
TYPE: net

TYPE NET_DATA
CUST 0
OPT
AC1 xNPA xSPN   ----- > (Set NPA, SPN not to associate to ESN Access Code 1)
FNP
CLID
...
```

Verify Customer Net Data block by using **LD 21**

```
>ld 21
PT1000

REQ: prt
TYPE: net
TYPE NET_DATA
CUST 0

TYPE NET_DATA
CUST 00
OPT RTA
AC1
AC2 INTL NPA SPN NXX LOC ----- > (NPA, SPN are associated to ESN Access Code 2)
FNP YES
...
```

5.6.3. Digit Manipulation Block (DMI)

Select **Dialing and Numbering Plans → Electronic Switched Network** from the left pane to display the **Electronic Switched Network (ESN)** screen. Select **Digit Manipulation Block (DGT)** as shown in **Figure 35**.

In the Choose a DMI Number field, select an available DMI from the drop-down list and click **to Add** as shown in **Figure 37**.

Enter the **Number of leading digits to be Deleted (Del)** field and select the **Call Type to be used by the manipulated digits (CTYP)** and then click **Submit** (see **Section 5.6.4**).

5.6.4. Digit Manipulation Block (DMI) for Outbound Call

The following steps show how to add DMI for the outbound call. There are 2 indexes, which were added to the Digit Manipulation Block List (14 and 15)

Select **Dialing and Numbering Plans → Electronic Switched Network** from the left pane to display the **Electronic Switched Network (ESN)** screen. Select **Digit Manipulation Block (DGT)** as above.

In the Choose a DMI Number field, select an available DMI from the drop-down list and click on **to Add** button as shown in **Figure 37**

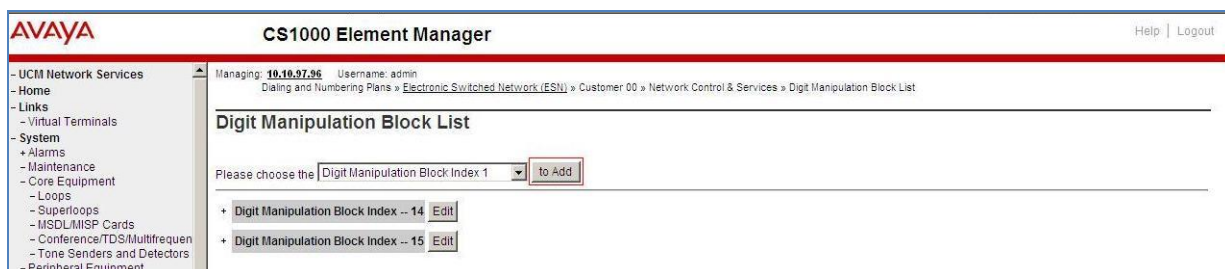


Figure 37 – Add a DMI

Add DMI_14: Enter **0** for the **Number of leading digits to be Deleted (Del)** field and select **NPA** for the **Call Type to be used by the manipulated digits (CTYP)** and then click on **Submit** button as shown in **Figure 38**

The screenshot shows the Avaya CS1000 Element Manager interface. The left sidebar contains a navigation menu with options like UCM Network Services, Home, Links, Virtual Terminals, System, Alarms, Maintenance, Core Equipment, Loops, Superloops, MSDLMISP Cards, Conference/TDS/Multifrequen, Tone Senders and Detectors, Peripheral Equipment, IP Network, Nodes: Servers, Media Cards, Maintenance and Reports, Media Gateways, and Zones. The main content area is titled 'Digit Manipulation Block'. It contains the following fields: 'Digit Manipulation Index numbers' set to 14, 'Number of leading digits to be deleted' set to 0 (with a range of 0 - 19), an 'Insert' field, 'IP Special Number' with an unchecked checkbox, and 'Call Type to be used by the manipulated digits' set to NPA (NPA). At the bottom right are buttons for Submit, Refresh, Delete, and Cancel.

Figure 38 – DMI_14 Configuration Details

Add DMI_15: Enter **1** for the **Number of leading digits to be Deleted (Del)** field and select **NPA** for the **Call Type to be used by the manipulated digits (CTYP)** and then click on **Submit** button as shown in **Figure 39**

The screenshot shows the Avaya CS1000 Element Manager interface, similar to Figure 38. The 'Digit Manipulation Index numbers' field is now set to 15. The 'Number of leading digits to be deleted' field is set to 1 (with a range of 0 - 19). The 'Call Type to be used by the manipulated digits' remains set to NPA (NPA). The interface elements and navigation menu are consistent with the previous figure.

Figure 39 – DMI_15 Configuration Details

5.6.5. Route List Block (RLB) (RLB 14)

This session shows how to add a RLB associated with the DMI created in **Section 5.6.4**.

Select **Dialing and Numbering Plans** → **Electronic Switched Network** from the left pane to display the **Electronic Switched Network (ESN)** screen. Select **Route List Block (RLB)** as shown in **Figure 35**

Select an available value in the textbox for the **route list index** (in this case is 14) and click on **to Add** button as shown in **Figure 40**



Figure 40 – Add a Route List Block.

Enter the following values for the specified fields, and retain the default values for the remaining fields (**Figure 41**). Scroll down to the bottom of the screen, and click on the **Submit** button.

- **Route number (ROUT): 100** (created in **Section 5.5.5**)
- **Digit Manipulation Index (DMI): 14** (created in **Section 5.6.4**)
- **Incoming CLID Table: 0** (created in **Section 5.5.7**)

AVAYA CS1000 Element Manager

Managing: 10.10.97.96 Username: admin
Dialing and Numbering Plans » Electronic Switched Network (ESN) » Customer 00 » Network Control & Services » Route List Blocks » Route List Block » Data Entry of a Route List Block

Data Entry of a Route List Block

Route List Block Index: 14

General Properties

Entry Number for the Route List: 0

Indexes

Time of Day Schedule: 0
Facility Restriction Level: 0 (0 - 7)
Digit Manipulation Index: 14
ISL D-Channel Down Digit Manipulation Index: 0 (0 - 1999)
Free Calling Area Screening Index: 0
Free Special Number Screening Index: 0
Business Network Extension Route: ☐
Incoming CLID Table: 0 (0 - 100)

Options

Local Termination entry: ☐
Route Number: 100
Skip Conventional Signaling: ☐
Use Tone Detector: ☐
Conversion to LDN: ☐
Expensive Route: ☐
Strategy on Congestion: No Reroute (NRR)
- QSIG Alternate Routing Causes: QSIG Alternate Routing Cause 1
Preferred Routing: Preferred Route 1
ISDN Drop Back Busy: Drop Back Disabled (DBD)
ISDN Off-Hook Queuing Option: ☐
Off-Hook Queuing Allowed: ☐

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Figure 41 – RLB_14 Route List Block Configuration Details

5.6.6. Route List Block (RLB) (RLB 15)

Select **Dialing and Numbering Plans** → **Electronic Switched Network** from the left pane to display the **Electronic Switched Network (ESN)** screen. Select **Route List Block (RLB)** as shown in **Figure 35**.

Select an available value in the textbox for the **route list block index** (in this case 15) and click on the **to Add** button as shown in **Figure 40**.

Enter the following values for the specified fields, and retain the default values for the remaining fields (**Figure 42**). Scroll down to the bottom of the screen, and click on the **Submit** button.

- **Route number (ROUT)** : 100 (created in **Section 5.5.5**)
- **Digit Manipulation Index (DMI)**: 15 (created in **Section 5.6.4**)
- **Incoming CLID Table**: 0 (created in **Section 5.5.7**)

AVAYA CS1000 Element Manager Help | Logout

Managing: 10.10.97.96 Username: admin
Dialing and Numbering Plans > Electronic Switched Network (ESN) > Customer 00 > Network Control & Services > Route List Blocks > Route List Block > Data Entry of a Route List Block

Data Entry of a Route List Block

Route List Block Index: 15

General Properties

Entry Number for the Route List: 0

Indexes

Time of Day Schedule: 0
Facility Restriction Level: 0 (0 - 7)
Digit Manipulation Index: 15
ISL D-Channel Down Digit Manipulation Index: 0 (0 - 1999)
Free Calling Area Screening Index: 0
Free Special Number Screening Index: 0
Business Network Extension Route: ☐
Incoming CLID Table: 0 (0 - 100)

Options

Local Termination entry: ☐
Route Number: 100
Skip Conventional Signaling: ☐
Use Tone Detector: ☐
Conversion to LDN: ☐
Expensive Route: ☐
Strategy on Congestion: No Reroute (NRR)
- QSIG Alternate Routing Causes: QSIG Alternate Routing Cause 1
Preferred Routing: Preferred Route 1
ISDN Drop Back Busy: Drop Back Disabled (DBD)
ISDN Off-Hook Queuing Option: ☐
Off-Hook Queuing Allowed: ☐

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Figure 42 – RLB_15 Route List Block Configuration Details

5.6.7. Inbound Call – Incoming Digit Translation Configuration

This section describes the steps for receiving the calls from PSTN via the PAETEC Communications system.

Select **Dialing and Numbering Plans → Incoming Digit Translation** from the left pane to display the **Incoming Digit Translation** screen. Click on the **Edit IDC** button as shown in **Figure 43**

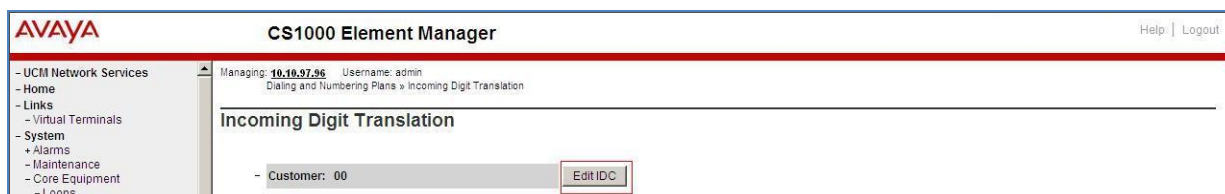


Figure 43 – Incoming Digit Translation

Click on the **New DCNO** to create the digit translation mechanism. In this example, Digit Conversion Tree Number 1 has been created as shown in **Figure 44**



Figure 44 – Incoming Digit Conversion Property

Detail configuration of the Digit Conversion Tree Configuration is shown in **Figure 45**. The **Incoming Digits** can be added to map to the Converted Digits which would be the Communication Server 1000 system phones DN. This **DCN0** has been assigned to route 100 as shown in **Figure 26** and **27**.

In the following configuration, the incoming call from PSTN with the prefix 713-343xxxx or 281-402xxxx will be translated to DN xxxx. The DID number 2814022045 is translated to 1700 for Voicemail accessing purpose.

AVAYA

CS1000 Element Manager

Help | Logout

- UCM Network Services

- Home

- Links

- Virtual Terminals

- System

+ Alarms

- Maintenance

+ Core Equipment

- Peripheral Equipment

- IP Network

- Nodes: Servers, Media Cards

- Maintenance and Reports

- Media Gateways

- Zones

- Host and Route Tables

- Network Address Translation (N)

- QoS Thresholds

- Personal Directories

- Unicode Name Directory

+ Interfaces

- Engineered Values

+ Emergency Services

+ Geographic Redundancy

+ Software

- Customers

- Routes and Trunks

- Routes and Trunks

Managing: 10.10.97.96 Username: admin

Dialing and Numbering Plans > Incoming Digit Translation > Customer 00 > Digit Conversion Tree 1 Configuration

Digit Conversion Tree 1 Configuration

Regular IDC tree

Send calling party DID disabled

Add...

Delete IDC

Delete IDC tree

Refresh

| | Incoming Digits ▲ | Converted Digits | CPND Name | CPND language |
|----|-------------------|------------------|-----------|------------------|
| 1 | 2814022045 | 1700 | , | Roman characters |
| 2 | 2814022046 | 2046 | , | Roman characters |
| 3 | 2814022126 | 2126 | , | Roman characters |
| 4 | 2814022130 | 2130 | , | Roman characters |
| 5 | 7133433756 | 3756 | , | Roman characters |
| 6 | 7133433757 | 3757 | , | Roman characters |
| 7 | 7133433758 | 3758 | , | Roman characters |
| 8 | 7133433759 | 3759 | , | Roman characters |
| 9 | 7133433760 | 3760 | , | Roman characters |
| 10 | 7133434390 | 4390 | , | Roman characters |

Figure 45 – Digit Conversion Tree

5.6.8. Outbound Call - Special Number Configuration

There are special numbers which have been configured to be used for this testing such as: 0, 011, 1800, 411, 911 and so on.

Select **Dialing and Numbering Plans** → **Electronic Switched Network** from the left pane to display the **Electronic Switched Network (ESN)** screen. Select **Special Number (SPN)** as shown in **Figure 35**

Enter SPN number and then click on **Add** button. **Figure 46** shows all the special number used for this testing

The screenshot displays the AVAYA CS1000 Element Manager web interface. The top header shows the AVAYA logo and the title 'CS1000 Element Manager'. Below the header, a navigation pane on the left lists various system components, with 'Dialing and Numbering Plans' and 'Electronic Switched Network' highlighted. The main content area is titled 'Special Number List' and shows a table of configured special numbers. At the top of the main area, there is a form to add a new special number: 'Please enter a Special Number' followed by a text input field and an 'Add' button. The table lists five special numbers: 0, 011, 1800, 411, and 911. Each entry includes details such as 'Flexible length', 'Inhibit time-out handler', 'Type of call', and 'Route list index'. Each row also has an 'Edit' button.

| Special Number | Flexible length | Inhibit time-out handler | Type of call | Route list index | Action |
|------------------------|-----------------|--------------------------|--------------|------------------|--------|
| Special Number -- 0 | 12 | NO | NATL | 14 | Edit |
| Special Number -- 011 | 14 | NO | INTL | 14 | Edit |
| Special Number -- 1800 | 11 | NO | NATL | 14 | Edit |
| Special Number -- 411 | 3 | NO | NATL | 14 | Edit |
| Special Number -- 911 | 3 | NO | NATL | 14 | Edit |

Figure 46 – Add a SPN.

5.6.9. Outbound Call - Numbering Plan Area (NPA)

This section describes the creation of NPA used in this testing configuration.

Select **Dialing and Numbering Plans → Electronic Switched Network** from the left pane to display the **Electronic Switched Network (ESN)** screen. Select **Numbering Plan Area Code (NPA)** as shown in **Figure 35**

Enter the area code desired in the textbox and click on the **to Add** button. The 1281, 1613, 1647 and 1713 area codes were used in this configuration as shown in **Figure 47**

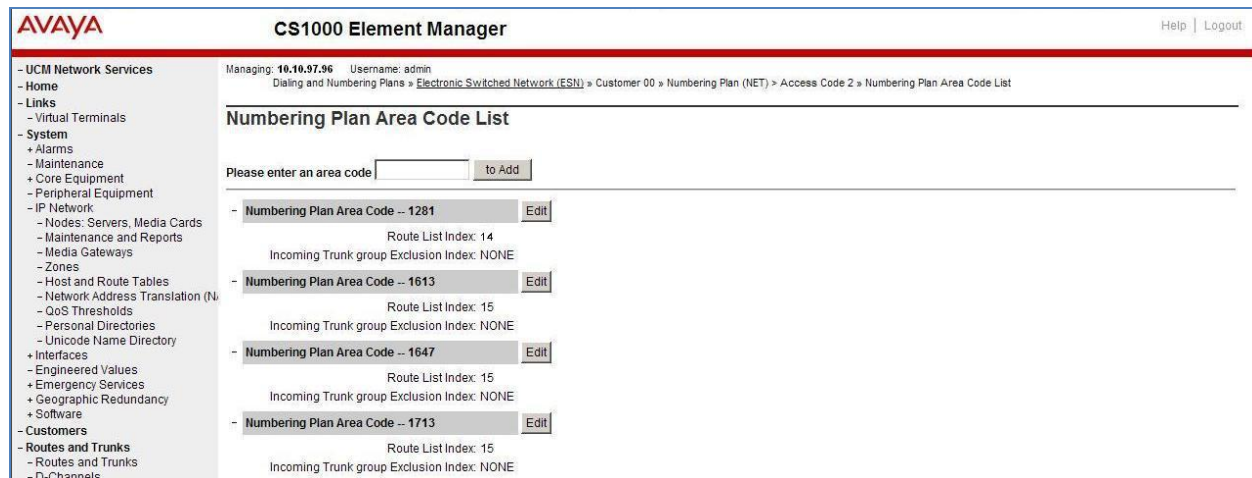


Figure 47 – Numbering Plan Area Code List

5.7. Administer Phone

This section describes the creation of Communication Server 1000 clients used in this configuration.

5.7.1. Phone creation

Refer to **Section 5.5.4** to create a virtual super-loop - **96** used for IP phone.

Refer to **Section 5.4.1** to create a bandwidth zone - **10** for IP phone.

Log in to the Call Server Command Line Interface (please refer to **Section 5.1.2** for more detail).

Create an IP phone by using **LD 11**.

```
>ld 11
REQ: prt
TYPE: 2002p2
TN 96 0 0 2
DATE
PAGE
DES
MODEL_NAME
EMULATED
DES 2002P2
```

TN 96 0 00 02 VIRTUAL
 TYPE 2002P2
 CDEN 8D
 CTYP XDLC
 CUST 0
 NUID
 NHTN
 CFG_ZONE 00010
 CUR_ZONE 00010
 MRT
 ERL 12345
 ECL 0
 FDN
 TGAR 0
 LDN NO
 NCOS 7
 SGRP 0
 RNPG 0
 SCI 0
 SSU
 LNRS 16
 XLST
 SCPW
 SFLT NO
 CAC_MFC 0
 CLS UNR FBD WTA LPR MTD FND HTD TDD CRPD
 MWD LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
 POD SLKD CCSD SWD LNA CNDA
 CFTD SFD MRD DDV CNID CDCA MSID DAPA BFED RCBF
 ICDD CDMD LLCN MCTD CLBD AUTU
 GPUD DPUD DNDD CFXD ARHD CLTD ASCD
 CPFA CPTA ABDD CFHD FICD NAID BUZZ AGRD MOAD
 UDI RCC HBTB AHD IPND DDGA NAMA MIND PRSD NRWD NRCD NROD
 DRDD EXR0
 USMD USRD ULAD CCBF RTDD RBDD RBHD PGND OCBF FLXD FTTC DNDY DNO3 MCBN
 FDSF NOVD VOLA VOUD CDMR PRED RECF MCDD T87D SBMD
 MSNV FRA PKCH MWTD DVLD CROD ELCD
 CPND_LANG ENG
 HUNT
 PLEV 02
 PUID
 UPWD
 DANI NO
 AST
 IAPG 0
 AACS NO
 ITNA NO
 DGRP
 MLWU_LANG 0
 MLNG ENG
 DNDR 0
KEY 00 SCR 3758 0 MARP
 CPND
 CPND_LANG ROMAN
 NAME Carrier1

```
XPLN 13
DISPLAY_FMT FIRST, LAST
01
02
<Text removed for brevity>
```

5.7.2. Enable Privacy for Phone

In this section, it shows how to enable Privacy for a phone by changing its class of service (CLS). By modifying the configuration of the phone created in **Section 5.7.1**, the display of the outbound call will be changed appropriately.

To hide the display number, set CLS to **ddgd**. Communication Server 1000 will include “Privacy:id” in the SIP message header before sending it to the Service Provider

```
>ld 11
REQ: chg
TYPE: 2002p2
TN 96 0 0 2
ECHG yes
ITEM cls ddgd
...
```

To allow display number, set CLS to **ddga**. Communication Server 1000 will not send the Privacy header to the Service Provider

```
>ld 11
REQ: chg
TYPE: 2002p2
TN 96 0 0 2
ECHG yes
ITEM cls ddga
...
```

5.7.3. Enable Call Forward for Phone

In this section, it shows how to configure the Call Forward feature at the system and phone level.

Select **Customer → 00 → Call Redirection**. The Call Redirection page is shown in **Figure 48**.

- **Total redirection count limit: 0** (unlimited)
- **Call Forward: Originating**
- **Number of normal ring cycle of CFNA: 4**

The screenshot displays the 'Call Redirection' configuration page within the 'UCM Network Services' interface. The left sidebar shows a navigation tree with categories like 'System', 'Customers', 'Routes and Trunks', 'Dialing and Numbering Plans', 'Phones', 'Tools', and 'Security'. The 'Customers' category is selected, and the 'Call Redirection' page is open. The main content area contains several configuration sections:

- Days for day option 1, 2, 3:** Three empty text input fields.
- Redirection Holidays:** A checkbox for 'Do not disturb hunting' is unchecked.
- Total redirection count limit:** A dropdown menu is set to '0'.
- Options:** A list of checkboxes for various call forwarding options. 'Call forward reminder tone for 500/2500 sets', 'CFNA treatment for call waiting calls on a DN', and 'DID call to second degree busy treatment' are unchecked. 'Message center' and 'Prevention of reciprocal call forward' are checked.
- Call forward:** A radio button selection where 'Originating' is selected and 'Forwarding' is unselected.
- Number of normal ringing cycles for CFNA:** A section with three dropdown menus for 'Option 0', 'Option 1', and 'Option 2', all set to '4'.
- Number of distinctive ringing cycles for CFNA:** A section with three dropdown menus for 'Option 0', 'Option 1', and 'Option 2', all set to '4'.
- Calls routed to message center:** Three checkboxes for 'No answer DID calls', 'No answer non-DID calls', and 'DID calls to busy telephones', all of which are unchecked.
- Buttons:** 'Save' and 'Cancel' buttons are located at the bottom right of the page.

Figure 48 – Call Redirection

To enable **Call Forward All Call (CFAC)** for a phone over a trunk, use **LD 11**, change its CLS to **CXFA**, **SFA** then program the forward number on the phone set. Following is the configuration of a phone that has **CFAC** enabled with forwarding number 916139675205

```
>ld 11
REQ: prt
TYPE: 2007
TN 96004
```

DATE
PAGE
DES
MODEL_NAME
EMULATED

DES 2007
TN 96 0 00 04 VIRTUAL
TYPE 2007

...
CLS UNR FBA WTA LPR MTD FNA HTA TDD HFD CRPD
MWA LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
POD SLKD CCSD SWD LNA CNDA
CFTD **SFA** MRD DDV CNID CDCA MSID DAPA BFED RCBD
ICDA CDMA LLCN MCTD CLBD AUTU
GPUD DPUD DNDD **CFXA** ARHD CLTD ASCD
...
19 CFW 16 916139675205

To enable **Call Forward Busy (CFB)** for phone over trunk by using **LD 11**, change its **CLS** to **FBA, HTA, SFA** then program the forward number as is **HUNT**. Following is the configuration of a phone has **CFB** enabled with forward number is 916139675205

>ld 11
REQ: prt
TYPE: 2007
TN 96 0 0 4
DATE
PAGE
DES
MODEL_NAME
EMULATED

DES 2007
TN 96 0 00 04 VIRTUAL
TYPE 2007
...
CLS UNR **FBA** WTA LPR MTD FNA **HTA** TDD HFD CRPD
MWA LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
POD SLKD CCSD SWD LNA CNDA
CFTD **SFA** MRD DDV CNID CDCA MSID DAPA BFED RCBD
...
FDN 916139675205
HUNT 916139675205
...

To enable **Call Forward No Answer (CFNA)** for a phone over a trunk by using **LD 11**, change its **CLS** to **FNA, SFA** then program the forward number as **FDN**. Following is the configuration of a phone that has CFNA enabled with forward number 916139675205

```
>ld 11
REQ: prt
TYPE: 2007
TN 96 0 0 4
DATE
PAGE
DES
MODEL_NAME
EMULATED

DES 2007
TN 96 0 00 04 VIRTUAL
TYPE 2007
...
FDN 916139675205
HUNT 916139675205
...
CLS UNR FBA WTA LPR MTD FNA HTA TDD HFD CRPD
MWA LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
POD SLKD CCSD SWD LNA CNDA
CFTD SFA MRD DDV CNID CDCA MSID DAPA BFED RCBD
...
```

5.7.4. Enable Call Waiting for Phone

In this section, it shows how to configure Call Waiting feature at phone level.

Log in to the Call Server CLI (please refer to **Section 5.1.2** for more detail), configure Call Waiting feature for phone by using **LD 11** to change **CLS** to **HTD, SWA** and adding a **CWT** key.

```
>ld 11
REQ: prt
TYPE: 2002p2

TN 96 0 0 2
DATE
PAGE
DES
MODEL_NAME
EMULATED
KEM_RANGE

DES 2002P2
TN 96 0 00 02 VIRTUAL
TYPE 2002P2
...
CLS UNR FBD WTA LPR MTD FNA HTD TDD HFD CRPD
```

MWA LMPN RMMD SMWD AAD IMD XHD IRD NID OLD VCE DRG1
POD SLKD CCSD **SWA** LNA CNDA

...

KEY 00 SCR 3758 0 MARP

CPND

CPND_LANG ROMAN

NAME Carrier1

XPLN 13

DISPLAY_FMT FIRST, LAST

01 CWT

...

6. Configure Avaya SBCE

This section describes the configuration of the Avaya SBCE necessary for interoperability with the Avaya Communication Server and PAETEC Communications systems.

In this testing, according to the configuration reference **Figure 1**, the Avaya elements reside on the Private side and the PAETEC Communications system reside on the Public side of the network.

Note: The following section assumes that Avaya SBCE has been installed and that network connectivity exists between the systems. For more information on Avaya SBCE, see **Section 10** of these Application Notes.

6.1. Log in Avaya SBCE

Access the web interface by typing “**https://x.x.x.x**” (where x.x.x.x is the management IP of the Avaya SBCE)

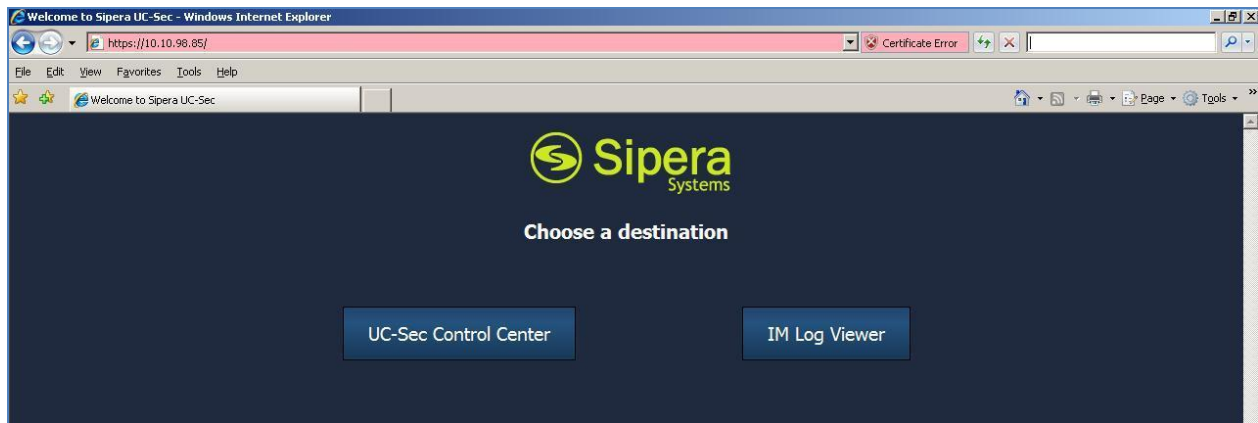
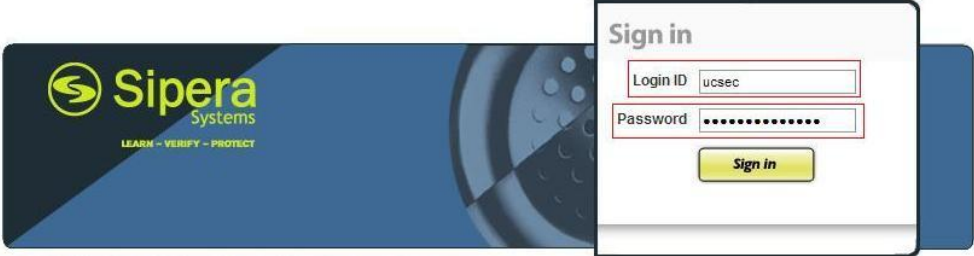


Figure 49: Avaya SBCE Web Interface

Select **UC-Sec Control Center** and enter the **login ID** and **password**



The UC-Sec™ family of products from Sipera Systems delivers comprehensive VoIP security by adapting the best practices of internet security and by using unique, sophisticated techniques such as VoIP protocol misuse & anomaly detection, behavioral learning based anomaly detection and voice spam detection to protect VoIP networks.

[Visit the Sipera Systems website to learn more.](#)

NOTICE TO USERS: This system is for authorized use only. Unauthorized use of this system is strictly prohibited. Unauthorized or improper use of this system may result in civil and/or criminal penalties. Use of this system constitutes consent to security monitoring. All activity is logged with login info, host name and IP address.

Figure 50: Avaya SBCE Login

6.2. Global Profiles

When selected, Global Profiles allows for configuration of parameters across all UC-Sec appliances.

6.2.1. Configure Server Interworking - Avaya Side

Server Interworking allows you to configure and manage various SIP call server-specific capabilities such as call hold, 180 Handling, etc.

From the menu on the left-hand side, select **Global Profiles → Server Interworking → Add Profile**

On the **General** Tab (Figure 51):

- Enter Profile name: **CS1K_Car3**
- Check **Hold Support** as **RFC2543** and **180 Handling** as **NO SDP**.
- Check **Diversion Header Support** as **Yes**.
- All other options on the General Tab can be left at default.

On the **Timers**, **URI Manipulation**, **Header Manipulation** and **Advanced** Tabs: All options can be left at default. Click Finish

The screenshot displays the UC-Sec Control Center web interface. The left sidebar shows a navigation tree with 'Server Interworking' selected. The main panel shows the configuration for the 'CS1K_Car3' profile. The 'General' tab is active, showing various SIP-related settings. The 'Hold Support' is set to 'RFC2543', '180 Handling' is 'No SDP', and 'Diversion Header Support' is 'Yes'. Other settings like '181 Handling', '182 Handling', '183 Handling', 'Refer Handling', '3xx Handling', 'Delayed SDP Handling', 'T.38 Support', 'URI Scheme', 'Via Header Format', 'Privacy Enabled', 'User Name', 'P-Asserted-Identity', 'P-Preferred-Identity', 'Privacy Header', and 'DTMF Support' are all set to their default values.

| General | |
|--------------------------|---------|
| Hold Support | RFC2543 |
| 180 Handling | No SDP |
| 181 Handling | None |
| 182 Handling | None |
| 183 Handling | None |
| Refer Handling | No |
| 3xx Handling | Yes |
| Diversion Header Support | Yes |
| Delayed SDP Handling | No |
| T.38 Support | No |
| URI Scheme | SIP |
| Via Header Format | RFC3261 |

| Privacy | |
|----------------------|----|
| Privacy Enabled | No |
| User Name | |
| P-Asserted-Identity | No |
| P-Preferred-Identity | No |
| Privacy Header | |

| DTMF | |
|--------------|------|
| DTMF Support | None |

Figure 51: Server Interworking – Avaya Side

6.2.2. Configure Server Interworking – PAETEC side

From the menu on the left-hand side, select **Global Profiles** → **Server Internetworking** → **Add Profile**

On the **General** Tab (Figure 52):

- Enter Profile name: **PAETEC**
- Check **Hold Support** as **RFC2543**
- Check **Diversion Header Support** as **Yes**
- All other options on the General Tab can be left at default.

On the **Timers**, **URI Manipulation**, **Header Manipulation** and **Advanced** Tabs: All options can be left at default. Click Finish

The screenshot shows the UC-Sec Control Center web interface. The left sidebar contains a navigation tree with 'Global Profiles' expanded, and 'Server Interworking' selected. The main content area is titled 'Global Profiles > Server Interworking: PAETEC'. It features a 'Add Profile' button and a list of profiles including 'CS1K_Car3' and 'PAETEC'. The 'PAETEC' profile is selected, and its configuration is shown in a tabbed interface with 'General' as the active tab. The 'General' tab contains a table of settings:

| General | |
|--------------------------|---------|
| Hold Support | RFC2543 |
| 180 Handling | None |
| 181 Handling | None |
| 182 Handling | None |
| 183 Handling | None |
| Refer Handling | No |
| 3xx Handling | Yes |
| Diversion Header Support | Yes |
| Delayed SDP Handling | No |
| T.38 Support | No |
| URI Scheme | SIP |
| Via Header Format | RFC3261 |

Below the 'General' tab is the 'Privacy' section with the following settings:

| Privacy | |
|----------------------|----|
| Privacy Enabled | No |
| User Name | |
| P-Asserted-Identity | No |
| P-Preferred-Identity | No |
| Privacy Header | |

At the bottom is the 'DTMF' section with the following setting:

| DTMF | |
|--------------|------|
| DTMF Support | None |

An 'Edit' button is located at the bottom right of the configuration area.

Figure 52: Server Interworking – PAETEC Side

6.2.3. Configure Routing – Avaya side

Routing profiles define a specific set of packet routing criteria that are used in conjunction with other types of domain policies to identify a particular call flow and thereby ascertain which security features will be applied to those packets. Parameters defined by Routing Profiles include packet transport settings, name server addresses and resolution methods, next hop routing information, and packet transport types.

From the menu on the left-hand side, select **Global Profiles** → **Routing** → **Add Profile**

Enter Profile Name: **PAETEC_To_CS1K_CAR3**

- **Next Hop Server 1: 10.10.97.178** (Avaya CS1000 Node IP address)
- Check **Next Hop Priority**
- **Outgoing Transport: TCP**
- Click Finish



Figure 53: Routing To Avaya

6.2.4. Configure Routing - PAETEC side

The Routing Profile allows you to manage parameters related to routing SIP signaling messages.

From the menu on the left-hand side, select **Global Profiles → Routing → Add Profile**

Enter Profile Name: **CS1K_Car3_To_PAETEC**

- **Next Hop Server 1: 20.20.64.220** (IP Address provided by PAETEC)
- Check **Next Hop Priority**
- **Outgoing Transport as UDP**



Figure 54: Routing To PAETEC

6.2.5. Configure Server – Avaya Communication Manager

The Server Configuration screen contains four tabs: General, Authentication, Heartbeat, and Advanced. Together, these tabs allow you to configure and manage various SIP call server-specific parameters such as TCP and UDP port assignments, IP Server type, heartbeat signaling parameters and some advanced options.

From the menu on the left-hand side, select **Global Profiles → Server Configuration → Add Profile**

Enter profile name: **CS1K_Car3**

On General tab (**Figure 55**):

- Select **Server Type: Call Server**
- **IP Address: 10.10.97.178** (CS1000 Node IP Address)
- **Supported Transports: Check UDP and TCP**
- **TCP Port: 5060, UDP Port: 5060**

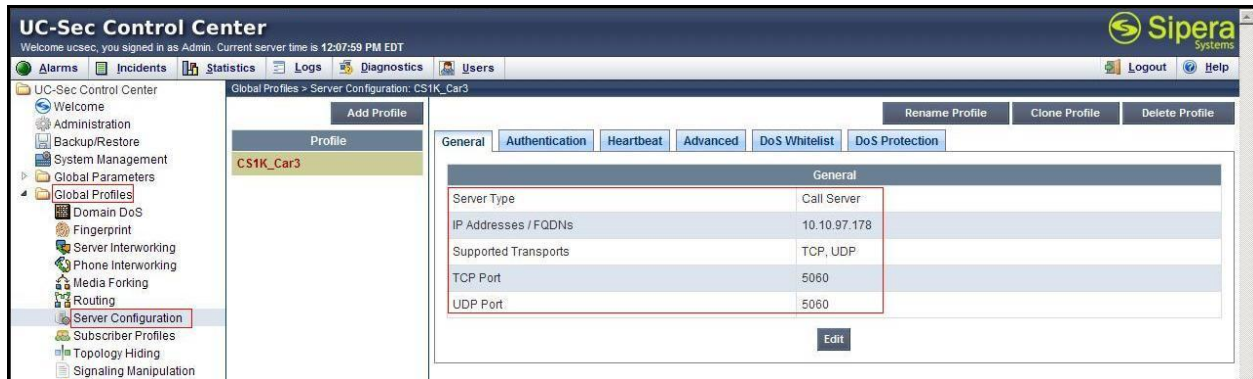


Figure 55: Avaya CS1000 Server Configuration 1

On the **Advanced** Tab (**Figure 56**), select **CS1K_Car3** for **Interworking Profile**
Click Finish (not shown)



Figure 56: Avaya CS1000 Server Configuration 2

6.2.6. Configure Server – PAETEC ACME packet SBC

From the menu on the left-hand side, select **Global Profiles → Server Configuration → Add Profile**

Enter profile name: **PAETEC**

On General tab (**Figure 57**):

- Select **Server Type: Trunk Server**
- **IP Address: 20.20.64.220** (PAETEC Trunk Server)
- **Supported Transports: Check UDP**
- **UDP Port: 5060**



Figure 57: PAETEC Server Configuration

On the **Advanced** Tab (**Figure 58**):

- Select **PAETEC** for **Interworking Profile**
- Select **Signaling Manipulation Script: CS1K_To_PAETEC**



Figure 58: PAETEC Server Advanced Configuration

On the **Heartbeat** Tab (Figure 59):

- Check on **Enable Heartbeat**
- Select **Method** as **REGISTER** (PAETEC requires registration)
- **Frequency**: **70 seconds**
- **From URI**: [7133434377@20.20.64.220](tel:7133434377@20.20.64.220)
- **To URI**: [7133434377@20.20.64.220](tel:7133434377@20.20.64.220)
 - Check **TCP Probe**, **TCP Probe Frequency**: **10 seconds**

Click Finish (not shown)



Figure 59: PAETEC Server Heartbeat Configuration

6.2.7. Configure Topology Hiding – Avaya side

The Topology Hiding screen allows you to manage how various source, destination and routing information in SIP and SDP message headers are substituted or changed to maintain the integrity of the network. It hides the topology of the enterprise network from external networks

From the menu on the left-hand side, select **Global Profiles → Topology Hiding**

Enter Profile Name: **CS1K_Car3**

For the Header **To**,

- In the **Criteria** column select **IP/Domain**
- In the **Replace Action** column select: **Overwrite**
- In the **Overwrite Value** column: **bwdev7.com**

For the Header **Request-Line**,

- In the **Criteria** column select **IP/Domain**
- In the **Replace Action** column select: **Overwrite**
- In the **Overwrite Value** column: **bwdev7.com**

For the Header **From**,

- In the **Criteria** column select **IP/Domain**
- In the **Replace Action** column select: **Overwrite**
- In the **Overwrite Value** column: **bwdev7.com**



Figure 60: Topology Hiding Avaya CS1000

6.2.8. Configure Topology Hiding – PAETEC side

From the menu on the left-hand side, select **Global Profiles** → **Topology Hiding**

Enter Profile Name: **PAETEC**

For the Header **To**,

- In the **Criteria** column select **IP/Domain**
- In the **Replace Action** column select: **Overwrite**
- In the **Overwrite Value** column: **20.20.64.220**

For the Header **Request-Line**,

- In the **Criteria** column select **IP/Domain**
- In the **Replace Action** column select: **Overwrite**
- In the **Overwrite Value** column: **20.20.64.220**

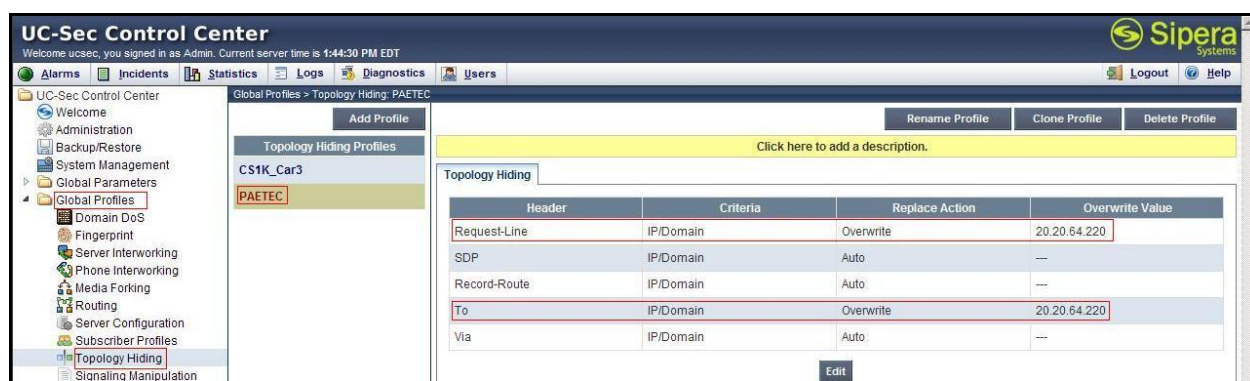


Figure 61: Topology Hiding PAETEC

6.2.9. Configure Signaling Manipulation

The Avaya's SIP signaling header manipulation feature is used for the UC-Sec product. This feature adds the ability to add, change and delete any of the headers and other information in a SIP message.

From the menu on the left-hand side, select **Global Profiles → Signaling Manipulation → Add Script**

Enter script Title: **CS1K_To_PAETEC**

- Edit the script as **Figure 62** to remove unwanted Header and Mimes from the body in SIP message and translate History Info to Diversion Header.
- Click Save (not shown)

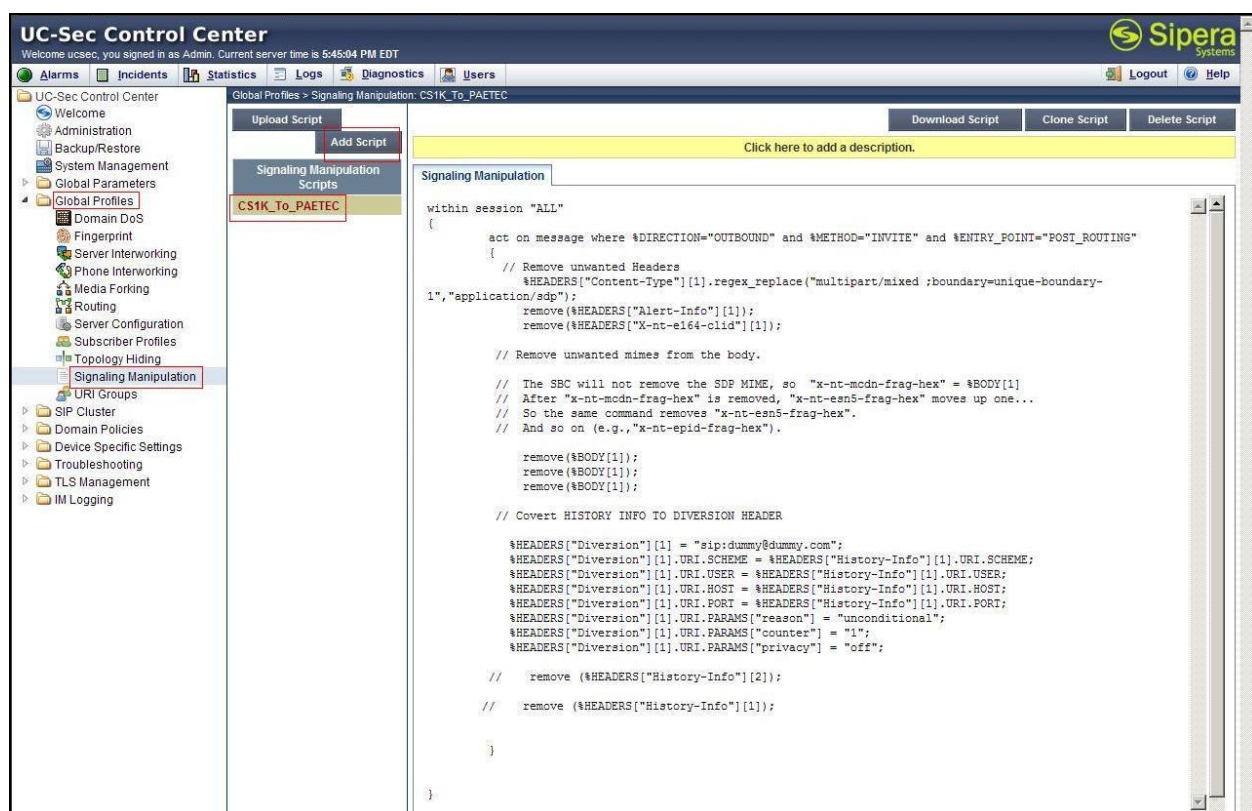


Figure 62: Signaling Manipulation

6.3. Domain Policies

The Domain Policies feature allows you to configure, apply, and manage various rule sets (policies) to control unified communications based upon various criteria of communication sessions originating from or terminating in the enterprise. These criteria can be used to trigger different policies which will apply on call flows, change the behavior of the call, and make sure the call does not violate any of the policies. There are default policies available to use, or you can create a custom domain policy.

6.3.1. Create Application Rules

Application Rules allow you to define which types of SIP-based Unified Communications (UC) applications the UC-Sec security device will protect: voice, video, and/or Instant Messaging (IM). In addition, you can determine the maximum number of concurrent voice and video sessions your network will process on order to prevent resource exhaustion.

From the menu on the left-hand side, select **Domain Policies** → **Application Rules**

Select **default** Rule

Select **Clone Rule** button

- Name: **CS1K_Car3_AppR**
- Click Finish (not shown)

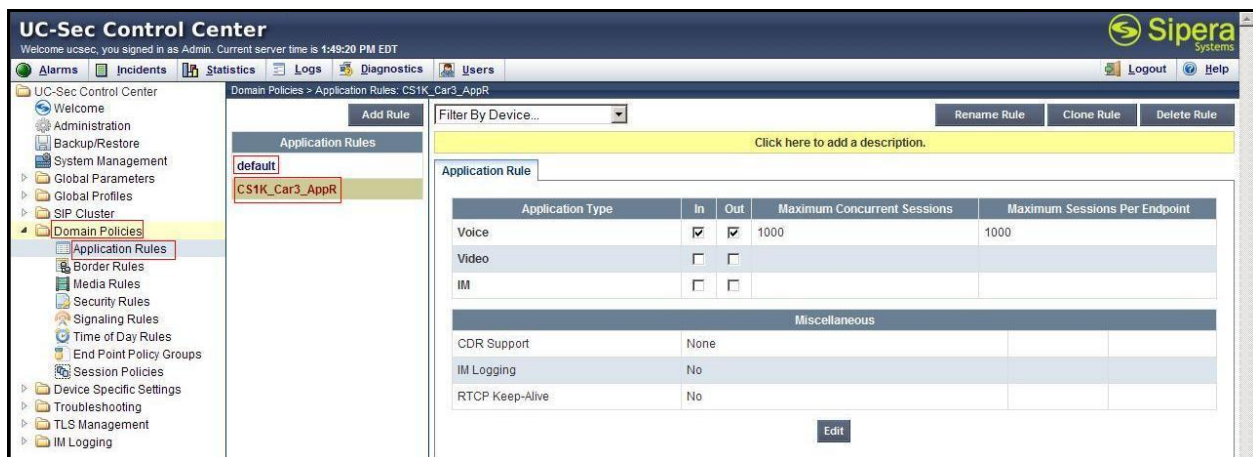


Figure 63: Avaya CS1000 Application Rule

From the menu on the left-hand side, select **Domain Policies** → **Application Rules**

Select the **default** Rule

Select **Clone Rule** button

- Name: **PAETEC_AppR**
- Click Finish (not shown)

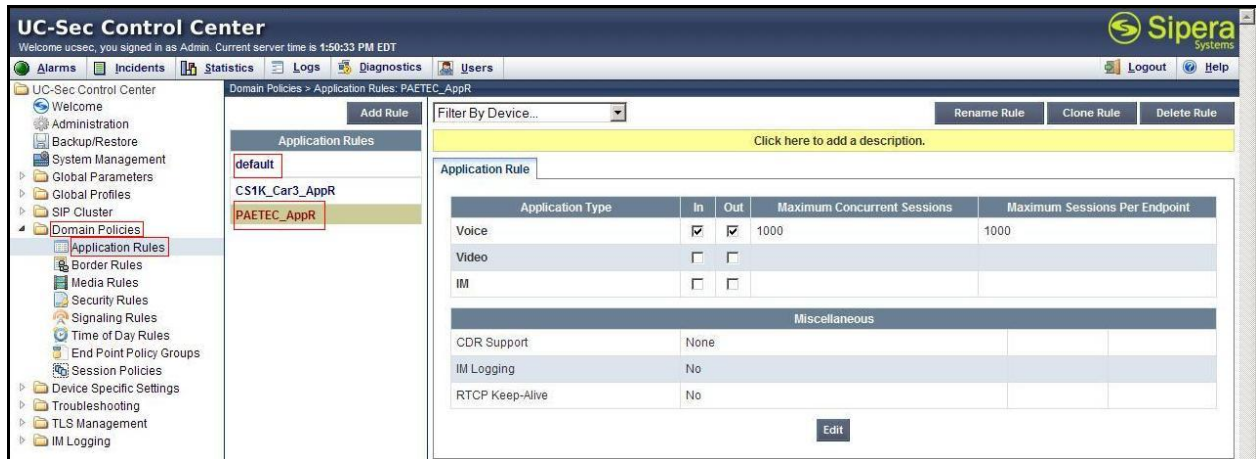


Figure 64: PAETEC Application Rule

6.3.2. Create Border Rules

Border Rules allow you control NAT Traversal. The NAT Traversal feature allows you to determine whether or not call flow through the DMZ needs to traverse a firewall and the manner in which pinholes will be kept open in the firewall to accommodate traffic

From the menu on the left-hand side, select **Domain Policies → Border Rules**

Select the **default** Rule

Select **Clone Rule** button

- Name: **CS1K_Car3_BorderR**
- Click Finish (not shown)

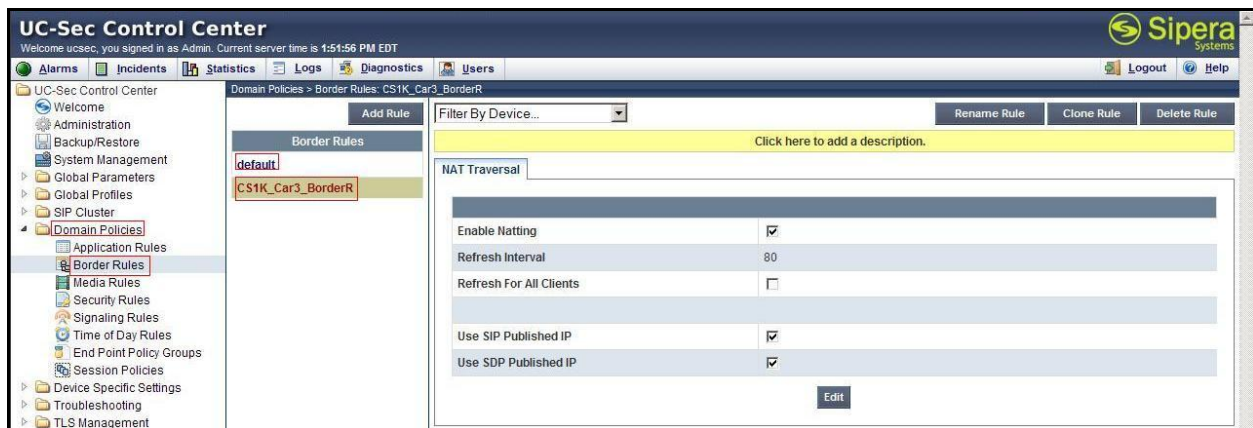


Figure 65: Avaya CS1000 Border Rule

From the menu on the left-hand side, select **Domain Policies → Border Rules**

Select the **default** Rule

Select **Clone Rule** button

- Name: **PAETEC_BorderR**
- Click Finish (not shown)

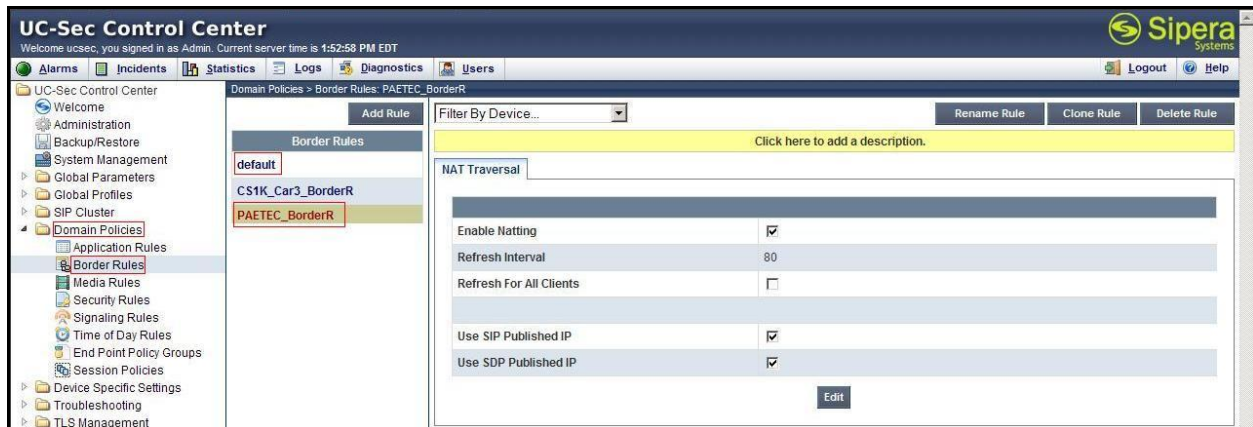


Figure 66: PAETEC Border Rule

6.3.3. Create Media Rules

Media Rules allow you to define RTP media packet parameters such as prioritizing encryption techniques and packet encryption techniques. Together these media-related parameters define a strict profile that is associated with other SIP-specific policies to determine how media packets matching these criteria will be handled by the UC-Sec security product

From the menu on the left-hand side, select **Domain Policies → Media Rules**

Select the **default-low-med** Rule

Select **Clone Rule** button

- Name: **CS1K_Car3_MediaR**
- Click Finish (not shown)



Figure 67: Avaya CS1000 Media Rule

From the menu on the left-hand side, select **Domain Policies → Media Rules**

Select the **default-low-med** Rule

Select **Clone Rule** button

- Name: **PAETEC_MediaR**
- Click Finish (not shown)



Figure 68: PAETEC Media Rule

6.3.4. Create Security Rules

Security Rules allow you to define which enterprise-wide VoIP and Instant Message (IM) security features will be applied to a particular call flow. Security Rules allows you to configure Authentication, Compliance, Fingerprinting, Scrubber, and Domain DoS. In addition to determining which combination of security features are applied, you can also define the security feature profile so that the feature is applied in a specific manner to a specific situation

From the menu on the left-hand side, select **Domain Policies** → **Security Rules**

Select the **default-med** Rule

Select **Clone Rule** button

- Name: **CS1K_Car3_SecurityR**
- Click Finish (not shown)



Figure 69: Avaya CS1000 Security Rule

From the menu on the left-hand side, select **Domain Policies** → **Security Rules**

Select the **default-med** Rule

Select **Clone Rule** button

- Name: **PAETEC_SecurityR**
- Click Finish (not shown)



Figure 70: PAETEC Security Rule

6.3.5. Create Signaling Rules

Signaling Rules allow you to define the action to be taken (*Allow*, *Block*, *Block with Response*, etc.) for each type of SIP-specific signaling request and response message. When SIP signaling packets are received by the UC-Sec, they are parsed and “patternmatched” against the particular signaling criteria defined by these rules. Packets matching the criteria defined by the Signaling Rules are tagged for further policy matching

From the menu on the left-hand side, select **Domain Policies → Signaling Rules**

Select the **default** Rule

Select **Clone Rule** button

- Name: **CS1K_Car3_SigR**
- Click Finish (not shown)

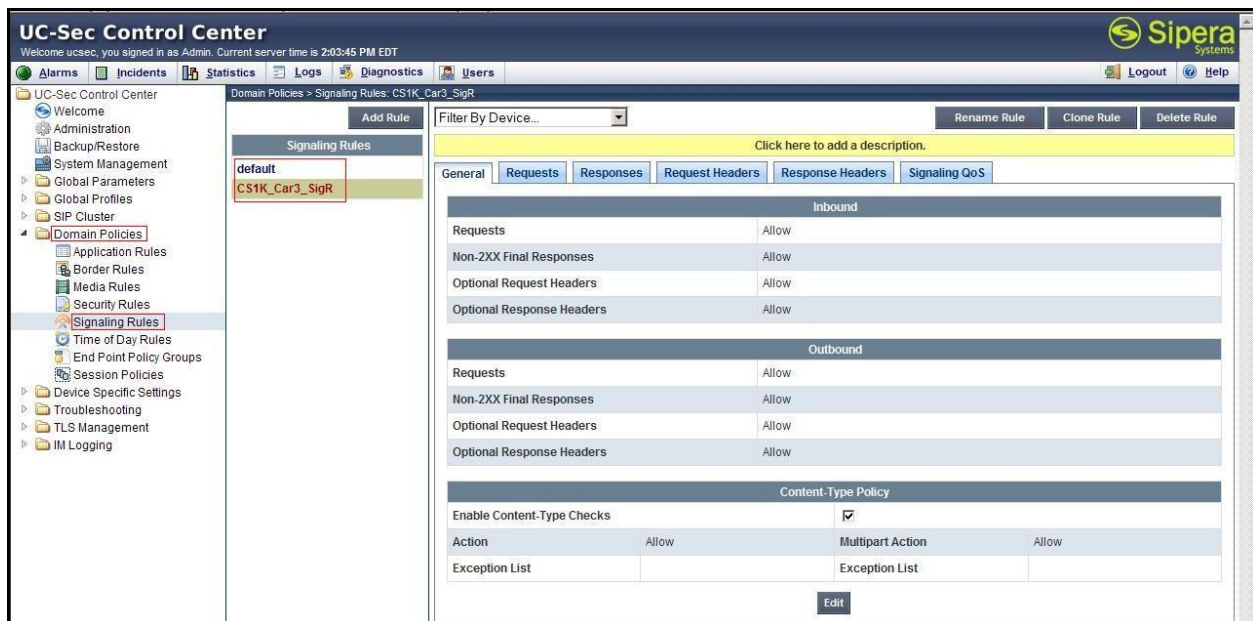


Figure 71: Avaya CS1000 Signaling Rule

From the menu on the left-hand side, select **Domain Policies → Signaling Rules**

Select the **default** Rule

Select **Clone Rule** button

- Name: **PAETEC_SigR**
- Click Finish (not shown)

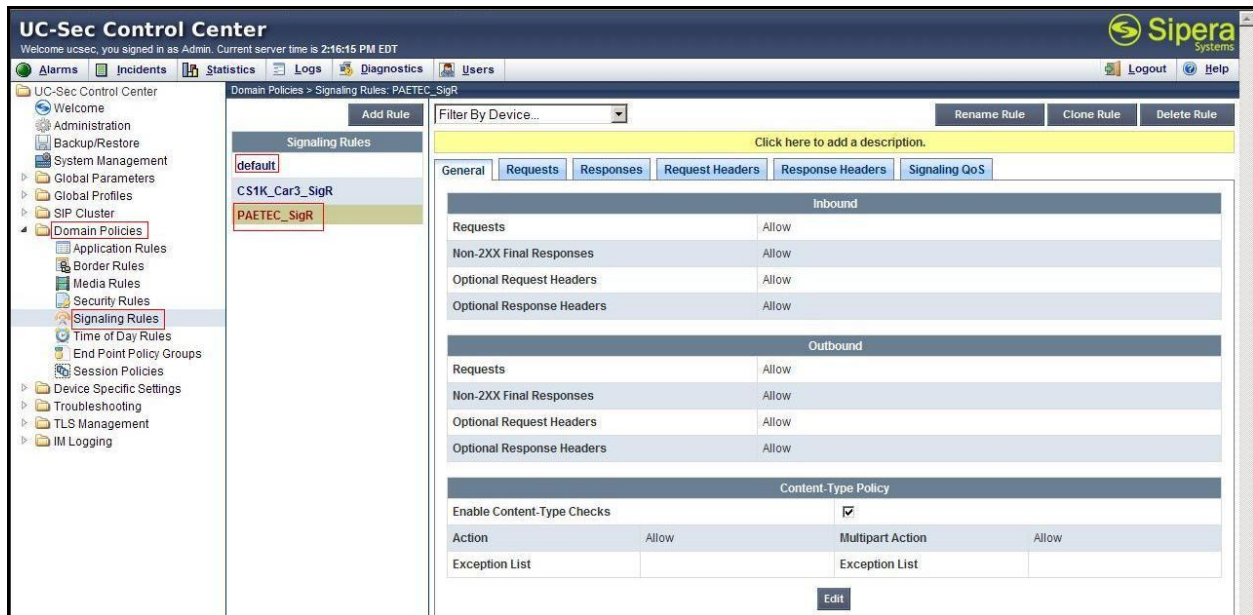


Figure 72: PAETEC Signaling Rule 1

The below configuration on PAETEC Signaling Rule converts 183 with SDP to 180 no SDP

Select the **Response Headers** Tab

Select **Add in Header Control**

- **Header Name:** Contact
- **Response Code:** 183
- **Method Name:** INVITE
- **Header Criteria:** Forbidden
- **Presence Action:** Change response to 180 Ringing

Click Finish (not shown)

UC-Sec Control Center

Welcome ucsec, you signed in as Admin. Current server time is 2:26:53 PM EDT

Alarms Incidents Statistics Logs Diagnostics Users Logout Help

Domain Policies > Signaling Rules: PAETEC_SigR

Filter By Device... Add Rule Rename Rule Clone Rule Delete Rule

Click here to add a description.

General Requests Responses Request Headers Response Headers Signaling QoS

Add In Header Control Add Out Header Control

| Row | Header Name | Response Code | Method Name | Header Criteria | Action | Proprietary | Direction | |
|-----|-------------|---------------|-------------|-----------------|----------------------------------|-------------|-----------|--|
| 1 | Contact | 183 | INVITE | Forbidden | Change response to "180 Ringing" | No | IN | |

Figure 73: PAETEC Signaling Rule 2

6.3.6. Create Time of Day Rules

A Time-of-day (ToD) Rule allows you to determine when the domain policy it is assigned to will be in effect. ToD Rules provide complete flexibility to fully accommodate the enterprise by, not only determining when a particular domain policy will be in effect, but also to whom it will apply, and for how long it will remain in effect

From the menu on the left-hand side, select **Domain Policies → Time of Day Rules**

Select the **default** Rule

Select **Clone Rule** button

- Name: **CS1K_Car3_ToDR**
- Click Finish (not shown)

The screenshot shows the UC-Sec Control Center interface. The left sidebar contains a navigation tree with the following items: Welcome, Administration, Backup/Restore, System Management, Global Parameters, Global Profiles, SIP Cluster, Domain Policies (selected), Application Rules, Border Rules, Media Rules, Security Rules, Signaling Rules, Time of Day Rules (highlighted), End Point Policy Groups, Session Policies, Device Specific Settings, Troubleshooting, TLS Management, and IM Logging. The main content area is titled 'Domain Policies > Time of Day Rules: CS1K_Car3_ToDR'. It features a 'Filter By Device...' dropdown, buttons for 'Add Rule', 'Rename Rule', 'Clone Rule', and 'Delete Rule', and a yellow box with the text 'Click here to add a description.' Below this, there are three sections: 'Date' with 'Start Date' (01/17/2012) and 'End Date' (Never); 'Time' with 'Start Time' (12:00 AM) and 'End Time' (11:59 PM); and 'Recurrence' with radio buttons for 'Daily' (selected), 'Weekly', 'Monthly', 'Every Day', 'Every Weekday', and 'Every Weekend'. An 'Edit' button is at the bottom right.

Figure 74: Avaya CS1000 Time of Day Rule

From the menu on the left-hand side, select **Domain Policies → Time of Day Rules**

Select the **default** Rule

Select **Clone Rule** button

- Name: **PAETEC_ToDR**
- Click Finish (not shown)

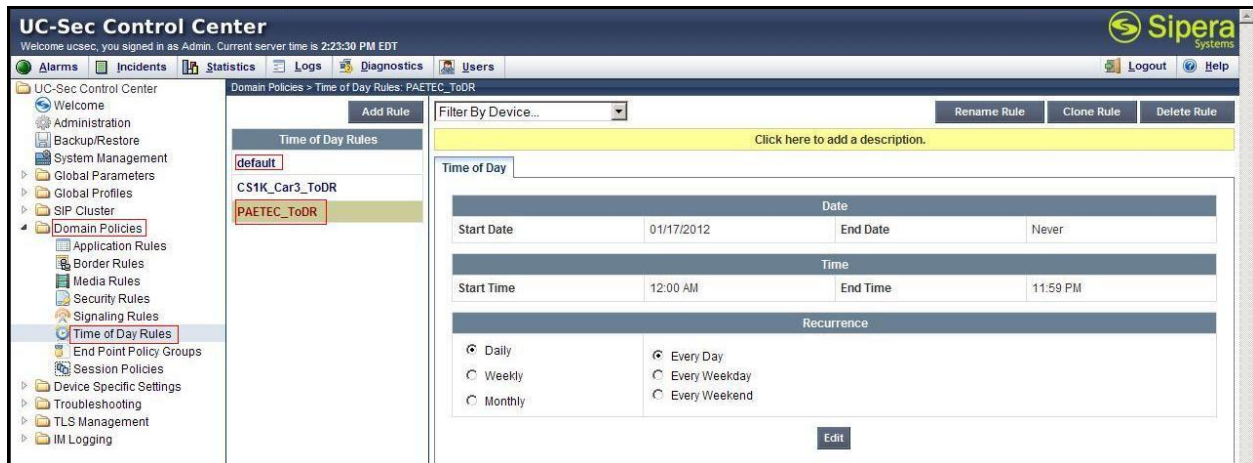


Figure 75: PAETEC Time of Day Rule

6.3.7. Create Endpoint Policy Groups

The End-Point Policy Group feature allows you to create *Policy Sets* and *Policy Groups*. A *Policy Set* is an association of individual, SIP signaling-specific security policies (rule sets): application, border, media, security, signaling, and ToD. (Each of which was creating using the procedures contained in the previous sections.) A *Policy Group* is comprised of one or more Policy Sets. The purpose of Policy Sets and Policy Groups is to increasingly aggregate and simplify the application of UC-Sec security features to very specific types of SIP signaling messages traversing through the enterprise

From the menu on the left-hand side, select **Domain Policies → End Point Policy Groups**

Select **Add Group**

Name: CS1K_Car3_PolicyG

- **Application Rule: CS1K_Car3_AppR**
- **Border Rule: CS1K_Car3_BorderR**
- **Media Rule: CS1K_Car3_MediaR**
- **Security Rule: CS1K_Car3_SecurityR**
- **Signaling Rule: CS1K_Car3_SigR**
- **Time of Day: CS1K_Car3_ToDR**

Select Finish (not shown)

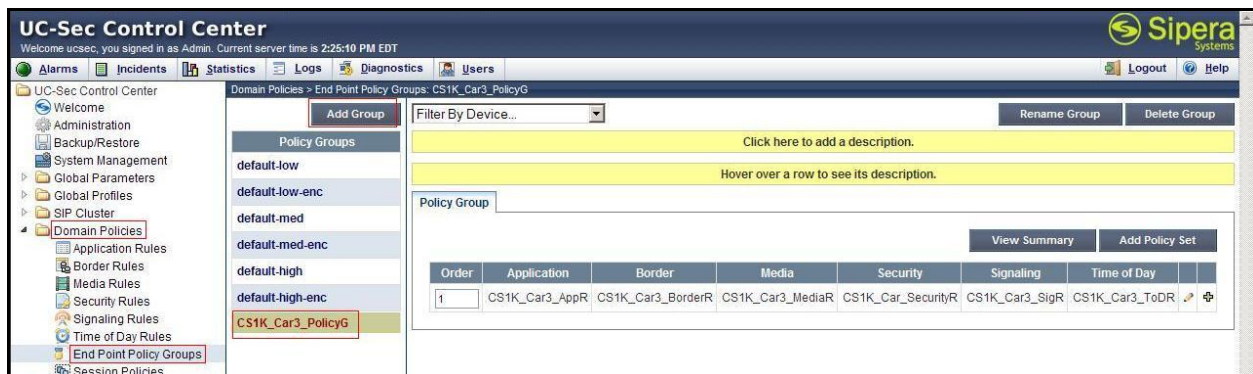


Figure 76: Avaya CS1000 End Point Policy Group

From the menu on the left-hand side, select **Domain Policies → End Point Policy Groups**
Select **Add Group**

Name: PAETEC_PolicyG

- **Application Rule: PAETEC _AppR**
- **Border Rule: PAETEC _BorderR**
- **Media Rule: PAETEC _MediaR**
- **Security Rule: PAETEC _SecurityR**
- **Signaling Rule: PAETEC _SigR**
- **Time of Day: PAETEC _ToDR**

Select Finish (not shown)



Figure 77: PAETEC End Point Policy Group

6.4. Device Specific Settings

The Device Specific Settings feature for SIP allows you to view aggregate system information, and manage various device-specific parameters which determine how a particular device will function when deployed in the network. Specifically, you have the ability to define and administer various device-specific protection features such as Message Sequence Analysis (MSA) functionality, end-point and session call flows and Network Management.

6.4.1. Manage Network Settings

From the menu on the left-hand side, select **Device Specific Settings → Network Management**. Enter the **IP Address** and **Gateway Address** for both the Inside and the Outside interfaces:

- **IP Address for Inside interface: 10.10.97.189; Gateway: 10.10.97.129**
- **IP Address for Outside interface: 10.10.98.112; Gateway: 10.10.98.97**

Select the physical interface used in the Interface column:

- **Inside Interface: A1**
- **Outside Interface: B1**

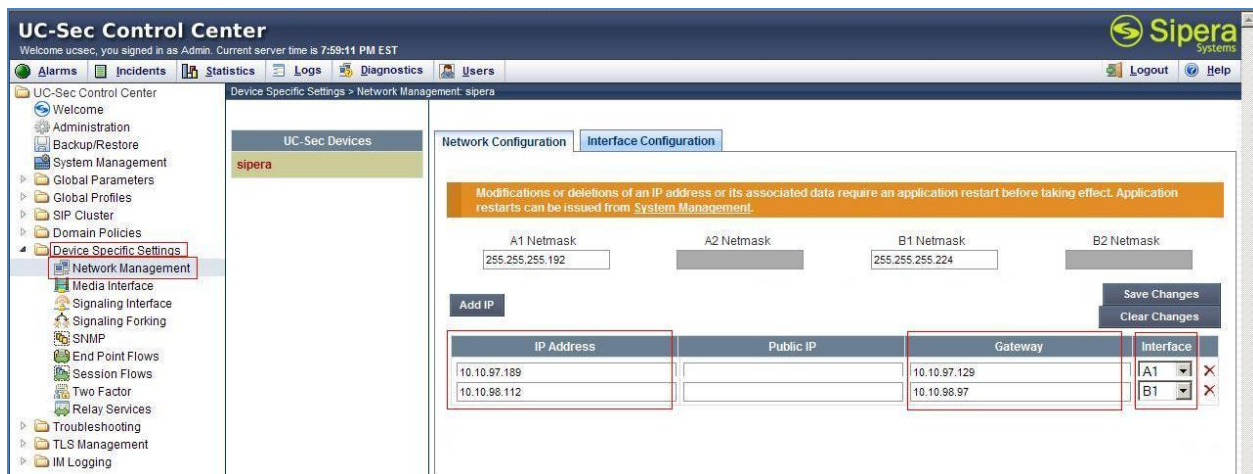


Figure 78: Network Management

Select the **Interface Configuration** Tab.
Toggle the State of the physical interfaces being used.

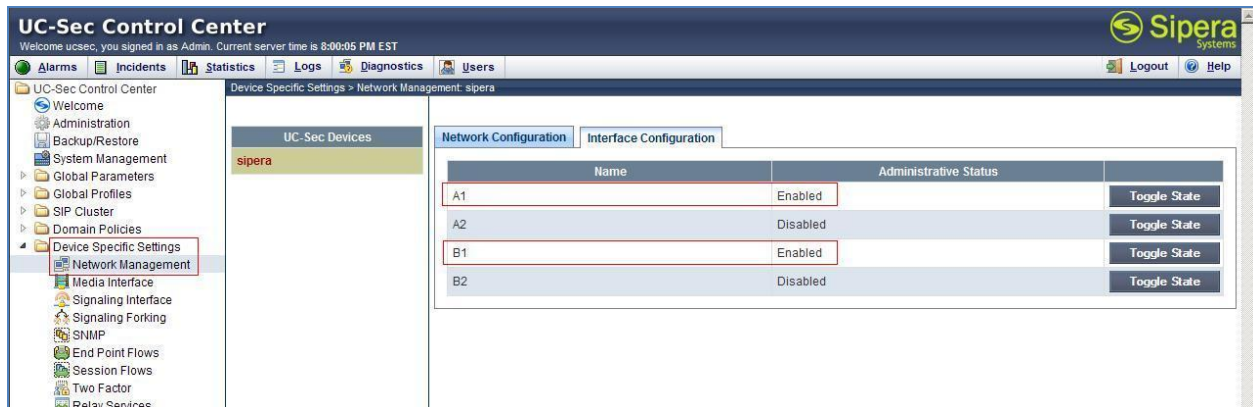


Figure 79: Network Interface Status

6.4.2. Create Media Interfaces

Media Interfaces (**Figure 80**) define the type of signaling on the ports. The default media port range on the Avaya can be used for both inside and outside ports

From the menu on the left-hand side, select **Device Specific Settings** → **Media Interface**
Select **Add Media Interface**

- **Name: InsideMedia**
- **Media IP: 10.10.97.189** (Internal Address toward Avaya CS1000)
- **Port Range: 35000 - 40000**
- Click Finish (not shown)

Select **Add Media Interface**

- **Name: OutsideMedia_Avaya**
- **Media IP: 10.10.98.112** (External Internet Address toward PAETEC trunk)
- **Port Range: 35000 - 40000**
- Click Finish (not shown)



Figure 80: Media Interface

6.4.3. Create Signaling Interfaces

Signaling Interfaces (**Figure 81**) define the type of signaling on the ports

From the menu on the left-hand side, select **Device Specific Settings → Signaling Interface**
Select **Add Signaling Interface**

- **Name: InsideSIP**
- **Media IP: 10.10.97.189 (Internal Address toward Avaya CS1000)**
- **TCP Port: 5060**
- **UDP Port: 5060**
- Click Finish (not shown)

From the menu on the left-hand side, select **Device Specific Settings → Signaling Interface**
Select **Add Signaling Interface**

- **Name: OutsideSIP_Sipera**
- **Media IP: 10.10.98.112 (External Internet Address toward PAETEC trunk)**
- **TCP Port: 5060**
- **UDP Port: 5060**
- Click Finish (not shown)

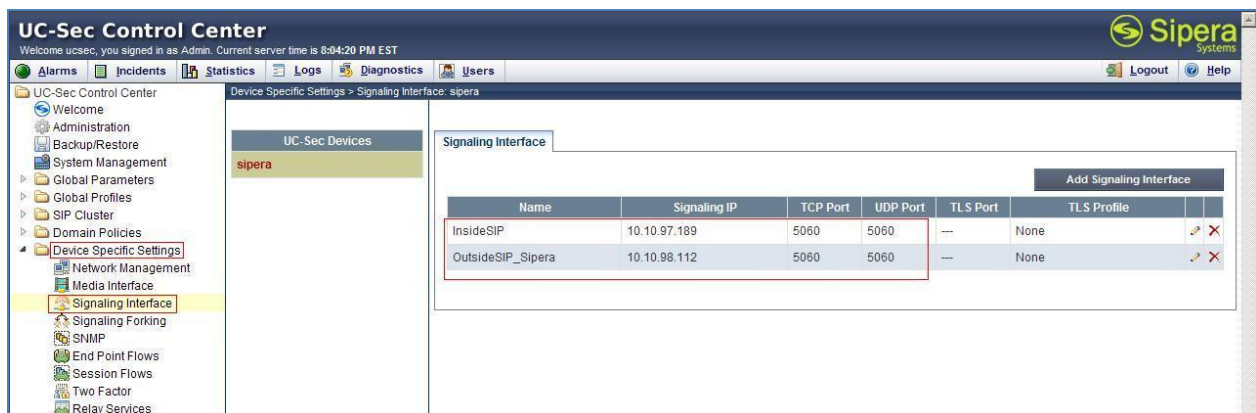


Figure 81: Signaling Interface

6.4.4. Configuration Server Flows

Server Flows (**Figure 82**) allow us to categorize trunk-side signaling and apply a policy.

6.4.4.1 Create End Point Flows - To Avaya CS1000

From the menu on the left-hand side, select **Device Specific Settings** → **End Point Flows**

Select the **Server Flows** Tab

- **Flow Name:** PAETEC_To_CS1K75
- **Server Configuration:** PAETEC
- **URI Group:** *
- **Transport:** *
- **Remote Subnet:** *
- **Received Interface:** InsideSIP
- **Signaling Interface:** OutsideSIP_Sipera
- **Media Interface:** OutsideMedia_Sipera
- **End Point Policy Group:** PAETEC_PolicyG
- **Routing Profile:** PAETEC_To_CS1K_CAR3
- **Topology Hiding Profile:** PAETEC
- **File Transfer Profile:** None
- Click Finish (not shown)



Figure 82: End Point Flows to Avaya CS1000

6.4.4.2 Create End Point Flows – To PAETEC

From the menu on the left-hand side, select **Device Specific Settings** → **End Point Flows**

Select the **Server Flows** Tab

- **Flow Name:** CS1K75_To_PAETEC
- **Server Configuration:** CS1K_Car3
- **URI Group:** *
- **Transport:** *
- **Remote Subnet:** *
- **Received Interface:** OutsideSIP_Sipera
- **Signaling Interface:** InsideSIP
- **Media Interface:** InsideMedia
- **End Point Policy Group:** CS1K_Car3_PolicyG
- **Routing Profile:** CS1K_Car3_To_PAETEC
- **Topology Hiding Profile:** CS1K_Car3
- **File Transfer Profile:** None
- Click Finish (not shown)

The screenshot displays the UC-Sec Control Center web interface. The left-hand navigation menu is expanded, showing 'Device Specific Settings' and 'End Point Flows'. The main content area is titled 'Device Specific Settings > End Point Flows: sipera'. It features two tabs: 'Subscriber Flows' and 'Server Flows', with 'Server Flows' selected. Below the tabs, there are two tables. The first table, titled 'Server Configuration: CS1K_Car3', lists configuration details for the flow 'CS1K75_To_PAETEC'. The second table, titled 'Server Configuration: PAETEC', lists configuration details for the flow 'PAETEC_To_CS1K75'.

| Priority | Flow Name | URI Group | Transport | Remote Subnet | Received Interface | Signaling Interface | Media Interface | End Point Policy Group | Routing Profile | Topology Hiding Profile |
|----------|------------------|-----------|-----------|---------------|--------------------|---------------------|-----------------|------------------------|---------------------|-------------------------|
| 1 | CS1K75_To_PAETEC | * | * | * | OutsideSIP_Sipera | InsideSIP | InsideMedia | CS1K_Car3_PolicyG | CS1K_Car3_To_PAETEC | CS1K_Car3 |

| Priority | Flow Name | URI Group | Transport | Remote Subnet | Received Interface | Signaling Interface | Media Interface | End Point Policy Group | Routing Profile | Topology Hiding Profile |
|----------|------------------|-----------|-----------|---------------|--------------------|---------------------|---------------------|------------------------|---------------------|-------------------------|
| 1 | PAETEC_To_CS1K75 | * | * | * | InsideSIP | OutsideSIP_Sipera | OutsideMedia_Sipera | PAETEC_PolicyG | PAETEC_To_CS1K_CAR3 | PAETEC |

Figure 83: End Point Flows to PAETEC

7. Verification Steps

The following steps may be used to verify the configuration

7.1. General

Place an inbound call from a PSTN phone to an internal Avaya phone, answer the call, and verify that two-way speech path exists. Verify that the call remains stable for several minutes and disconnects properly

7.2. Verification of an Active Call on Call Server

Active Call Trace (LD 80)

The following is an example of one of the commands available on the Communication Server 1000 to trace the DN for which the call is in progress or idle. The call scenario involved PSTN phone number 6139675205 calling 7133433758.

- Login on to Signaling Server 10.10.97.177 with admin account and password.
- Issue a command “cslogin” to login on to the Call Server.
- Log in to the Overlay command prompt, issue the command **LD 80** and then **trace 0 3758**.
- After the call is released, issue command **trac 0 3758** again to see if the DN is released back to idle state.

Below is the actual output of the Call Server Command Line mode when the 3758 is in call state:

```
>ld 80

.trac 0 3758

ACTIVE VTN 096 0 00 02

ORIG VTN 100 0 00 00 VTRK IPTI RMBR 100 1 INCOMING VOIP GW CALL
FAR-END SIP SIGNALLING IP: 20.20.64.220
FAR-END MEDIA ENDPOINT IP: 10.10.97.242 PORT: 24574
FAR-END VendorID: Not available
TERM VTN 096 0 00 02 KEY 0 SCR MARP CUST 0 DN 3758 TYPE 2002P2
SIGNALLING ENCRYPTION: INSEC
MEDIA ENDPOINT IP: 10.10.98.3 PORT: 5200
MEDIA PROFILE: CODEC G.711 MU-LAW PAYLOAD 20 ms VAD OFF
RFC2833: RXPT 101 TXPT 101 DIAL DN 3758
MAIN_PM ESTD
TALKSLOT ORIG 20 TERM 25
EES_DATA:
NONE
QUEU NONE
CALL ID 501 76

---- ISDN ISL CALL (ORIG) ----
CALL REF # = 484
BEARER CAP = VOICE
HLC =
```

```
CALL STATE = 10  ACTIVE
CALLING NO = 16139675205 NUM_PLAN:UNKNOWN  TON:UNKNOWN  ESN:UNKNOWN
CALLED NO  = 7133433758 NUM_PLAN:UNKNOWN  TON:UNKNOWN  ESN:UNKNOWN
```

And this is the example after the call on 3758 is finished.

```
.trac 0 3758
IDLE VTN 96 0 00 02  MARP
```

SIP Trunk monitoring (LD 32)

Place a call inbound from PSTN (6139675205) to an internal device (7133433758). Then check the SIP trunk status by using LD 32, one trunk is BUSY

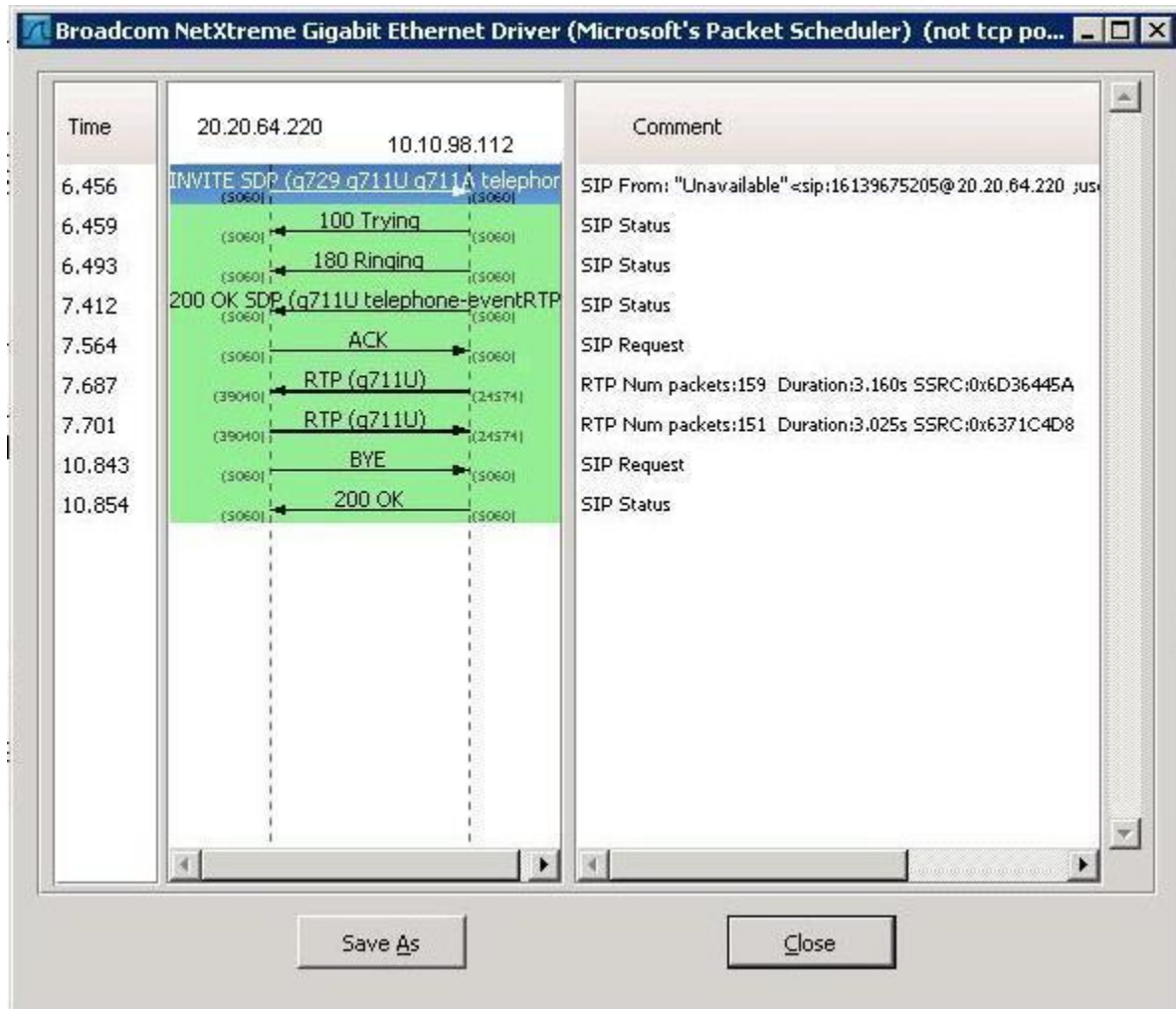
```
>ld 32
NPR000
.stat 100 0
091 UNIT(S) IDLE
001 UNIT(S) BUSY
000 UNIT(S) DSBL
000 UNIT(S) MBSY
```

After the call is released, check all SIP trunk status changed to IDLE state.

```
.stat 100 0
092 UNIT(S) IDLE
000 UNIT(S) BUSY
000 UNIT(S) DSBL
000 UNIT(S) MBSY
```

7.3. Protocol Trace

Below is a wireshark trace of the same call scenario described in **Section 7.2**. Note that only detail of the INVITE message is being shown here.



```
■ User Datagram Protocol, Src Port: sip (5060), Dst Port: sip (5060)
■ Session Initiation Protocol
  ■ Request-Line: INVITE sip:7133433758@10.10.98.112:5060;transport=UDP SIP/2.0
    Method: INVITE
    ■ Request-URI: sip:7133433758@10.10.98.112:5060;transport=UDP
      [Resent Packet: False]
    ■ Message Header
      Via: SIP/2.0/UDP 20.20.64.220:5060;branch=z9hG4bKajd14b008o6121s3m180.1
      ■ From: "Unavailable"<sip:16139675205@20.20.64.220;user=phone;broadworks=BWWESTSIGIS-1ecpqqa1h9ba>;tag=244833123-13202597
        SIP Display info: "Unavailable"
        ■ SIP from address: sip:16139675205@20.20.64.220;user=phone;broadworks=BWWESTSIGIS-1ecpqqa1h9ba
          SIP tag: 244833123-1320259723119-
        ■ To: "CS1K 8"<sip:7133433758@10.10.98.112;interopis=interopis-h3bnp35pc3i58>
          SIP Display info: "CS1K 8"
          ■ SIP to address: sip:7133433758@10.10.98.112;interopis=interopis-h3bnp35pc3i58
            Call-ID: Bw184843119021111827754577@20.20.51.199
        ■ CSeq: 852381624 INVITE
          Sequence Number: 852381624
          Method: INVITE
        ■ Contact: <sip:16139675205@20.20.64.220:5060;broadworks=BWWESTSIGIS-o6i7c69dv2579;transport=udp>
          ■ Contact-URI: sip:16139675205@20.20.64.220:5060;broadworks=BWWESTSIGIS-o6i7c69dv2579;transport=udp
            Contact parameter: broadworks=BWWESTSIGIS-o6i7c69dv2579
            Contact parameter: transport=udp>
          Allow: ACK,BYE,CANCEL,INFO,INVITE,OPTIONS,PRACK,REFER,NOTIFY
          Accept: multipart/mixed,application/media_control+xml,application/sdp
          Supported: timer
          Min-SE: 60
          Max-Forwards: 47
          Content-Type: application/sdp
          Content-Length: 283
      ■ Message Body
        ■ Session Description Protocol
          Session Description Protocol Version (v): 0
          ■ Owner/Creator, Session Id (o): BroadWorks 206875 1 IN IP4 20.20.64.220
            Session Name (s): -
          ■ Connection Information (c): IN IP4 20.20.64.220
          ■ Time Description, active time (t): 0 0
          ■ Media Description, name and address (m): audio 39040 RTP/AVP 18 0 8 101
```

8. Conclusion

All of the test cases have been executed. Despite the number of observations seen during testing as noted in **Section 2.2**, the test result met the objectives outlined in **Section 2.1**. The PAETEC Communications system is considered **compliant** with Avaya Communication Server 1000 Release 7.5 and Avaya Session Border Controller for Enterprise Release 4.0.5.

9. Appendix

The ring-back-tone issue has been found on another PAETEC solution tested with One X Mobile Lite application on iPhone. In order to make sure this issue has not been observed on our solution testing, the below additional test cases were executed for this verification.

Call Scenario 01: Inbound call: PSTN1 ----call ----- CS1000 number (associated with a CS1000 desk phone paired with a 1xMobile LITE iPhone)

Result: PASSED

- Both CS1000 desk phone and iPhone (pop up on cell phone native function) rang.
- PSTN1 heard ring back tone. (Observed the 2nd leg, CS1000 sent out INVITE without SDP, and PAETEC responded 180 Ringing without SDP. As the result, PSTN1 could hear the ring back tone).
- The speech path was good after iPhone answered the call.

Call Scenario 02: Outbound call: 1xMobile LITE application on iPhone -----call---- - PSTN1 thru CS1000 DISA number

Result: PASSED

- iPhone acted in two stage dialing:
 - + Dialed DISA number and waited for dial tone.
 - + Dialed the destination as PSTN1 number.
- iPhone heard ring back tone.
- There was speech path after PSTN1 answered the call.

Note: As the observation, in Call Scenario_01: On the 2nd leg, CS1000 sent out INVITE without SDP and PAETEC responded 180 Ringing w/o SDP.

10. Additional References

Product services for Avaya SBCE may be found at:

<http://www.sipera.com/products-services/esbc>

Product documentation for Avaya, including the following, is available at:

<http://support.avaya.com/>

[1] *Network Routing Service Fundamentals, Avaya Communication Server 1000, Release 7.5, Document Number NN43001-130, Revision 03.02, November 2010.*

[2] *IP Peer Networking Installation and Commissioning, Avaya Communication Server 1000, Release 7.5, Document Number NN43001-313, Revision: 05.02, November 2010*

[3] *Communication Server 1000E Overview, Avaya Communication Server 1000, Release 7.5, Document Number NN43041-110, Revision: 05.02, January 2011*

[4] *Communication Server 1000 Unified Communications Management Common Services Fundamentals, Avaya Communication Server 1000, Release 7.5, Document Number NN43001-116, Revision 05.08, January 2011*

[5] *Communication Server 1000 Dialing Plans Reference, Avaya Communication Server 1000, Release 7.5, Document Number NN43001-283, Revision 05.02, November 2010*

[6] *Product Compatibility Reference, Avaya Communication Server 1000, Release 7.5, Document Number NN43001-256, Revision 05.02, February 2011*

11. Change History

| Issue | Date | Reason |
|-------|------------|---------------|
| 1.0 | 26/04/2012 | Initial issue |
| | | |

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