



Avaya Solution & Interoperability Test Lab

Configuring Avaya Communication Manager on an Avaya S8300 Media Server with Nortel Business Communications Manager (BCM200), using H.323 Signaling and IP Trunks - Issue 1.0

Abstract

These Application Notes present a sample configuration for a simple network comprised of an Avaya S8300 Media Server, Avaya G700 Media Gateway, and a Nortel Business Communications Manager (BCM200). The focus is on the Avaya Communication Manager configuration for the H.323 Signaling Groups, IP Trunk Groups, and IP Codec Sets, and the corresponding configuration on the Nortel BCM. Using this configuration, Nortel digital telephones, Nortel IP Telephones, and Nortel IP Softphones can call (and be called by) Avaya digital telephones, Avaya IP Telephones, Avaya IP Softphones, and other Avaya Telephones. Screens that describe the detailed status and communication paths of active calls are presented to reinforce the understanding of the configuration. These results should be applicable to other Avaya media servers and gateways.

1. Introduction

These Application Notes present a sample configuration for a simple network comprised of an Avaya S8300 Media Server, Avaya G700 Media Gateway, and a Nortel Business Communications Manager (BCM200). The focus is on the Avaya Communication Manager configuration for the H.323 Signaling Groups and IP Trunk Groups, and the corresponding configuration on the Nortel BCM. Using this configuration, Nortel digital telephones, Nortel IP Telephones, and Nortel IP Softphones can call (and be called by) Avaya digital telephones, Avaya IP Telephones, Avaya IP Softphones, and other Avaya Telephones. These results should be applicable to other Avaya media servers and gateways.

Figure 1 depicts the simple network used to verify these Application Notes. The data network is kept simple to focus on the relevant server and H.323 IP Trunk configuration.

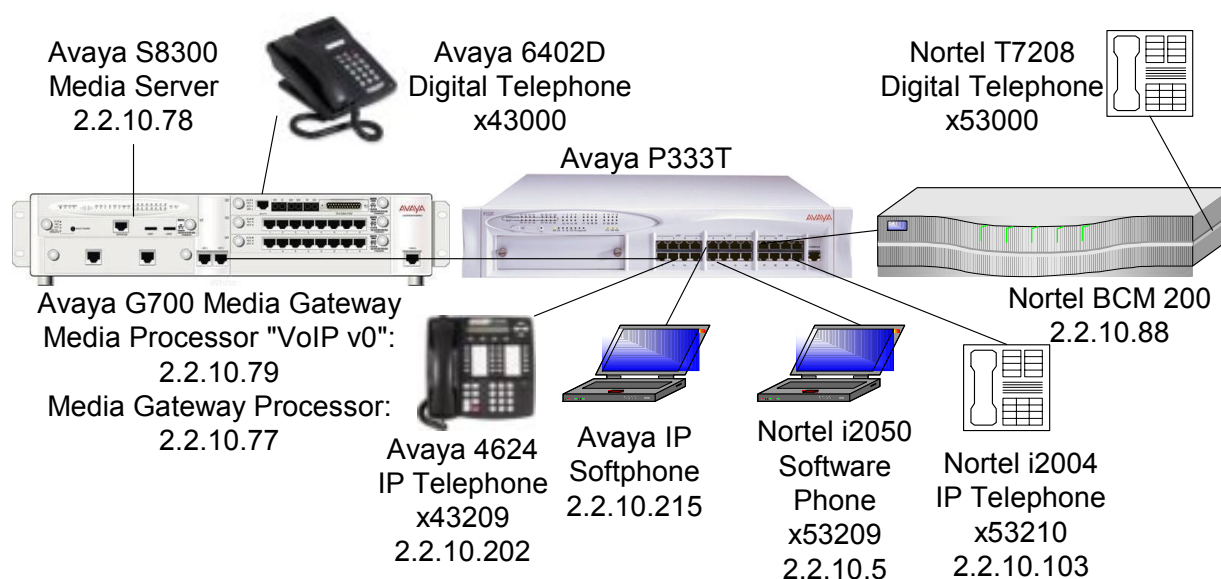


Figure 1: Network Overview

A five digit Uniform Dial Plan (UDP) is used to facilitate dialing. Unique ranges of extensions are associated with the Nortel BCM (53xxx) and the Avaya S8300 Media Server (4xxxx). The Avaya S8300 Media Server will route 53xxx extensions to the Nortel BCM over an H.323 Signaling Group and IP Trunk Group, whose configuration is fully described. The Nortel BCM will in turn route 4xxxx numbers to an "H.323 Gateway" that corresponds to the H.323 Signaling Group interface defined on the S8300 Media Server. The Nortel H.323 gateway configuration is also presented. The Avaya UDP configuration steps are not described in detail, since there is no new routing consideration introduced by the presence of the Nortel BCM in the network. All

servers are configured to pass 5 digit extensions over the IP Trunks (i.e., five digits are included in the Called Party Number Information Element in the Q.931 SETUP message).

2. Equipment and Software Validated

The following equipment and software were used for this sample configuration. Note that it is necessary to have an Avaya Communication Manager load of 533 or greater (within the 1.3.1 load series). While these application notes were verified using load 533, the software enabling interoperability is also expected to be available in Communication Manager 2.0, beginning with load 221. It is necessary to obtain a Communication Manager license with Special Application SA8507 enabled.

Network Component	Version Information
Avaya S8300 Media Server running Avaya Communication Manager	Load 533 With SA8507 Turned on
Avaya G700 Media Gateway Processor (MGP)	20.19
Avaya G700 VoIP	FW V11
Avaya 4600 Series IP Telephones	1.8
Avaya IP Softphone	4.1.3.8
Nortel Business Communications Manager (BCM 200)	BCM Release 3.0, specifically UM-111302-BCM30-RC2.2, UNISTIM Terminal Proxy Server version 30.120.20.21
Nortel BCM Media Services Card (MSC)	Type MSC 1A \ HW Revision 3
Nortel i2004 IP Telephone	C502B41
Nortel i2050 Software Phone	1.1.0 Build 300
Nortel BCM Monitor	30.50.1.27

Table 1 – Equipment Version Information

3. Conventions

Native interfaces have been used to describe the configuration. Wizard interfaces are also available as an alternative. For example, additional information on the Avaya Installation Wizard and other wizards can be found at <http://support.avaya.com/avayaiw/>.

In these Application Notes, Avaya Communication Manager administration screens are shown with a gray shaded background. These administration screens are also referred to as “SAT” (System Access Terminal) screens in this document. In many instances, the original screens have been edited for brevity in presentation. Commands and fields requiring user input or special attention are highlighted in bold.

It is assumed that the appropriate license files have been installed on all products, and that login and password credentials for all products are available to the reader.

4. Configuring Avaya Communication Manager on the Avaya S8300 Media Server

This section presents configuration steps for the Avaya S8300 Media Server. Before proceeding, use the command “**display system-parameters special-applications**” and page forward to Page 2 to verify that Special Application SA8507 is enabled. SA8507 must be enabled to achieve the interoperability documented in these application notes. If SA8507 is not enabled, contact your authorized Avaya sales representative.

```

display system-parameters special-applications                               Page 2 of 5
      SPECIAL APPLICATIONS
      (SA7666) - COS Conference Tone Check? n
      (SA7880) - ASAI Internally Measured Data? n
      (SA7779) - Enhanced DID Routing? n
      (SA7777) - Night Service on DID Trunk Groups? n
      (SA7778) - Display UII Information? n
      (SA7776) - Display Incoming Digits for ISDN Trunk Groups? n
      (SA7852) - # and * in Vector Collect Step? none
      (SA7933) - Busy Tone with SAC and No Available Cvg Points? n
      (SA7963) - Dial By Name? n
      (SA7900) - Service Observe Physical Set? n
      (SA7991) - Variable Length Account Code? n
      (SA8052) - ISDN Redirecting Number? n
      (SA8077) - Russian Power Industry Feature? n
      (SA8507) - H245 Support With Other Vendors? y
      (SA7161) - NORTEL SL1 PRI and DMS Names Display? n
      (SA7578) - Integrated Directory Service over DCS? N
  
```

Section 4.1 shows aspects of the configuration that are not unique to configurations involving Nortel BCM. The steps outlining the initial setup of the G700 Media Gateway and S8300 Media Server are omitted; product documentation and other available Application Notes cover these steps. There are no special G700 considerations due to the presence of the Nortel BCM in this configuration. A reader experienced with the Avaya S8300 Media Server may wish to skip forward to **Section 4.2**, which illustrates the parameters used in the administration of the H.323 Signaling Group, IP Trunk Group, and IP Codec Sets used to connect with Nortel BCM.

4.1. Common Avaya Communication Manager VoIP Procedures

The “ip-interfaces” screen available from the SAT interface shows the IP identity of the S8300 Media Server. The IP address and Gateway address are stored in a configuration file created using the S8300 Media Server Web utilities. These addresses are displayed, but not configured, using the screen shown below. The “PROCR” interface will be used as the near-end of the Signaling Group to the Nortel BCM. Avaya IP Telephones can register for service with this interface.

```

display ip-interfaces                                                       Page 1 of 19
      IP INTERFACES
      Net
      ON Type Slot Code Sfx Node Name Subnet Mask Gateway Address Rgn VLAN
      y PROCR          2 .2 .10 .78 255.255.255.0 2 .2 .10 .1 1
  
```

The “display media-gateway 1” screen shown below illustrates aspects of the G700 Media Gateway configuration. The Identifier field is the serial number of the G700 Media Gateway. The “IP Address” field is a display only field that is not assigned via the SAT. The “IP Address” field will contain the address of the G700 Media Gateway processor, after it has registered with the Avaya S8300 Media Server as its controller. As noted in **Figure 1**, the IP address associated with the VoIP Media Processor “VoIP v0” on the G700 Media Gateway is 2.2.10.79.

```

display media-gateway 1
                                MEDIA GATEWAY
Number: 1
Name: BCM-Interop-Test          Identifier: 03DR01075003
IP Address: 2 .2 .10 .77        MAC Address: 00:04:0d:02:0d:43
Network Region: 1              Location: 1
Site Data:                      Registered? y
                                Slot   Module Type
                                V1:    icc
                                V2:
                                V3:    dcp
                                V4:
                                V8:
                                V9:    gateway-announcements

```

The following illustrates a subset of the “change node-names ip” screen that maps logical names to IP addresses. These node names are presented because they will appear in other screens, such as the screen defining the H.323 Signaling Group to the Nortel BCM.

```

change node-names ip
                                Page 1 of 1
Name          IP Address      IP NODE NAMES      IP Address
Nortel-BCM   2 .2 .10 .88          Name
procr        2 .2 .10 .78          IP Address

```

4.2. Configuration Related to Nortel BCM Interoperability

This section focuses on the parameter settings recommended for the H.323 Signaling Group, IP Trunk Group, and IP Codec Sets used to connect with Nortel BCM.

Signaling Group 1 will be created using the command “**add signaling-group 1**” to establish an H.323 signaling link between the Avaya S8300 Media Server and the Nortel BCM. The Signaling Group number is not relevant; use any available Signaling Group number.

This Signaling Group uses the near-end node-name “procr”, and the node-name “Nortel-BCM” as the far-end node-name. Retain the default near-end listen port (1720) and enter 1720 as the far-end listen port. The “Calls Share IP Signaling Connection” and the “Direct IP-IP Audio Connections?” fields *must* remain set to the default “n” setting, or interoperability problems will be experienced. The “IP Audio Hairpinning” field is also intentionally left at the default of “n”.

In general, the “Far-end Network Region” field can be left blank, or it can be populated with a network region number, corresponding to the Nortel BCM. In these Application Notes, the “Far-end Network Region” field is populated to illustrate how different audio codecs can be used for

intra-region calls among the Avaya devices, and inter-region calls over the IP Trunk from Avaya to Nortel. Since “Direct IP-IP Audio Connections”, also referred to as “shuffling”, must remain disabled for the Signaling Group, calls between Avaya IP Telephones and Nortel IP Telephones will require the resources of the G700 media processors. The approach described below allows the Avaya IP telephone to communicate G.711MU with the G700 media processor resource, while another G700 media processor resource communicates using G.729 to the Nortel BCM. (This may be a preferred configuration in production environments where the two servers are separated by a WAN, and it is desirable to conserve bandwidth over the WAN.) For Signaling Group 1, the “Far-end Network Region” field has been set to 2, which means that Avaya Communication Manager will treat calls using this Signaling Group as if they were calls between network region 1 and network region 2.

The Signaling Group created with the following screen will be associated with Trunk Group 1 in a subsequent step.

```

add signaling-group 1                                     Page 1 of 5
                SIGNALING GROUP
Group Number: 1      Group Type: h.323
                    Remote Office? n           Max number of NCA TSC: 0
                    SBS? n                     Max number of CA TSC: 0
                                           Trunk Group for NCA TSC:
Trunk Group for Channel Selection:
Supplementary Service Protocol: a

Near-end Node Name: procr      Far-end Node Name: Nortel-BCM
Near-end Listen Port: 1720     Far-end Listen Port: 1720
                    Far-end Network Region: 2
                    Calls Share IP Signaling Connection? n
                    H245 Control Addr On FACility? n
                    Bypass If IP Threshold Exceeded? n
                    Media Encryption? n
                    DTMF over IP: out-of-band   Direct IP-IP Audio Connections? n
                                           IP Audio Hairpinning? n
                                           Interworking Message: PROGRESS

```

The “ip-network-region” and “ip codec set” screens are shown below to complete the example of using different codecs for intra-region (Avaya-Avaya) and inter-region (Avaya-Nortel) calls. Within region 1, the “Codec Set” field shown in bold on the first page of the form determines the Codec Set used.

```

change ip-network-region 1                                     Page 1 of 3
      Region: 1
      Location: 1
      Name: G700/S8300
      Intra-region IP-IP Direct Audio: yes
      Inter-region IP-IP Direct Audio: yes
      IP Audio Hairpinning? y
      UDP Port Range
      Min: 2048
      Max: 3028
      RTCP Reporting Enabled? y
      RTCP MONITOR SERVER PARAMETERS
      Use Default Server Parameters? y
      DIFFSERV/TOS PARAMETERS
      Call Control PHB Value: 34
      Audio PHB Value: 46
      AUDIO RESOURCE RESERVATION PARAMETERS
      RSVP Enabled? n
      802.1P/Q PARAMETERS
      Call Control 802.1p Priority: 7
      Audio 802.1p Priority: 6

```

Paging forward to Page 2, the Codec Set configured for calls between region 1 and region 2 will be Codec Set 2, as shown by the bold number 2 in the connection matrix.

```

change ip-network-region 1                                     Page 2 of 2
      Inter Network Region Connection Management
      (Group Of 32)
Region
  1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2
001-032 1 2
033-064
.....

```

By using G.711MU with 2 Frames Per Packet in “ip-codec-set 1” (default configuration), calls among the Avaya devices within region 1 will use G.711MU.

```

change ip-codec-set 1                                         Page 1 of 1
      IP Codec Set
      Codec Set: 1
      Audio      Silence      Frames      Packet
      Codec      Suppression  Per Pkt    Size(ms)
1: G.711MU      n          2          20
2:
.....
7:
Media Encryption: never

```

Calls to and from the Nortel BCM will use G.729 because Signaling Group 1 specifies the “Far-end Network Region” field to be region 2, and calls between region 1 and region 2 are configured to use ip-codec-set 2, containing G.729 with 3 Frames Per Packet.

```

change ip-codec-set 2                                     Page 1 of 1
                IP Codec Set
  Codec Set: 2
  Audio      Silence      Frames      Packet
  Codec      Suppression  Per Pkt   Size(ms)
1: G.729          n           3       30
2:
.....
7:
Media Encryption: never

```

Note that testing has revealed that it is *necessary* to specify 3 Frames Per Packet in the Avaya “ip-codec-set” for interoperability with the Nortel BCM. If the default 2 Frames Per Packet were used, calls from Nortel telephones to Avaya telephones would fail to establish a media path. Although the configuration presented here shows how to achieve G.729 at 3 Frames Per Packet across the IP Trunk (i.e., in “ip-codec-set 2”), note that G.711MU at 3 Frames Per Packet as well as G.723 at different data rates were also verified successfully, as shown in **Section 7**.

Next, a trunk group is established for calls to and from the Nortel BCM. Most fields can be left at their defaults. Data has been entered in the fields shown in bold. See **Section 7.8** for additional information on the telephone displays produced using this configuration.

```

add trunk-group 1                                       Page 1 of 22
                TRUNK GROUP
Group Number: 1                Group Type: isdn                CDR Reports: y
  Group Name: To Nortel-BCM          COR: 1                TN: 1                TAC: 101
  Direction: two-way          Outgoing Display? y          Carrier Medium: IP
  Dial Access? n              Busy Threshold: 255          Night Service:
Queue Length: 0
Service Type: tie                Auth Code? n                TestCall ITC: rest
                Far End Test Line No:
TestCall BCC: 4
TRUNK PARAMETERS
  Codeset to Send Display: 6          Codeset to Send National IEs: 6
  Max Message Size to Send: 260      Charge Advice: none
  Supplementary Service Protocol: a    Digit Handling (in/out): enbloc/enbloc
                Trunk Hunt: cyclical
                Digital Loss Group: 18
Calling Number - Delete:          Insert:                Numbering Format:
                Bit Rate: 1200          Synchronization: async    Duplex: full
Disconnect Supervision - In? y    Out? n
Answer Supervision Timeout: 0

```

Page forward to Page 2. The “Send Name” field can be set to “y” to allow the Avaya S8300 Media Server to send the name display information for calls using this trunk group. Similarly, the “Send Calling Number” field can be set to “y” to allow the calling party number to be included in calls from Avaya to Nortel, subject to the usual rules governing the inclusion and content of this information (i.e., not unique to Nortel, and not presented here). Although the “Send Connected Number” field is shown set to “y”, the Nortel BCM software tested does not display the connected number on a display-equipped telephone.

```

add trunk-group 1                                     Page 2 of 22
TRUNK FEATURES
  ACA Assignment? n                               Measured: none           Wideband Support? n
                                           Internal Alert? n       Maintenance Tests? y
                                           Data Restriction? n    NCA-TSC Trunk Member:
                                           Send Name: y         Send Calling Number: y

  Used for DCS? n
  Suppress # Outpulsing? n   Numbering Format: public
  Outgoing Channel ID Encoding: preferred   UII IE Treatment: service-provider
                                           Replace Restricted Numbers? n
                                           Replace Unavailable Numbers? n
                                           Send Connected Number: y

  Send UII IE? y
  Send UCID? n
  Send Codeset 6/7 LAI IE? y
  SBS? n   Network (Japan) Needs Connect Before Disconnect? n

```

Page forward and add the trunk members, as shown below. The keyword “ip” is entered in the “Port” field, and the Signaling Group number is entered in the “Sig Grp” field. The number of rows or trunk members added here will determine the number of simultaneous calls allowed on the IP Trunk Group linking the Avaya S8300 Media Server with the Nortel BCM.

```

add trunk-group 1                                     Page 6 of 22
TRUNK GROUP
Administered Members (min/max): 0/0
GROUP MEMBER ASSIGNMENTS   Total Administered Members: 0

  Port      Code Sfx Name      Night      Sig Grp
  1: ip
  2: ip
  .....

```

Next, the Signaling Group is associated with the IP Trunk Group. Using the command “change signaling-group 1”, enter the number 1 in the “Trunk Group for Channel Selection” field.

```

change signaling-group 1                               Page 1 of 5
SIGNALING GROUP
Group Number: 1
Group Type: h.323
Remote Office? n
SBS? n
Max number of NCA TSC: 0
Max number of CA TSC: 0
Trunk Group for NCA TSC:

Trunk Group for Channel Selection: 1
Supplementary Service Protocol: a

Near-end Node Name: procr
Near-end Listen Port: 1720
Far-end Node Name: Nortel-BCM
Far-end Listen Port: 1720
Far-end Network Region: 2
LRQ Required? n
RRQ Required? n
Media Encryption? n
Calls Share IP Signaling Connection? n
H245 Control Addr On FACility? n
Bypass If IP Threshold Exceeded? n

DTMF over IP: out-of-band
Direct IP-IP Audio Connections? n
IP Audio Hairpinning? n
Interworking Message: PROGRESS

```

Traditional UDP call routing is established such that dialed number 53xxx is routed to trunk group 1, passing the dialed 53xxx digits to the Nortel BCM.

The command “**save translation**” must be entered to save the configuration.

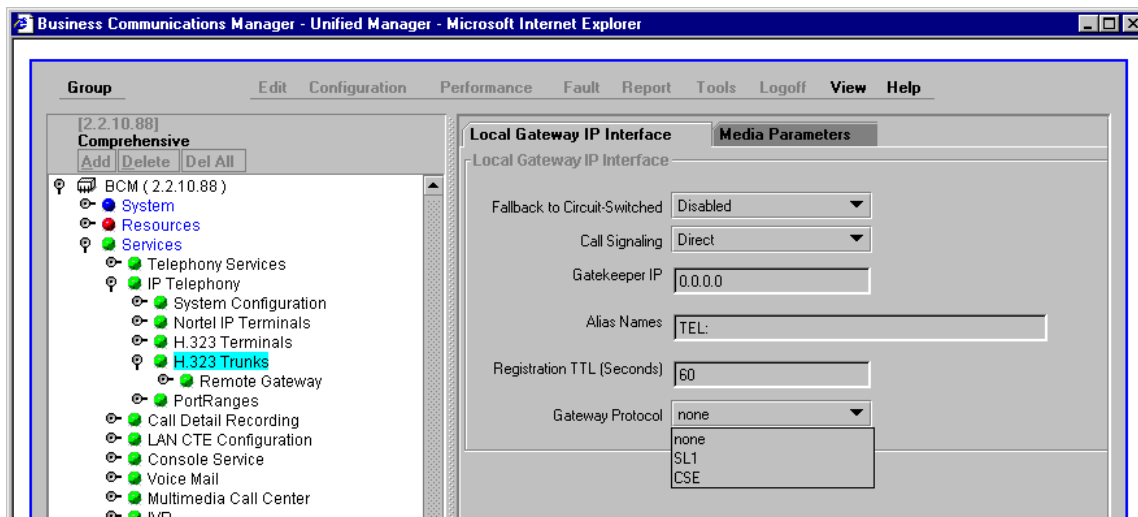
5. Nortel BCM Configuration

This section is divided into two subsections. **Section 5.1** presents the Nortel BCM configuration relevant for the interface to the Avaya equipment. **Section 5.2** illustrates other aspects of the Nortel BCM configuration that will help the reader understand the detailed status screens presented in **Section 7**.

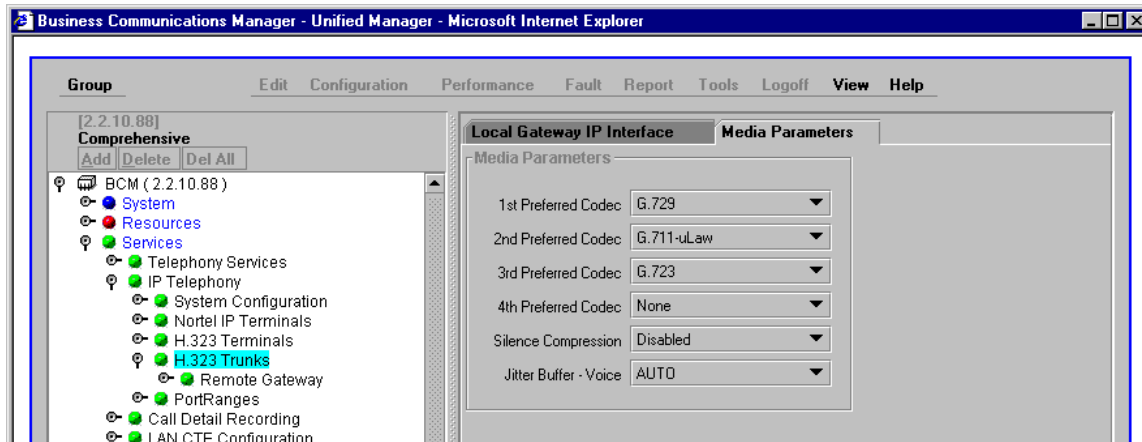
Configuration will be performed using “Unified Manager”, accessed via a web browser. In this configuration, the Nortel BCM has IP address 2.2.10.88, so a web browser can connect to <http://2.2.10.88:6800>. On the menu presented, click “Configure”, log in using authorized credentials, and a java applet will load for configuration.

5.1. Nortel BCM Configuration Relevant to the H.323 Trunk Interface

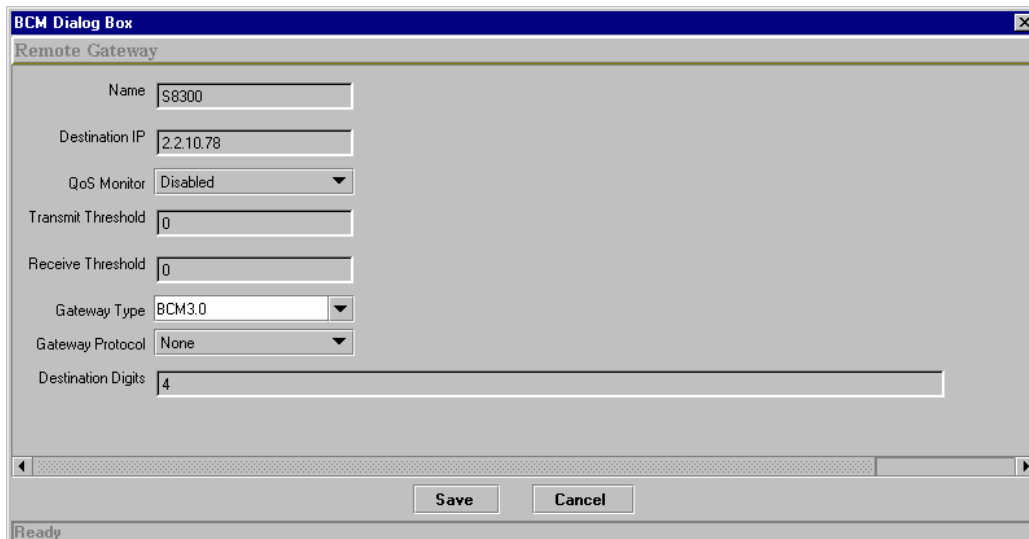
The Nortel BCM will be configured with an H.323 trunk gateway, which will connect logically with the IP address of the S8300 Media Server. From Unified Manager, select “Services → IP Telephony → H.323 Trunks” as shown below. In the “Local Gateway IP Interface” tab, select the parameters shown.



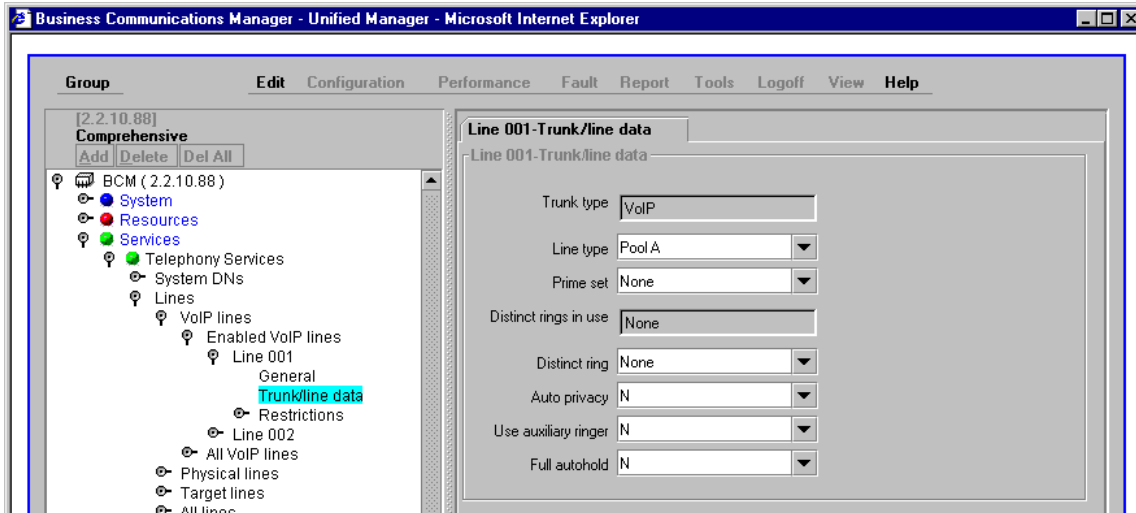
Select the “Media Parameters” Tab. The parameters shown make G.729 the preferred codec for H.323 gateway calls. This is consistent with the Avaya configuration for “ip-codec-set 2” shown in **Section 4**.



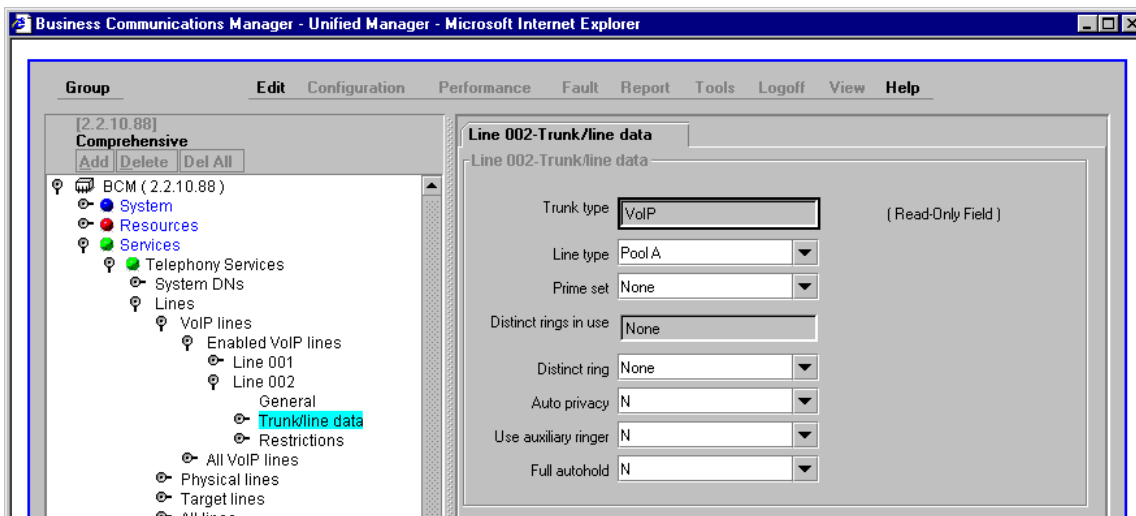
Select “Remote Gateway”, “Configuration”, and “Add Entry”. Fill in the parameters shown below. The “Destination IP” is the IP address assigned to the Avaya S8300 Media Server. The name is an arbitrary identifier. The “Destination Digits” associate dialed numbers with this gateway. Click “Save”.



The following screen illustrates the configuration of one of two “VoIP Lines” on the Nortel BCM. The VoIP Lines are placed in “Pool A”.

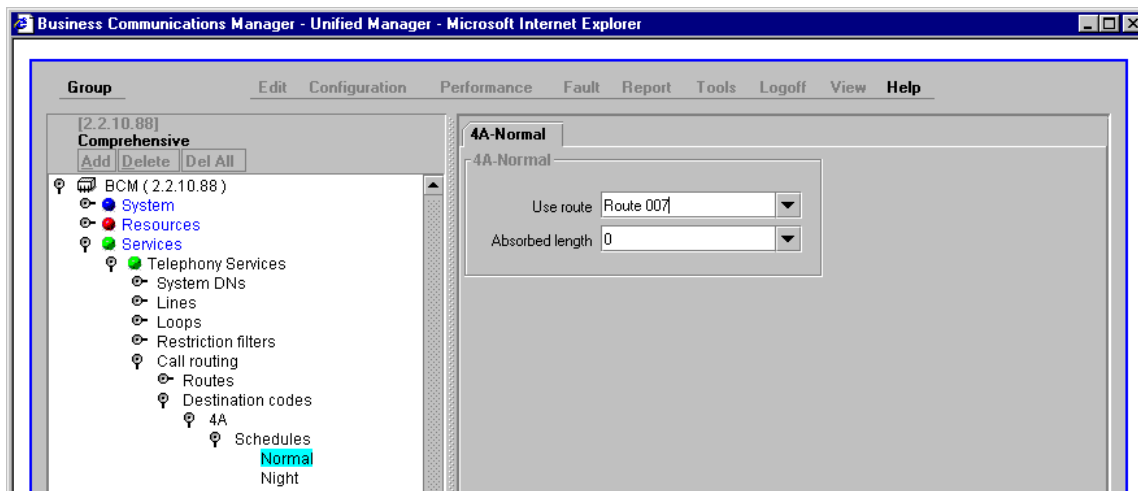


The following screen illustrates the second “VoIP Line”. (The two “VoIP Lines” correspond to the two members of Trunk Group 1 in the Avaya configuration.)

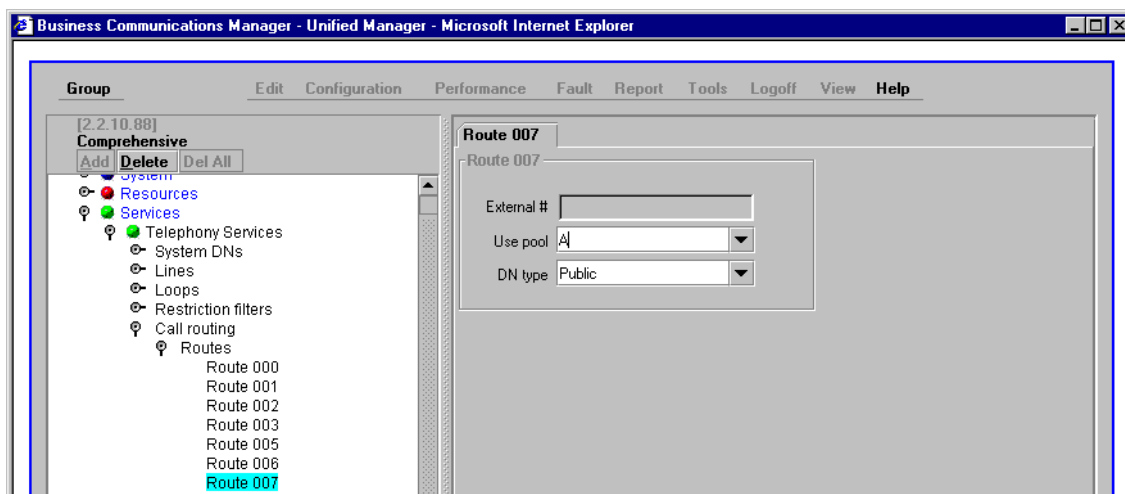


Next, call routing is configured such that calls from Nortel to Avaya are directed to the appropriate H.323 gateway, depending on the number dialed.

The following screen shows that calls to destination code 4XXXX will be directed to “Route 007”, and none of the digits will be absorbed, so that the 4XXXX dialed digits are passed on.

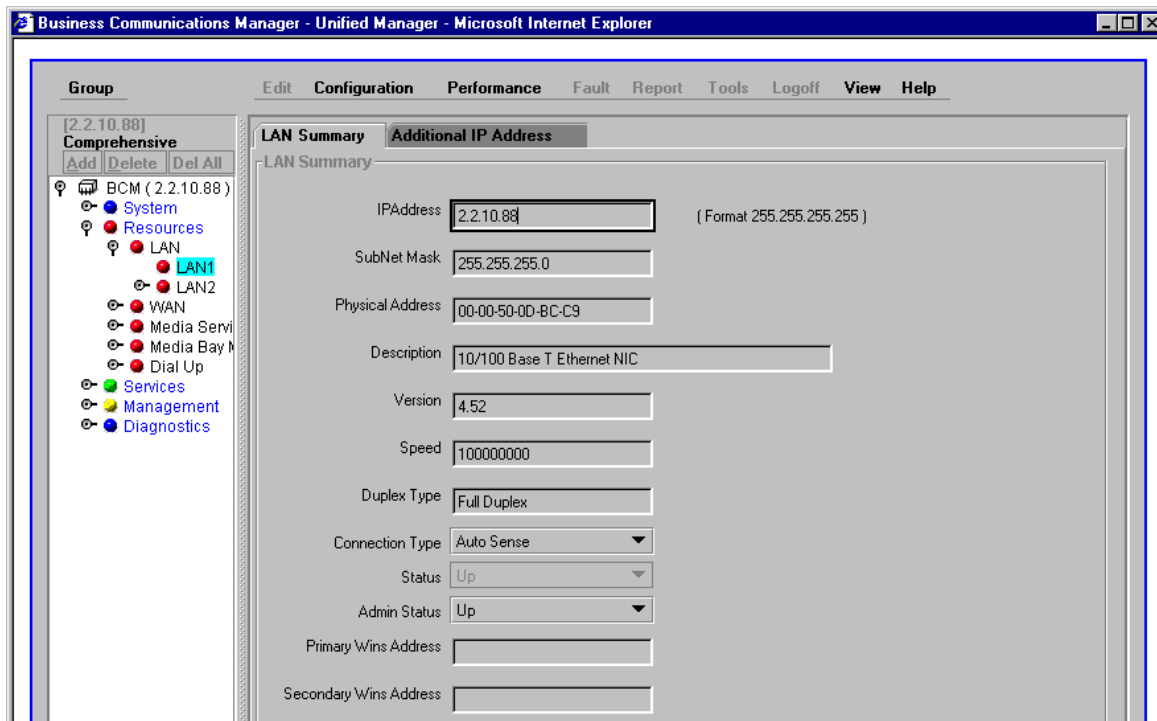


The following configuration shows that Route 007 points to “Pool A”. Recall that the “VoIP Lines” are associated with Pool A.



5.2. Nortel BCM Generic Configuration

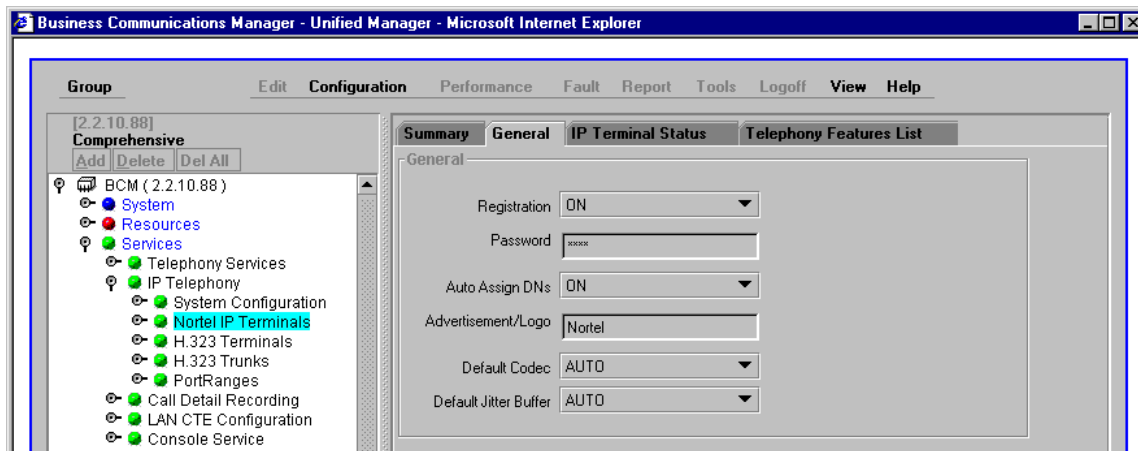
The following screen shows the “LAN1” configuration of the Nortel BCM.



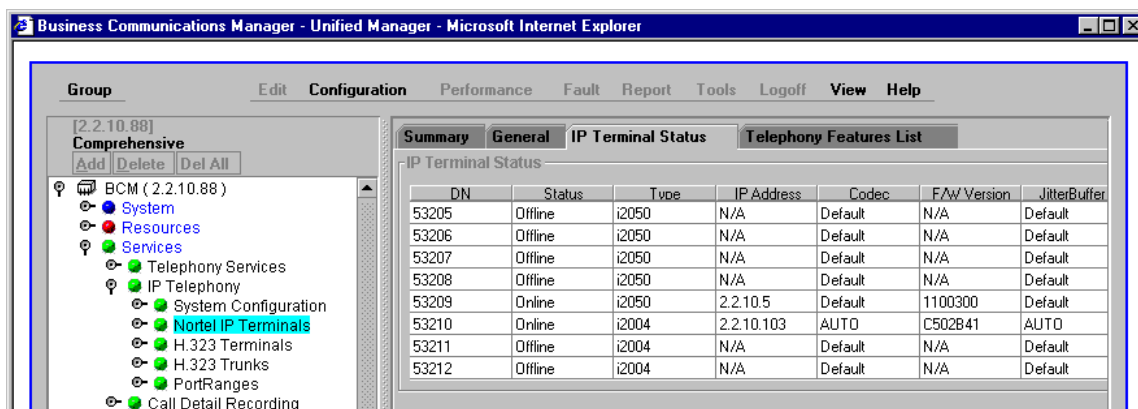
The following screen shows that the IP address assigned to LAN1, “IP-LAN1”, is the “Published IP Address” of the Nortel BCM.



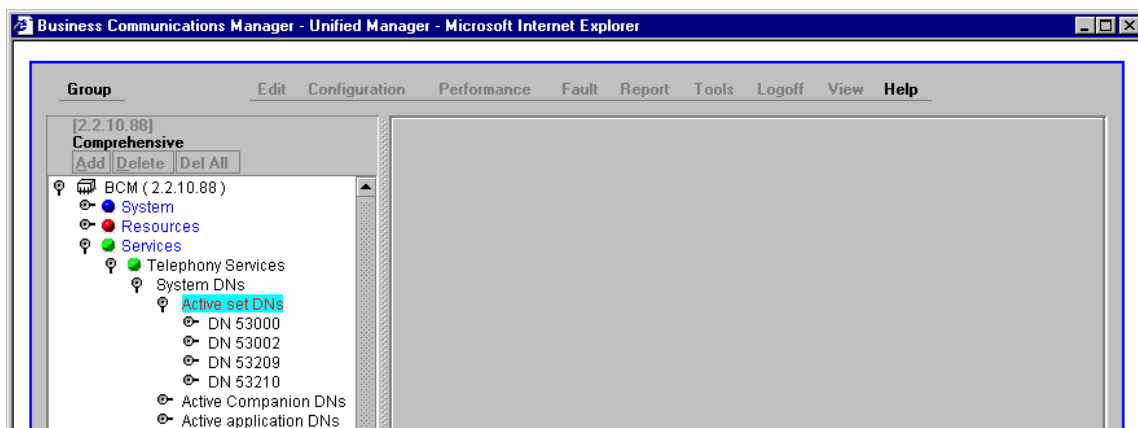
The following screen illustrates the parameters governing the Nortel BCM’s interaction with its IP end-user devices. With the configuration shown, Nortel BCM will use G.711MU at 2 Frames Per Packet for its communications among Nortel entities (e.g., a Nortel IP Telephone receiving dial tone, or a Nortel IP Telephone communicating with a Nortel digital telephone). As shown in **Section 5.1**, G.729 can be configured for communications over the H.323 Trunk to the Avaya equipment. This is similar to the configuration of the Avaya equipment in **Section 4**, where “intra-region” calls among the Avaya devices use G.711MU at 2 Frames Per Packet, while “inter-region” calls to the Nortel BCM are configured to use G.729 at 3 Frames Per Packet.



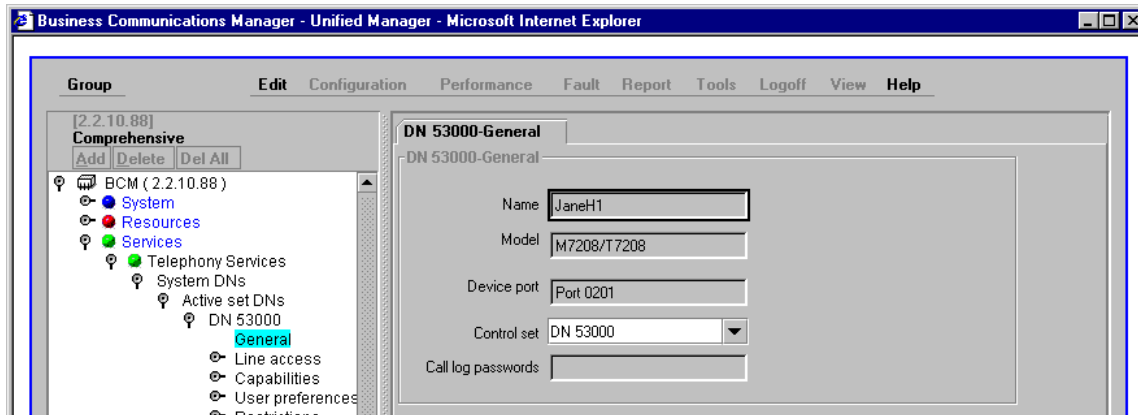
The following illustrates a snapshot of the Nortel IP Terminal Status, showing the Nortel i2004 Telephone extension 53210 and Nortel i2050 Software Phone 53209 in service.



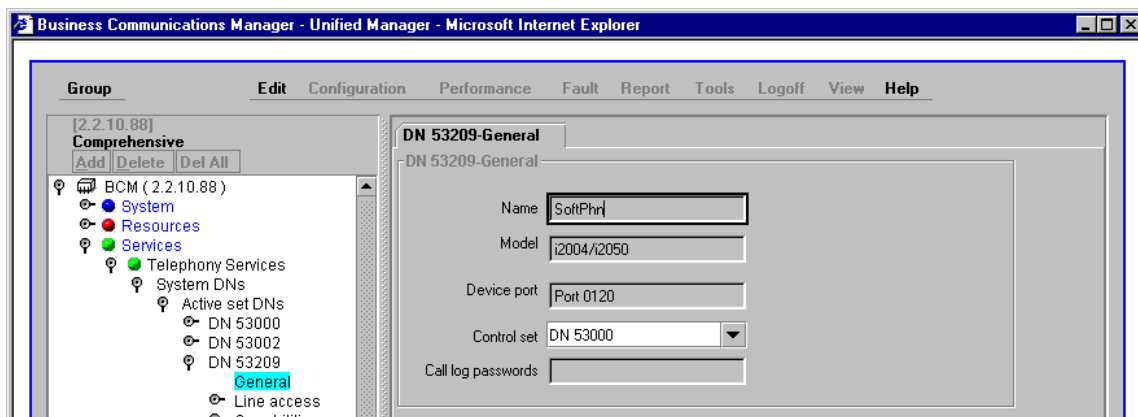
The following illustrates a snapshot of the active directory numbers, showing the IP telephones from above, as well as two T7208 digital telephones with extensions 53000 and 53002.



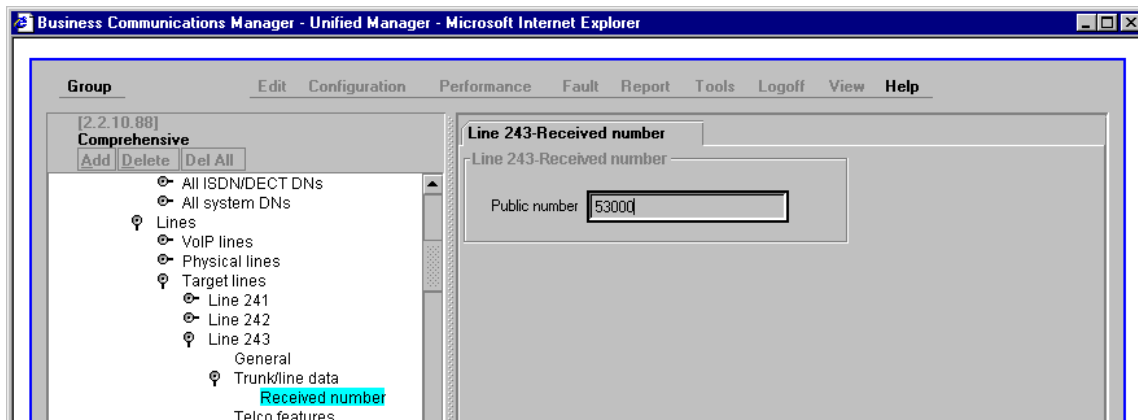
The following illustrates further details for digital station 53000.



The following illustrates further details for Nortel IP Software Phone 53209.

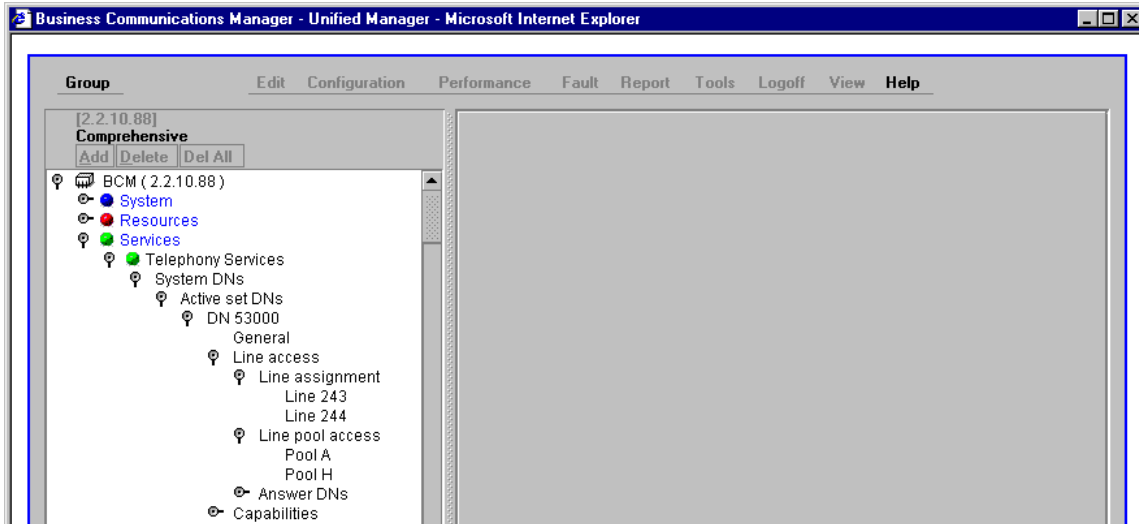


The following screen illustrates the configuration of a “Target Line” 243 for received number 53000.

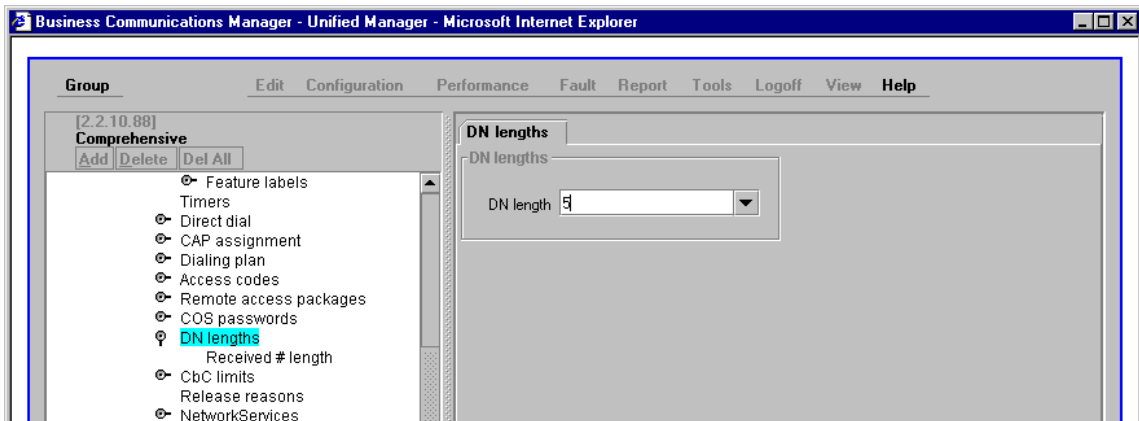


This target line can be assigned to a telephone in order for the telephone to be capable of answering a call to 53000 arriving over the H.323 trunk. As shown below, Target Line 243 is assigned to directory number 53000 to allow it to receive direct incoming trunk calls. Other target lines are assigned for other directory numbers used in this configuration (e.g., 53002,

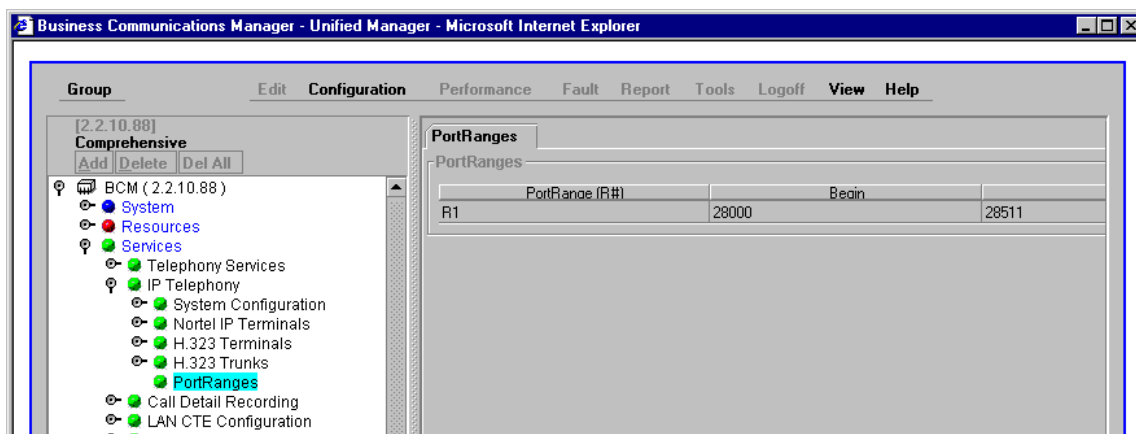
53209, and 53210), and these target lines are associated with the appropriate telephone. It can also be observed using the screen below that DN 53000 has access to Pool A, containing the “VoIP lines.”



The following screen illustrates the 5 digit Directory Number length used in this configuration.



The following screen illustrates the (default) port range that will be used. In **Section 7**, where active call status is illustrated, the reader may notice that the Nortel BCM acting as an IP-TDM gateway uses ports beginning with 28000. The port range can be changed using this screen, if necessary. (On Avaya Communication Manager, the port range can be controlled on a network region basis via the “ip-network-region” screen illustrated in **Section 4.2**, if necessary. Default port ranges have been retained on all products throughout these Application Notes.)



6. Verify Connectivity

Verification of the configuration described here includes, but is not limited to:

- Calls between Nortel i2004 IP telephones controlled by the Nortel BCM and Avaya IP Telephones and Softphones registered to the Avaya S8300 Media Server. Successful calls can be made in both directions across the IP Trunk using either G.729 at 3 Frames Per Packet, G.711MU at 3 Frames Per Packet (see **Section 7.9**), or G.723 (see **Section 7.10**). As mentioned previously, “shuffling” of the media to “ip-direct” must be disabled.
- Calls between Nortel i2050 Softphones controlled by the Nortel BCM and Avaya IP Telephones and Softphones registered to the Avaya S8300 Media Server. Successful calls can be made in both directions across the IP Trunk using either G.729 at 3 Frames Per Packet, G.711MU at 3 Frames Per Packet, or G.723. As mentioned previously, “shuffling” of the media to “ip-direct” must be disabled.
- Calls between Nortel i2004 IP telephones controlled by the Nortel BCM and Avaya digital telephones connected to the G700 Media Gateway (i.e., controlled by the Avaya S8300 Media Server). Successful calls can be made in both directions using G.711MU, G.729, or G.723.
- Calls between Nortel i2050 Softphones controlled by the Nortel BCM and Avaya digital telephones connected to the G700 Media Gateway (i.e., controlled by the Avaya S8300 Media Server). Successful calls can be made in both directions using G.711MU, G.729, or G.723.
- Calls from Nortel i2004 IP telephones, Nortel i2050 Softphones, and Nortel digital telephones into an Avaya Meet-Me conference configured on the Avaya S8300 Media Server. After answer, digits pressed on any of the Nortel telephone keypads (to enter the conference password) are processed properly, and the Nortel telephones can participate in the conference. This verification is included to show that Avaya applications requiring DTMF can collect the digits from the IP Trunk interface to the Nortel server. The IP Trunk interface serving the Nortel telephones can be muted using the Avaya Communication Manager “fe-mute” feature button, and the Nortel telephone can use the “#” key to un-mute the trunk. (Far-end mute is a feature that can be used in conjunction with Avaya Communication Manager Meet-Me conferencing, allowing unwanted music

on hold or noisy audio sources to be muted at the Avaya trunk interface by a display-equipped telephone or softphone.)

- Calls from Avaya IP Telephones, Avaya IP Softphones, and Avaya digital telephones interacting with the voice messaging system of the Nortel BCM. Digits pressed on any of the Avaya telephone keypads are processed properly by the Nortel voice messaging application. This verification is included to show that Nortel applications requiring DTMF can collect the digits from the IP Trunk interface to the Avaya server.
- Ringback tone to the originator of calls is heard when appropriate in all cases. (When Avaya calls Nortel, Avaya is supplying ringback to the Avaya originating party based on signaling messages received from Nortel. When Nortel calls Avaya, the Nortel telephone is hearing ringback sourced from the Avaya G700 Media Gateway over the IP Trunk.)
- Display verifications (See **Section 7.8** for further details):
 - For calls from an Avaya telephone to a Nortel telephone, the Nortel telephone can display either the name or number of the Avaya caller, provided the Avaya server is provisioned to send this information. Whether the name or number is displayed can be controlled based on configuration of the Nortel BCM “Telco Features” as shown in **Section 7.8.1**.
 - For calls from a Nortel telephone to an Avaya telephone, the Avaya telephone can display both the calling party name and number, if sent by the Nortel BCM. **Section 7.8.2** shows the Nortel BCM screens that control the content of the calling party name and number sent to Avaya Communication Manager.

7. Detailed Information for Active Calls

To reinforce the understanding of the configuration, the following subsections show detailed status for representative calls.

7.1. Avaya IP Telephone Calls Nortel IP Telephone

This section presents details for a call involving the Avaya IP Telephone with IP address 2.2.10.202 (x43209) and the Nortel IP Telephone with IP address 2.2.10.103 (x53210). The Avaya IP telephone is registered with the S8300 Media Server, whose address is 2.2.10.78. The Nortel IP telephone is registered with the Nortel BCM, whose address is 2.2.10.88.

Observe the final audio path for the call, shown in the Avaya “status station” screen below. The first media path shown, between the Avaya IP Telephone and the Avaya G700 Media Gateway VoIP at 2.2.10.79, is within network region 1. Recall that Codec Set 1 has been configured for intra-region calls, and Codec Set 1 contains G.711MU at 2 Frames Per Packet (20 msec audio). The second media path shown is from the G700 VoIP at 2.2.10.79 to the Nortel IP Telephone. This connection was configured as an inter-region call between network region 1 and network region 2, due to the “Far-end Network Region” field being set to 2 for the Signaling Group to the Nortel BCM. Codec Set 2, which contained G.729 at 3 Frames Per Packet, is used for calls between regions 1 and 2. Recall that the G700 Media Gateway VoIP remains in the communication path because “Direct IP-IP Audio Connections” or “shuffling” has been turned off on the Signaling Group to the Nortel BCM. With the software loads shown in **Table 1**, it is necessary to turn off shuffling.

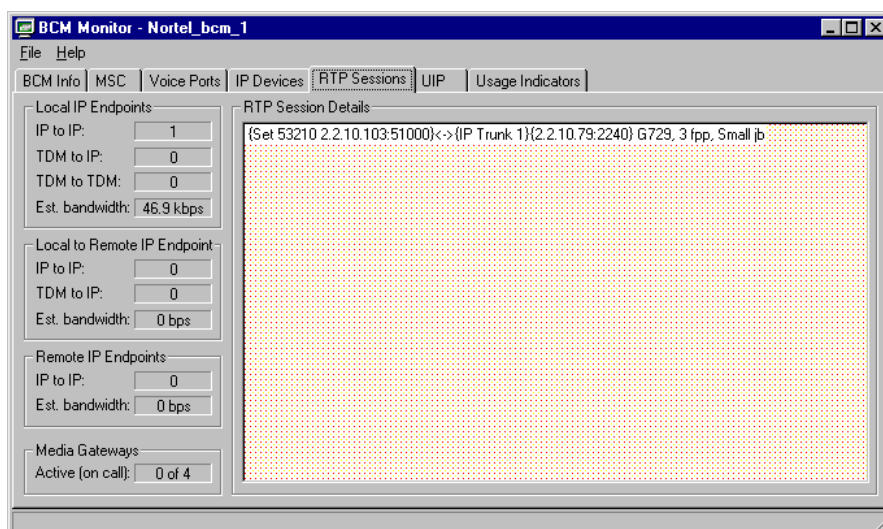
```

status station 43209                                     Page 4 of 4
                                     CONNECTED PORTS
src port: S00002                                     src port: S00002
MP           HP           MP           H
ip-start: 2. 2. 10.202:3010
ip-end: 2. 2. 10. 79:2242 001V103
audio: G.711MU      ss:off  pkt:20ms

ip-start: 2. 2. 10. 79:2240 001V102
ip-end: 2. 2. 10.103:51000
audio: G.729       ss:off  pkt:30ms
.....
dst port: T00001                                     dst port:

```

The following screen shows the Nortel BCM Monitor view of the RTP session for this call. The communication path is between the Nortel IP Telephone, whose IP address is 2.2.10.103, and 2.2.10.79, the IP address of the “VoIP v0” resources on the motherboard of the Avaya G700 Media Gateway. The codec is G.729 at 3 “fpp” or “Frames Per Packet”.



The following illustrates the first page of the Avaya “status trunk” screen for this same call.

```

Status trunk 1/1                                     Page 1 of 2
                                     TRUNK STATUS
Trunk Group/Member: 0001/001                         Service State: in-service/active
Port: T00001                                         Maintenance Busy? no
Signaling Group ID:                                CA-TSC state: not allowed
Connected Ports: S00002
Port          Near-end IP Addr : Port      Far-end IP Addr : Port
Q.931: PROCR  2. 2. 10. 78 : 10476     2. 2. 10. 88 : 1720
H.245: PROCR  2. 2. 10. 78 : 10477     2. 2. 10. 88 : 1263
G.729 Audio:  2. 2. 10. 79 : 2240       2. 2. 10.103 : 51000
H.245 Tunneler in Q.931? no
Audio Connection Type: ip-tdm

```

7.2. Nortel IP Telephone Calls Avaya IP Telephone

The following Avaya screens show status for a call from a Nortel IP telephone to an Avaya IP Telephone. Note that the final media path is the same, independent of the direction of the call.

```
status trunk 1/1                                     Page 1 of 2
                                     TRUNK STATUS
Trunk Group/Member: 0001/001           Service State: in-service/active
      Port: T00001           Maintenance Busy? no
Signaling Group ID:           CA-TSC state: none
      Connected Ports: S00002

      Port      Near-end IP Addr : Port      Far-end IP Addr : Port
      Q.931: PROC 2. 2. 10. 78 : 1720      2. 2. 10. 88 : 1214
      H.245: PROC 2. 2. 10. 78 : 10473      2. 2. 10. 88 : 1216
G.729      Audio: 2. 2. 10. 79 : 2250      2. 2. 10.103 : 51000
      H.245 Tunneled in Q.931? no
      Audio Connection Type: ip-tdm
```

The next screen shows Page 2.

```
status trunk 1/1                                     Page 2 of 2
                                     CONNECTED PORTS
      src port: T00001
      MP      HP      src port: T00001      MP      H
ip-start: 2. 2. 10.103:51000
ip-end: 2. 2. 10. 79:2250 001V102
audio: G.729      ss:off  pkt:30ms

ip-start: 2. 2. 10. 79:2252 001V103
ip-end: 2. 2. 10.202:3010
audio: G.711MU      ss:off  pkt:20ms
.....
dst port: S00002      dst port:
```

The next screen shows the information available from “status station”.

```
status station 43209                               Page 4 of 4
                                     CONNECTED PORTS
      src port: S00002
      MP      HP      src port: S00002      MP      H
ip-start: 2. 2. 10.202:3010
ip-end: 2. 2. 10. 79:2252 001V103
audio: G.711MU      ss:off  pkt:20ms

ip-start: 2. 2. 10. 79:2250 001V102
ip-end: 2. 2. 10.103:51000
audio: G.729      ss:off  pkt:30ms
.....
dst port: T00001      dst port:
```

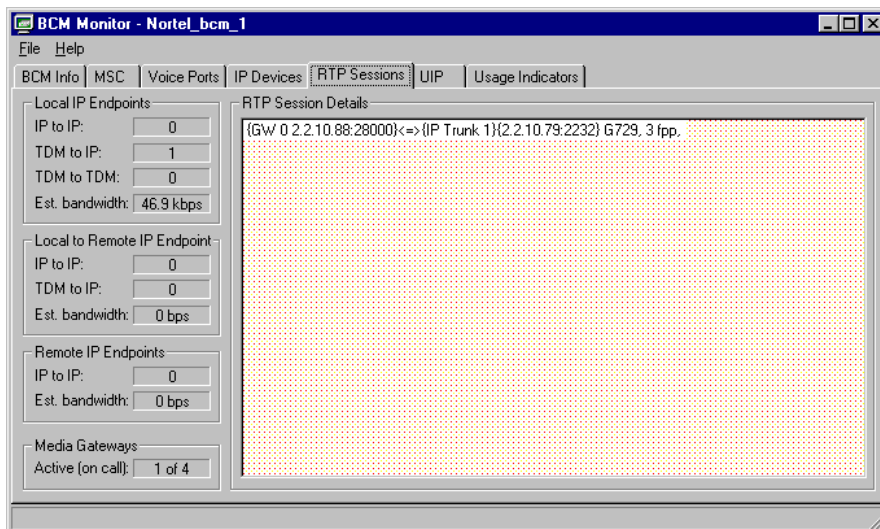
7.3. Nortel Digital Telephone calls Avaya Digital Telephone

This section illustrates details for a call between an Avaya digital telephone (i.e., example of a non-IP Telephone) connected to port 1v301 on the G700 Media Gateway and the Nortel T7208 Digital Phone (DN 53000, as shown in **Figure 1** and **Section 5.2**). The Nortel digital telephone 53000 dialed the Avaya digital telephone (x43000).

Observe the Q.931 signaling path is between the Avaya S8300, whose IP address is 2.2.10.78 (near-end of Signaling Group 1), and the Nortel BCM, whose IP address is 2.2.10.88 (far-end of Signaling Group 1). The audio path is from the G700 VoIP media processor, whose IP address is 2.2.10.79, to the Nortel BCM. The trunk port shown, T00001, is a member of trunk group 1.

```
status trunk 1/1 Page 1 of 1
                                TRUNK STATUS
Trunk Group/Member: 0001/001      Service State: in-service/active
Port: T00001                      Maintenance Busy? no
Signaling Group ID:              CA-TSC state: none
Connected Ports: 001V301
    Port      Near-end IP Addr : Port      Far-end IP Addr : Port
    Q.931: PROCR      2. 2. 10. 78 : 1720      2. 2. 10. 88 : 1207
    H.245: PROCR      2. 2. 10. 78 : 10469     2. 2. 10. 88 : 1209
G.729      Audio:      2. 2. 10. 79 : 2232      2. 2. 10. 88 : 28000
    H.245 Tunneled in Q.931? no
    Audio Connection Type: ip-tdm
```

The following screen shows the Nortel BCM Monitor view of the RTP stream associated with this call. Note the communication path is between 2.2.10.88, the IP address of the Nortel BCM, and 2.2.10.79, the IP address of the VoIP engine on the motherboard of the G700 Media Gateway. The codec used is G.729 at 3 “fpp” or “Frames Per Packet”. Note further that the Nortel BCM is using port 28000, the first in the range shown in **Section 5.2**.



7.4. Avaya Digital Telephone calls Nortel Digital Telephone

The following screen shows a similar status screen for a call from Avaya digital telephone extension 43000 to Nortel digital telephone DN 53000. Again, the final media path is the same

independent of the direction of the call. In general, note that the Nortel BCM will continue to use port 28000 if it is unused, whereas the ports used for sequential calls involving Avaya media processor resources will increment by 2.

```

status trunk 1/2                                     Page 1 of 2
                                     TRUNK STATUS
Trunk Group/Member: 0001/002           Service State: in-service/active
      Port: T00002                     Maintenance Busy? no
Signaling Group ID:                   CA-TSC state: not allowed
  Connected Ports: 001V301
      Port      Near-end IP Addr : Port      Far-end IP Addr : Port
    Q.931: PROCR      2. 2. 10. 78 : 10466      2. 2. 10. 88 : 1720
    H.245: PROCR      2. 2. 10. 78 : 10467      2. 2. 10. 88 : 1201
G.729   Audio:       2. 2. 10. 79 : 2246       2. 2. 10. 88 : 28000
    H.245 Tunneler in Q.931? no
    Audio Connection Type: ip-tdm

```

7.5. Avaya Digital Telephone and Nortel IP Softphone

The following screens illustrate details for a call between an Avaya digital telephone connected to port 1v301 in the G700 Media Gateway and the Nortel i2050 Software Phone, loaded on a computer whose IP address is 2.2.10.5. The Avaya digital telephone is extension 43000, and the Nortel IP Software Phone is directory number 53209. The Nortel IP Software Phone dialed 43000 to ring the Avaya digital set. This call does not illustrate any new concept; it is presented to include status of a call involving the Nortel IP Software Phone.

```

status trunk 1/1                                     Page 1 of 2
                                     TRUNK STATUS
Trunk Group/Member: 0001/001           Service State: in-service/active
      Port: T00001                     Maintenance Busy? no
Signaling Group ID:                   CA-TSC state: none
  Connected Ports: 001V301
      Port      Near-end IP Addr : Port      Far-end IP Addr : Port
    Q.931: PROCR      2. 2. 10. 78 : 1720       2. 2. 10. 88 : 1270
    H.245: PROCR      2. 2. 10. 78 : 10479      2. 2. 10. 88 : 1272
G.729   Audio:       2. 2. 10. 79 : 2260       2. 2. 10. 5  : 51002
    H.245 Tunneler in Q.931? no
    Audio Connection Type: ip-tdm

```

Page 2 shows further details of the IP audio path, using G.729 at 3 Frames Per Packet, between the Nortel IP Software Phone (2.2.10.5) and the G700 Media Gateway VoIP (2.2.10.79).

```

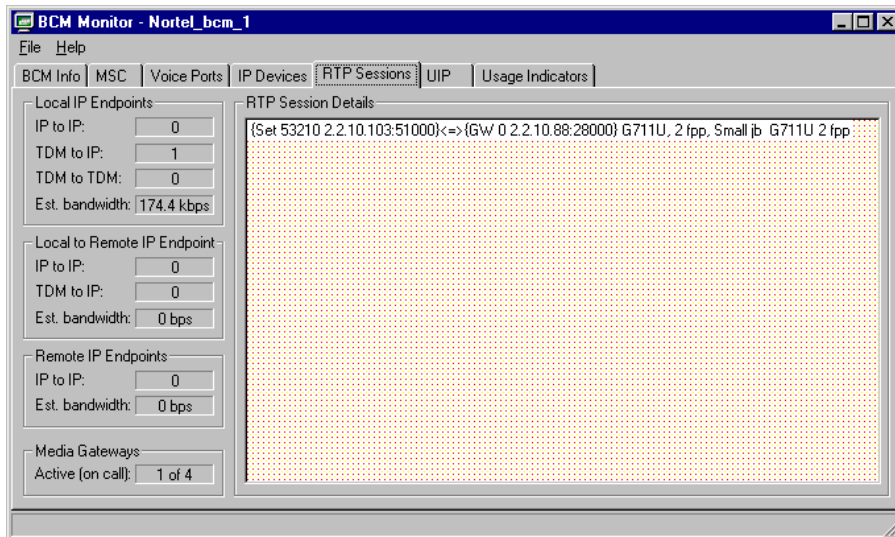
status trunk 1/1                                     Page 2 of 2
                                     CONNECTED PORTS
      src port: T00001                   src port: T00001
      MP      HP                         MP      HP
ip-start: 2. 2. 10. 5:51002
ip-end:   2. 2. 10. 79:2260 001V103
audio: G.729      ss:off  pkt:30ms
.....
dst port: 001V301                         dst port:

```

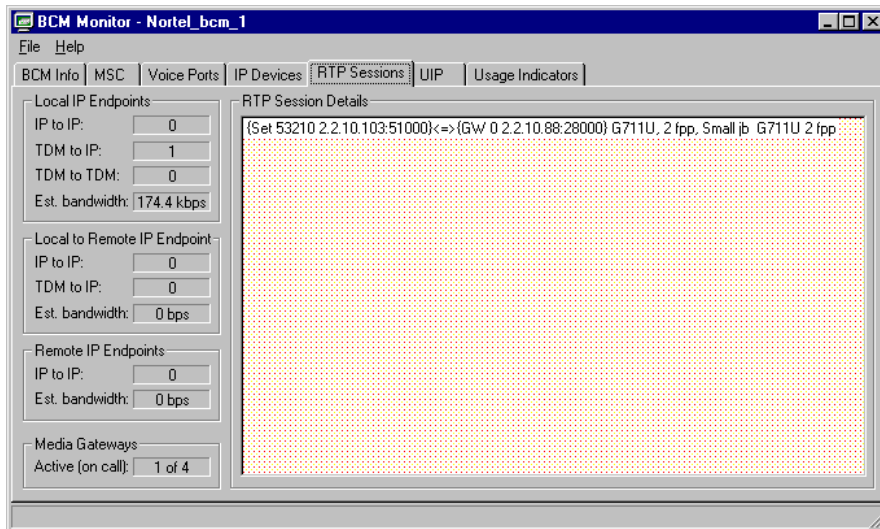
7.6. Status for Connections Among Nortel IP Devices

As previously mentioned, calls among the Avaya endpoints in “ip-network-region 1” will use G.711MU at 20 msec. This section illustrates the same concept for calls among the Nortel endpoints. Calls between Avaya and Nortel over the IP Trunk will use G.729/30 msec.

The following Nortel BCM Monitor screen was taken as a Nortel IP telephone was receiving dial tone from the Nortel BCM. Observe the use of G.711MU at 2 Frames Per Packet.



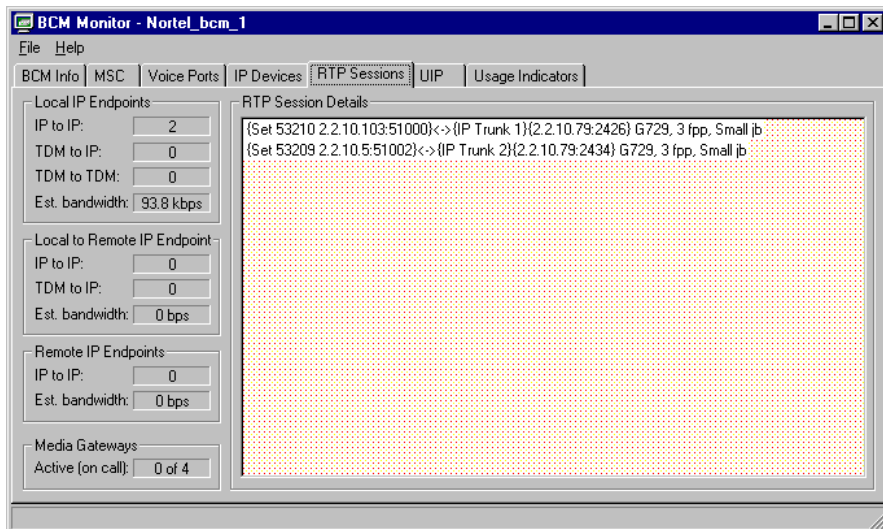
The following Nortel BCM Monitor screen was taken while a Nortel IP telephone was connected to a Nortel digital telephone. Again, observe the use of G.711MU at 2 Frames Per Packet.



7.7. Multiple Calls Active over the Avaya-Nortel IP Trunk

The following screen from the Nortel BCM Monitor was taken while a Nortel IP Telephone and a Nortel IP Software Phone were dialed into an Avaya Meet-Me Conference. Observe the two

separate G.729/30 msec sessions over the IP Trunk to the Avaya G700 Media Gateway VoIP resource at 2.2.10.79. (If one call at a time can be placed over the IP Trunk, but problems arise when a second concurrent call is attempted, verify the “Calls Share Signaling Connection” parameter is set to “no” on the Avaya signaling group.)

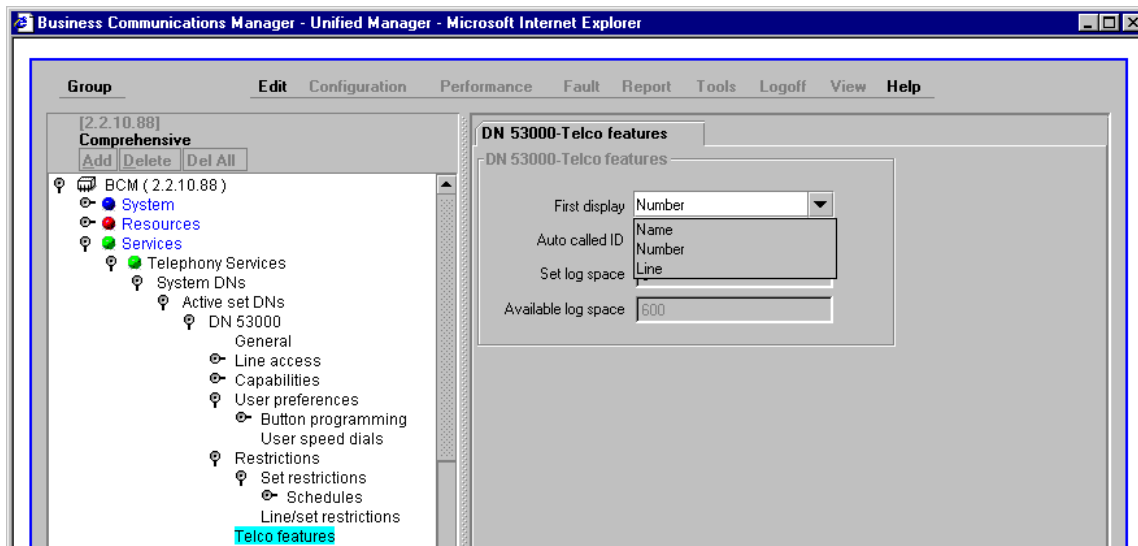


7.8. Call Display Verification and Configuration

This section presents additional information relevant to calling party name and number displays for calls over the IP Trunk.

7.8.1. Calls From Avaya Telephones to Nortel Telephones

Avaya Communication Manager can be configured to send the Calling Party Name and Calling Party Number to the Nortel BCM in the SETUP message passed over the IP Trunk. The Nortel BCM can be configured to display either the Name or the Number to display-equipped users, based on the configuration parameter shown below. With the “First display” field set to “Name”, the name configured for the Avaya calling station can be displayed on the Nortel telephone. This is true whether the “Codeset to Send Display” on the Avaya trunk group is set to “0” or “6”. With the “First display” field set to “Number”, the calling party number sent by Avaya is displayed on the Nortel telephone (i.e., instead of the calling party name).



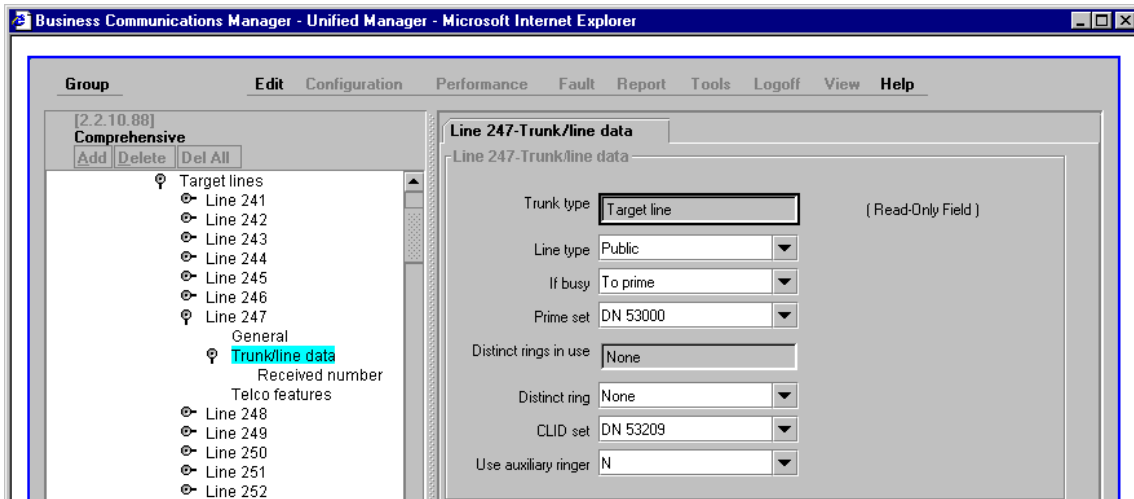
The next screen, from the Nortel i2050 Software Phone, shows an active call from an Avaya IP Telephone, whose name is configured as “Mister 4624”, to the Nortel i2050 Software Phone. In this case, the “First display” under “Telco features” had been set to “Name.”



The next screen, from the Nortel i2050 Software Phone, shows an active call from the same Avaya IP Telephone. The Avaya telephone’s calling party number is configured to be “732-555-3209”. In this case, the “First display” parameter under “Telco features” was set to “Number.”

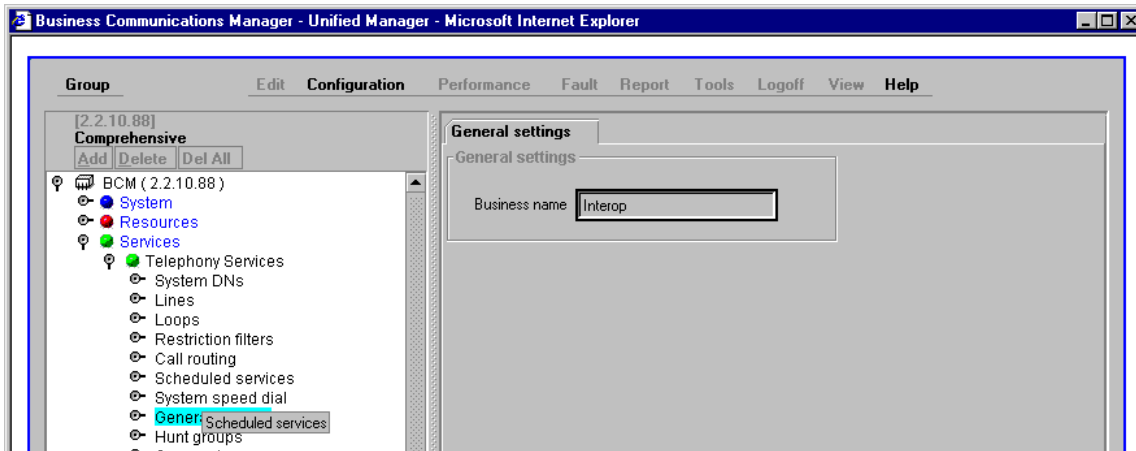


If the caller ID information appears after a call is answered, but not while the call is ringing, check the following screen. To see the caller ID information while the call is ringing at a DN, populate the “CLID set” parameter with the appropriate DN.

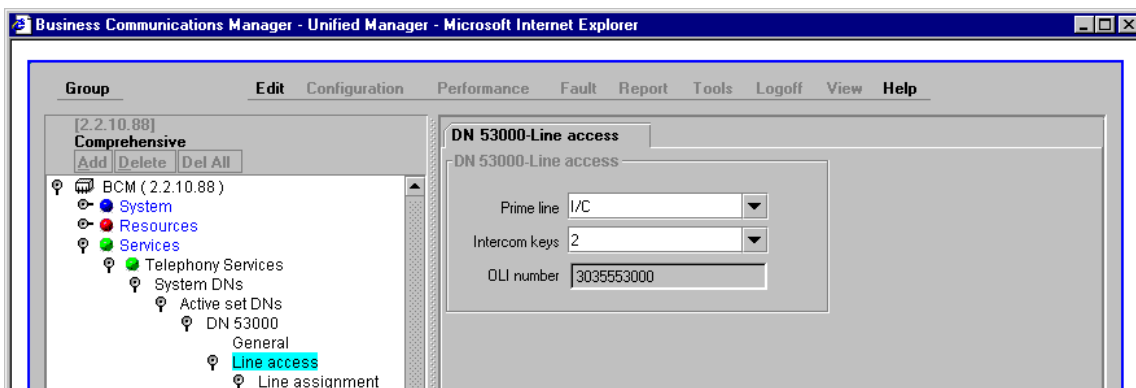


7.8.2. Calls From Nortel Telephones to Avaya Telephones

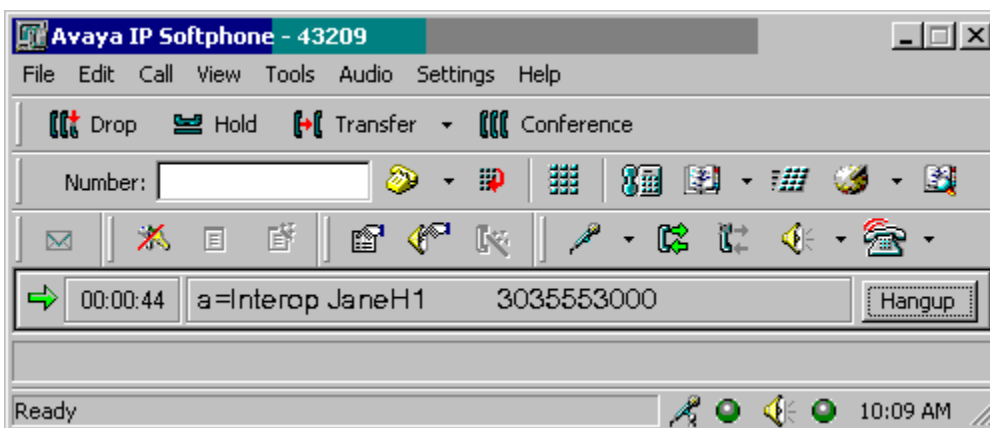
Nortel BCM can be configured to send the Calling Party Name and Calling Party Number to Avaya Communication Manager in the SETUP message passed over the IP Trunk. The Calling Party Name can optionally include a global “Business Name”, administered using “Services” → “General Settings”. In the screen below, the Business Name is set to “Interop”.



The next screen shows an example configuration for DN 53000. DN 53000 will be used to originate a call to continue the example. The “OLI number” has been set to 3035553000.



As seen in **Section 5.2**, DN 53000 has been configured with user name “JaneH1”. With this configuration, the following Avaya IP Softphone screen illustrates an example display for a call from DN 53000 to an Avaya display-equipped telephone. In this example, Nortel DN 53000 called Avaya extension 43209. An Avaya IP Softphone, registered as extension 43209, handles the call. As can be seen, the calling party name, consisting of the “Business Name” and “User Name”, and the calling party number are displayed.

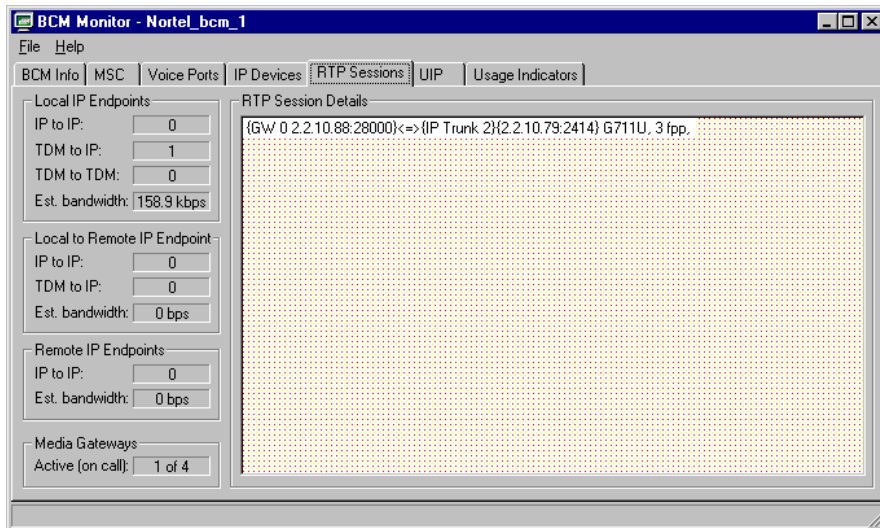


7.9. Example of Call Using G.711MU over the IP Trunk

As stated previously, the configuration screens presented in these Application Notes show how to achieve G.729 over the IP Trunk. However, other codecs are supported. As with G.729, it is required to configure 3 Frames Per Packet on the Avaya “ip-codec-set” to avoid interoperability problems. The following screen shows a call between an Avaya digital station and a Nortel digital station using G.711MU/30 msec across the IP Trunk.

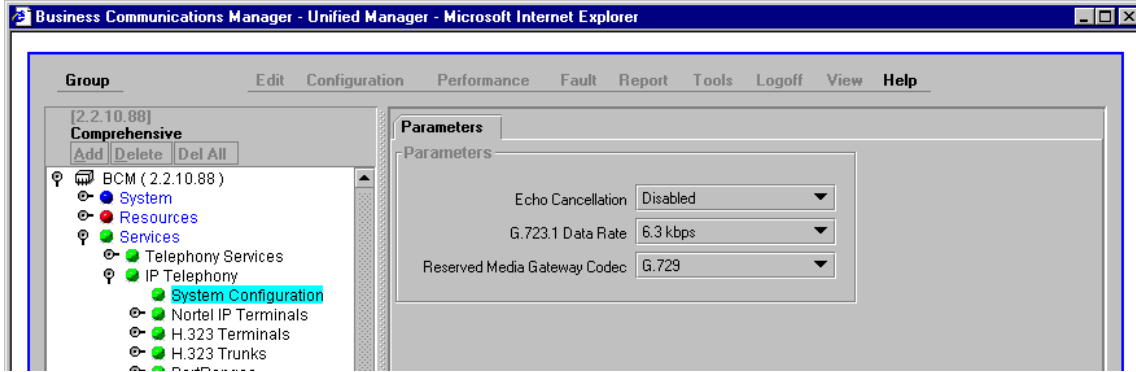
```
status trunk 1/1 Page 2 of 2
                CONNECTED PORTS
      src port: T00001                src port: T00001
      MP          HP                    MP          HP
ip-start: 2. 2. 10. 88:28000
ip-end: 2. 2. 10. 79:2414 001V105
  audio: G.711MU      ss:off  pkt:30ms
.....
dst port: 001V301                dst port:
```

The following shows a Nortel BCM Monitor screen for this same call.



7.10. Examples of Calls Using G.723 over the IP Trunk

Again, the configuration screens presented in these Application Notes show how to achieve G.729 over the IP Trunk. However, other codecs are supported. The following screen shows how the preferred G.723.1 data rate can be varied on the Nortel BCM, using the G.723.1 Data Rate drop down menu, available from “Services” → “IP Telephony” → “System Configuration”. (On Avaya Communication Manager, the preferred G.723.1 rate is configured using the “ip-codec-set” form).



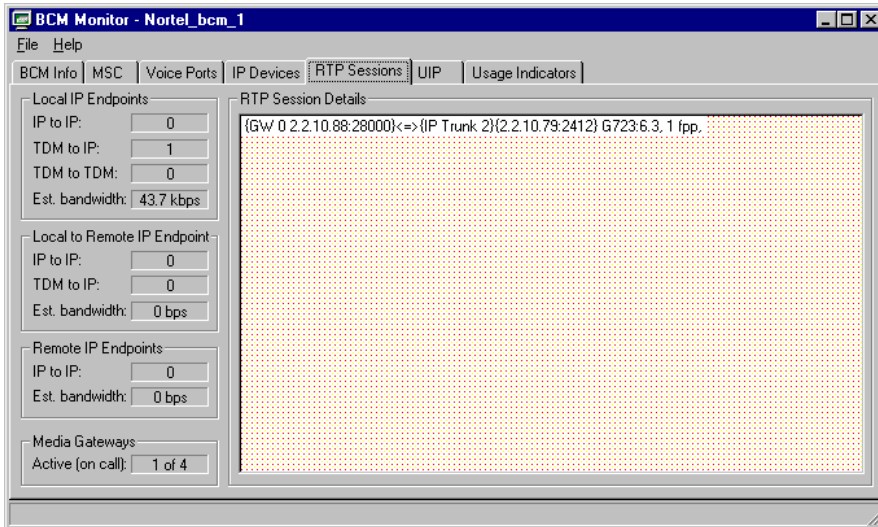
The following screen shows an active call between an Avaya digital station and a Nortel digital station using G.723-6.3K across the IP Trunk.

```

status trunk 1/1                                     Page 2 of 2
                                     CONNECTED PORTS
src port: T00001                                MP      HP      src port: T00001                                MP      HP
ip-start: 2. 2. 10. 88:28000
ip-end: 2. 2. 10. 79:2412 001V105
audio: G.723-6.3K  ss:off  pkt:30ms
-----
dst port: 001V301                                dst port:

```

The following is a Nortel BCM Monitor screen for this same call.



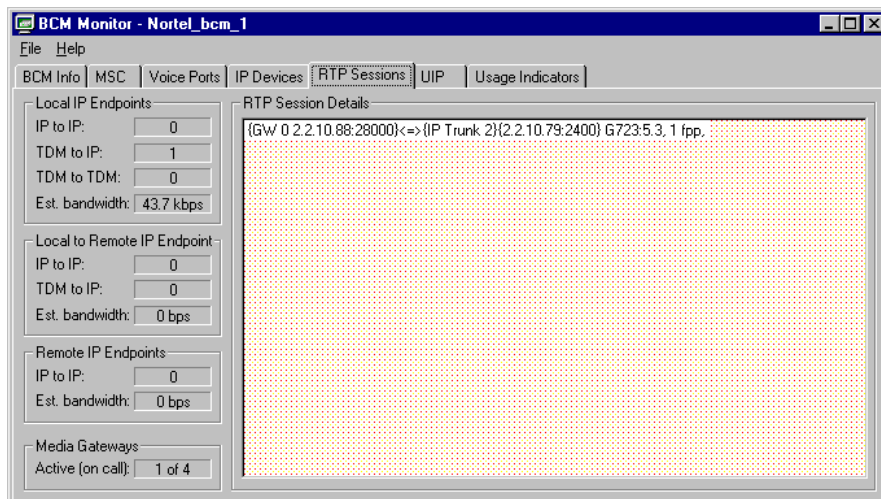
Calls using G.723-5.3K are also supported. The following two screens show an Avaya digital telephone and a Nortel digital telephone communicating over the IP Trunk using G.723-5.3K.

```

status trunk 1/1                                     Page 2 of 2
                                     CONNECTED PORTS
src port: T00001                                     src port: T00001
MP           HP                                     MP           HP
ip-start: 2. 2. 10. 88:28000
ip-end: 2. 2. 10. 79:2400 001V105
audio: G.723-5.3K  ss:off  pkt:30ms
-----
dst port: 001V301                                     dst port:

```

The following is a Nortel BCM Monitor screen for this same call.



8. Conclusion

As illustrated in these Application Notes, Avaya Communication Manager can interoperate with Nortel BCM using H.323 Trunks. Interoperability can be achieved using G.711, G.729, or G.723 for communication over the IP Trunk. Compared with other H.323 Trunk configurations, the main Communication Manager configuration differences for interoperability with the Nortel BCM Release 3.0 are as follows. First, Special Application SA8507 must be enabled. Second, Direct IP-IP audio connections, often referred to as “shuffling”, must be disabled on the Avaya H.323 Signaling Group. Finally, the Avaya “ip-codec-set” must be configured for 3 Frames Per Packet for G.711 and G.729.

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