



Avaya Solution & Interoperability Test Lab

Application Notes for Spirent Abacus 5000 with Avaya Communication Manager using the ISDN PRI and Analog Interfaces – Issue 1.0

Abstract

These Application Notes describe the configuration steps required for Spirent Abacus 5000 to successfully interoperate with Avaya Communication Manager using the ISDN PRI and analog interfaces. Information in these Application Notes has been obtained through compliance testing and additional technical discussions. Testing was conducted via the *DeveloperConnection* Program at the Avaya Solution and Interoperability Test Lab.

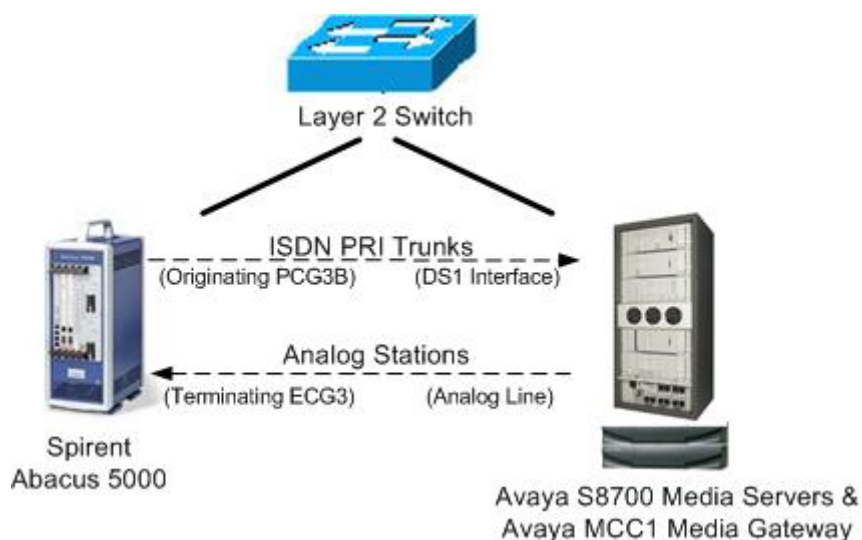
1. Introduction

Spirent Abacus 5000 is an integrated IP and PSTN telephony test system with analog, TDM, and Ethernet interfaces. The system generates real voice streams to simulate real-world loads, and performs real time voice quality measurements.

Abacus 5000 can function as a call generator or a switch. The compliance testing focused on Abacus 5000 as an ISDN PRI call generator to load Avaya Communication Manager with termination of the load to analog endpoints on Abacus 5000.

In the integration of Abacus 5000 with Avaya Communication Manager, Abacus 5000 utilizes an ISDN capable PCG3B card to originate the ISDN PRI calls to Avaya Communication Manager, and an analog capable ECG3 card to terminate the calls. The outgoing ISDN PRI calls from Abacus 5000 arrive on Avaya Communication Manager via the ISDN trunk interface, and are routed back out to Abacus 5000 via the analog station interface. The ports on the Abacus 5000 ECG3 card are administered as analog stations on Avaya Communication Manager.

The Abacus 5000 originating PCG3B card is physically connected to the DS1 Interface circuit pack on Avaya Communication Manager, and the Abacus 5000 terminating ECG3 card is physically connected to the Analog Line circuit pack on Avaya Communication Manager.



The compliance testing involved originating calls from the Abacus 5000 across an ISDN trunk and terminating these same calls on the Abacus 5000 as generic analog endpoints. The information from these Application Notes can easily be extended to other possible test scenarios such as:

Originating From	Terminating To
Abacus Trunks	Avaya Endpoints
Abacus Trunks	Abacus Trunks

1.1. Abacus 5000 PCG3B and ECG3 Capacity

For the compliance testing, five simultaneous calls were configured and launched on Abacus 5000, thus involving five channels on the originating PCG3B card and five channels on the terminating ECG3 card. Below is a table listing of the capacity of the PCG3B and ECG3 cards from the Abacus 5000 documentation:

Channel Densities of Abacus 5000 PSTN Subsystems			
CG Acronym	CG Subsystem Type	Circuits per Subsystem	Channels per Subsystem
ECG3/XCG3	Analog; Loop Start/Ground Start	14	14
PCG3/PCG3B	T1 (DS1)	4, 14, or 28	96, 336, or 672
PCG3/PCG3B	E1 (DS1)	4, 14, or 21	120, 420, or 830
PCG3/PCG3B	ISDN PRI 1544 kbps	4, 14, or 28	92, 322, or 644; 95, 335, or 647 with NFAS
PCG3/PCG3B	ISDN PRI 2048 kbps	4, 14, or 28	120, 420, or 840; 123, 433, or TBS with NFAS
PCG3/PCG3B	GR-303 ¹	4, 14, or 28	94, 334, or 668
PCG3/PCG3B	V5.1	4, 14, or 28	120, 420, or 630
PCG3/PCG3B	V5.2*	4, 14, or 28	122, 432, or 630
PCG3/PCG3B	SS7 for T1	4, 14, or 28	95, 335, or TBS
PCG3/PCG3B	SS7 for E1	4, 14, or 28	123, 433, or TBS

2. Equipment and Software Validated

The following equipment and software were used for the configurations provided:

Equipment	Software
Avaya S8700 Media Servers	Communication Manager 3.0.1, load 346.0
Avaya MCC1 Media Gateway <ul style="list-style-type: none">TN464GP DS1 InterfaceTN742 Analog Line	HW02 FW015 19
Spirent Abacus 5000	3.2, patch 14

3. Configure Avaya Communication Manager

The procedures for configuring the ISDN PRI trunk and analog station interfaces on Avaya Communication Manager include the following areas:

- Verify Avaya Communication Manager License
- Administer DS1 Circuit Pack
- Administer ISDN trunk group
- Administer ISDN signaling group
- Administer ISDN trunk group members
- Administer analog stations

3.1. Verify Avaya Communication Manager License

Log into the System Access Terminal (SAT) to verify that the Avaya Communication Manager license has proper permissions for features illustrated in these Application Notes. Use the “display system-parameters customer-options” command to verify that the **ISDN-PRI** option is set to “y” on **Page 4**, as shown below.

```
display system-parameters customer-options                                Page 4 of 11
                                OPTIONAL FEATURES

Emergency Access to Attendant? y                                         IP Stations? y
  Enable 'dadmin' Login? y                                             Internet Protocol (IP) PNC? n
  Enhanced Conferencing? y                                           ISDN Feature Plus? y
    Enhanced EC500? y                                         ISDN Network Call Redirection? n
Enterprise Survivable Server? n                                         ISDN-BRI Trunks? n
  Enterprise Wide Licensing? n                                         ISDN-PRI? y
    ESS Administration? n                                         Local Survivable Processor? n
      Extended Cvg/Fwd Admin? y                                         Malicious Call Trace? y
External Device Alarm Admin? n                                         Media Encryption Over IP? n
Five Port Networks Max Per MCC? n  Mode Code for Centralized Voice Mail? n
  Flexible Billing? n
Forced Entry of Account Codes? y                                         Multifrequency Signaling? y
  Global Call Classification? n  Multimedia Appl. Server Interface (MASI)? n
    Hospitality (Basic)? y                                         Multimedia Call Handling (Basic)? y
Hospitality (G3V3 Enhancements)? y  Multimedia Call Handling (Enhanced)? y
  IP Trunks? y

IP Attendant Consoles? n
(NOTE: You must logoff & login to effect the permission changes.)
```

3.2. Administer DS1 Circuit Pack

Administer a DS1 circuit pack to be used for connectivity to the originating PCG3B card from Abacus 5000. Use the “add ds1 1b08” command. Note that the actual slot number may vary. In this case “1b08” is the slot number. Enter the following values for the specified fields, and retain the default values for all remaining fields. Submit these changes.

- **Name:** A desirable name.
- **Line Coding:** “b8zs”
- **Signaling Mode:** “isdn-pri”
- **Connect:** “line-side”
- **Protocol Version:** “b”

Note that for the compliance testing, the DS1 circuit pack is configured for ISDN PRI service. Modify the DS1 settings as necessary to reflect the actual network configuration.

add ds1 1b08		Page 1 of 2
DS1 CIRCUIT PACK		
Location: 01B08	Name: Abacus PRI T1	
Bit Rate: 1.544	Line Coding: b8zs	
Line Compensation: 1	Framing Mode: esf	
Signaling Mode: isdn-pri		
Connect: line-side		
TN-C7 Long Timers? n	Country Protocol: 1	
Interworking Message: PROGRESS	Protocol Version: b	
Interface Companding: mulaw	CRC? n	
Idle Code: 11111111	DCP/Analog Bearer Capability: 3.1kHz	
T303 Timer(sec): 4		
Slip Detection? n		
Near-end CSU Type: other		
Alarm When PRI Endpoint Detached? y		
Block Progress Indicator? N		

3.3. Administer ISDN Trunk Group

Administer an ISDN PRI trunk group to interface with the originating ICG3 card from Abacus 5000. Use the “add trunk-group n” command, where “n” is an available trunk group number. Enter the following values for the specified fields, and retain the default values for all remaining fields. Submit these changes.

- **Group Type:** “isdn”
- **Group Name:** A descriptive name.
- **TAC:** An available trunk access code.
- **Service Type:** “tie”

add trunk-group 62		Page 1 of 20
TRUNK GROUP		
Group Number: 62	Group Type: isdn	CDR Reports: y
Group Name: Abacus PRI T1 Trunk	COR: 1	TN: 1 TAC: 1062
Direction: two-way	Outgoing Display? n	Carrier Medium: PRI/BRI
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: 13
Incoming Calling Number - Delete:	Insert:	Format:
Bit Rate: 1200	Synchronization: async	Duplex: full
Disconnect Supervision - In? y	Out? n	
Answer Supervision Timeout: 0		

3.4. Administer ISDN Signaling Group

Administer an ISDN signaling group for the newly added trunk group. Use the “add signaling-group n” command, where “n” is an available signaling group number. For the **Primary D-Channel** field, enter the slot number for the DS1 circuit pack from **Section 3.2** and port “24”. For network configurations using the ISDN E1 service, use port “16” instead of “24” for the **Primary D-Channel** field.

For the **Trunk Group for Channel Selection** field, enter the ISDN trunk group number from **Section 3.3**. Maintain the default values for the remaining fields, and submit these changes.

add signaling-group 62		Page 1 of 5
SIGNALING GROUP		
Group Number: 62	Group Type: isdn-pri	
Associated Signaling? y	Max number of NCA TSC: 0	
Primary D-Channel: 01B0824	Max number of CA TSC: 0	
	Trunk Group for NCA TSC:	
Trunk Group for Channel Selection: 62		
Supplementary Service Protocol: a		

3.5. Administer ISDN Trunk Group Members

Use the “change trunk-group n” command, where “n” is the trunk group number added in **Section 3.3**. Navigate to **Page 4** of the **TRUNK GROUP** screen, and enter an available port of the DS1 circuit pack into the **Port** field, and the corresponding **Code** and **Sfx** fields will be populated automatically. Enter the ISDN signaling group number from **Section 3.4** into the **Sig Grp** field as shown below.

Repeat this procedure for the desired number of trunk group members, which would be the same as the desired number of maximum simultaneous incoming PRI calls. For the compliance testing, five trunk group members are used, and hence five simultaneous incoming PRI calls. Submit these changes.

change trunk-group 62		Page 4 of 20	
TRUNK GROUP			
Administered Members (min/max): 1/5			
Total Administered Members: 5			
GROUP MEMBER ASSIGNMENTS			
Port	Code Sfx Name	Night Sig Grp	
1: 01B0801	TN464 G	62	
2: 01B0802	TN464 G	62	
3: 01B0803	TN464 G	62	
4: 01B0804	TN464 G	62	
5: 01B0805	TN464 G	62	
6:			
7:			

3.6. Administer Analog Stations

Use the “add station n” command, where “n” is an available extension number. Enter the following values for the specified fields, and retain the default values for the remaining fields. Submit these changes.

- **Type:** “2500”
- **Port:** Enter an available port on the Analog Line circuit pack.
- **Name:** Enter a descriptive name.

```

add station 29901                                     Page 1 of 3

                                STATION

Extension: 29901                                Lock Messages? n          BCC: 0
  Type: 2500                                Security Code:          TN: 1
  Port: 01B1301                        Coverage Path 1:          COR: 1
  Name: Analog Endpoint-1            Coverage Path 2:          COS: 1
                                Hunt-to Station:          Tests? y

STATION OPTIONS
  Loss Group: 1                                Message Waiting Indicator: none
  Off Premises Station? n

  Survivable COR: internal
  Survivable Trunk Dest? y
  
```

Repeat the “add station n” command to add the desired number of analog stations, which would be the same as the desired number of simultaneous calls. For the compliance testing, five analog stations were administered as shown below. When possible, use consecutive extension numbers for the analog stations, for ease of configuring Abacus 5000.

```

list station 29901 count 5
  
```

STATIONS							
Ext/ Type	Port/ Hunt-to	Name/ Surv GK NN	Move	Room/ Data Ext	Cv1/ Cv2	COR/ COS	Cable/ Jack
29901	01B1301	Analog Endpoint-1				1	
2500			no			1	
29902	01B1302	Analog Endpoint-2				1	
2500			no			1	
29903	01B1303	Analog Endpoint-3				1	
2500			no			1	
29904	01B1304	Analog Endpoint-4				1	
2500			no			1	
29905	01B1305	Analog Endpoint-5				1	
2500			no			1	

4. Configure Abacus 5000

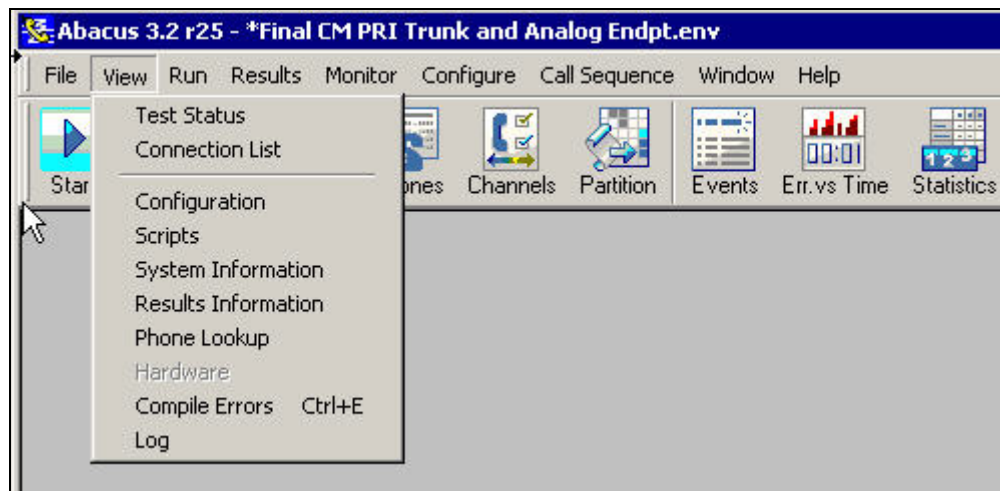
The procedures for configuring the originating ISDN and terminating analog interfaces on Abacus 5000 to interoperate with Avaya Communication Manager include the following areas:

- Verify system information
- Administer protocol selection
- Administer phones
- Administer channels
- Administer partitioning and timing
- Increase script holdoff threshold

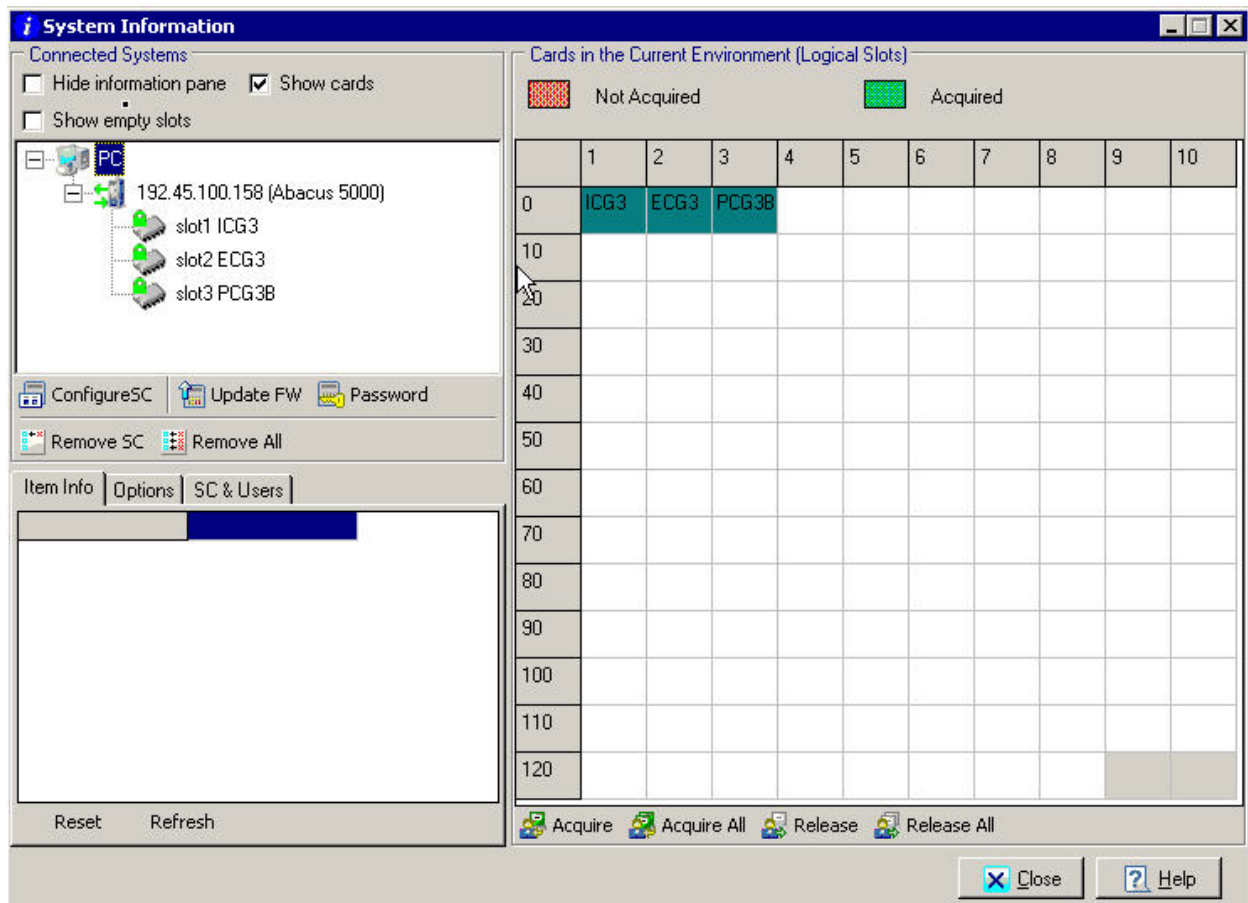
As part of the installation, the Abacus 5000 user interface software is installed on a standalone PC, and used to configure the IP address for the system and to connect to the system.

4.1. Verify System Information

From the PC running the Abacus 5000 user interface, navigate to **Start > Programs > Abacus 5000 > 3.2 > Abacus** to open the Abacus 5000 window. Select **View > System Information** from the main menu bar as shown below.



The **System Information** screen is displayed, and shows the cards that are available in the system. For the compliance testing, a PCG3B card is used to originate ISDN PRI calls over the ISDN trunks to Avaya Communication Manager, and an ECG3 card to terminate the calls to the analog stations from Avaya Communication Manager. Release any extra card by selecting the green grid that corresponds to the card in the right pane, in this case “ICG3”, and click on the **Release** button in the bottom of the pane to release the card. Repeat this procedure to release all extra cards.



Next, verify the license on each of the cards. Select the **ECG3** card in the directory pane in the upper left section of the window, and click on the **Options** tab in the lower left pane to view the available options the card supports. Verify that the **Call generation**, **PSQM\PSQM+** or **PESQ** options are enabled with a corresponding check mark in the **available** column.

The screenshot shows the 'System Information' window. On the left, under 'Connected Systems', a PC at 192.45.100.158 (Abacus 5000) is listed with three slots: slot1 ICG3, slot2 ECG3 (selected), and slot3 PCG3B. Below this are buttons for 'ConfigureSC', 'Update FW', 'Password', 'Remove SC', and 'Remove All'. The 'Options' tab is selected, showing a table of options and their availability.

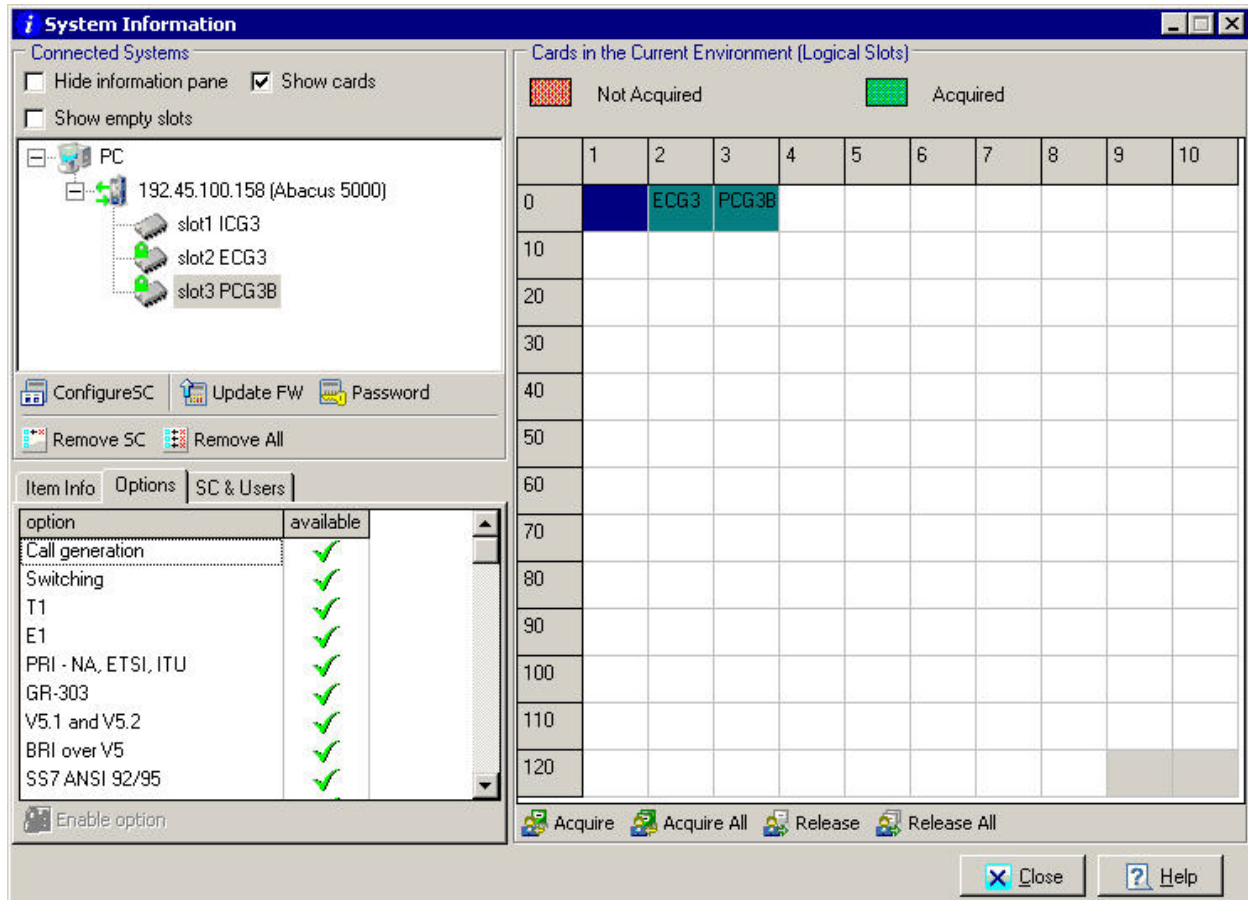
option	available
Call generation	✓
PSQM\PSQM+	✓
PESQ	✓
T.30 Fax to V.17	✓
Echo measurement	✓
V.34 Analog Data Modem	✓

At the bottom left of the Options pane is an 'Enable option' button. On the right, the 'Cards in the Current Environment (Logical Slots)' table shows the status of 11 slots (0-10). Slot 0 contains 'ECG3' and 'PCG3B'. Slots 1-10 are empty.

	1	2	3	4	5	6	7	8	9	10
0		ECG3	PCG3B							
10										
20										
30										
40										
50										
60										
70										
80										
90										
100										
110										
120										

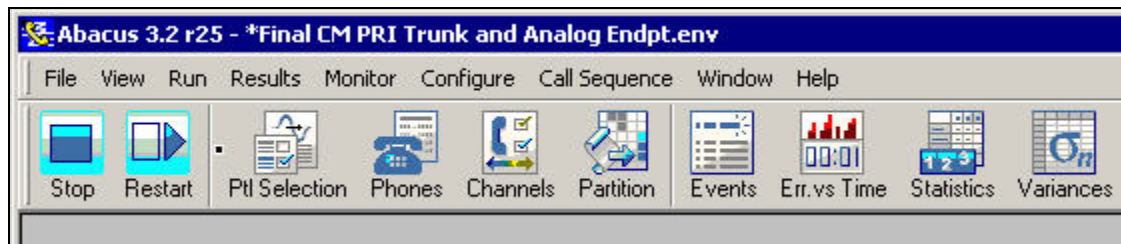
At the bottom right of the right pane are buttons: 'Acquire', 'Acquire All', 'Release', and 'Release All'. The bottom of the window has 'Close' and 'Help' buttons.

Select the **PCG3B** card in the directory pane in the upper left section of the window, and click on the **Options** tab in the lower left pane to view the available options the card supports. Verify that the **Call generation, T1 or E1, PRI – NA, ETSI, ITU** options are enabled with a corresponding check mark in the **available** column. Scroll down the lower left pane to also verify that the **PSQM/PSQM+ or PESQ Analysis** option is enabled (not shown below). After verifying the options on both of the cards, click on **Close**.



4.2. Administer Protocol Selection

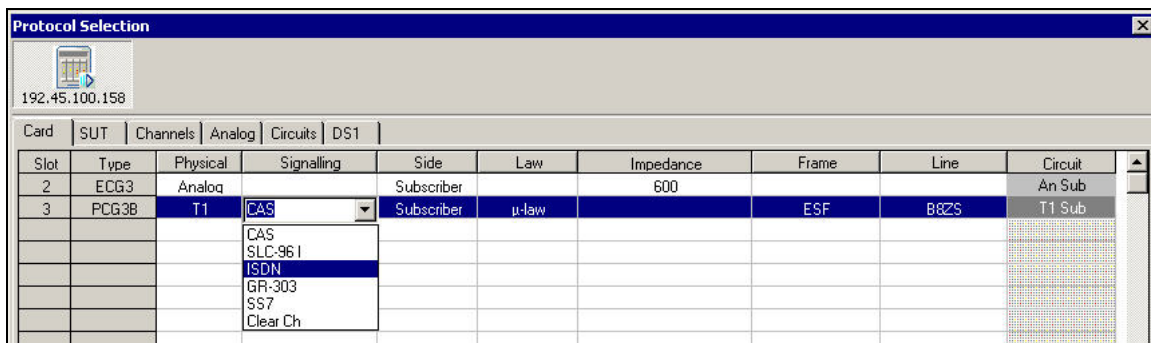
Click on the **Ptl Selection** icon from the main menu bar shown below.



4.2.1. Administer Protocol Selection Card

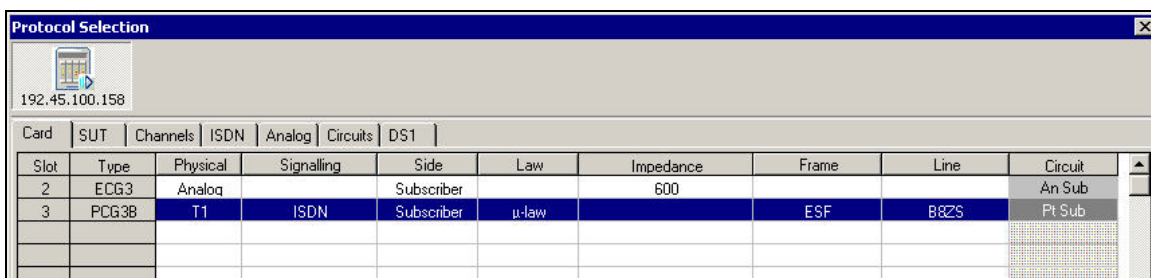
In the **Card** tab, right click in the **Signalling** field for the PCG3B card, and select the option **Select From List** from the drop down (not shown below). This sets the clicking option for all fields on this screen.

Left click on the same **Signalling** field. Select “ISDN” from the list, as shown below.



After the selection, the default value for the **Circuit** field will automatically be changed to “Pt Sub”. In addition, a new **ISDN** tab will be created automatically by Abacus 5000 and appears between the **Channels** and **Analog** tabs, as shown below.

Maintain the default values in the **SUT**, **Channels**, **ISDN**, and **Analog** tabs. Proceed to administer the **Circuits** tab.



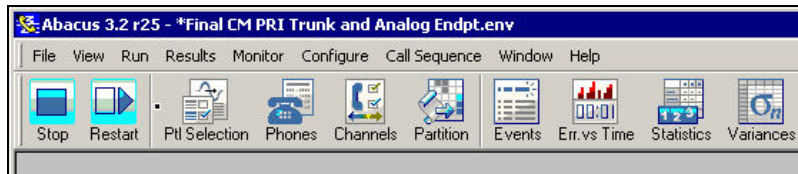
Select the **Circuits** tab. For the **ECG3** card, disable any unused circuits by selecting the corresponding grids and clicking on the **Disable Selected** button in the bottom of the screen. For the compliance testing, five circuits were used from the ECG3 card, each with a physical connection to a port on the Analog Line circuit pack on Avaya Communication Manager.

Maintain the default values in the **DS1** tab. Click on **OK** at the bottom of the screen to submit these changes.



4.3. Administer Phones

Click on the **Phones** icon from the main menu bar.



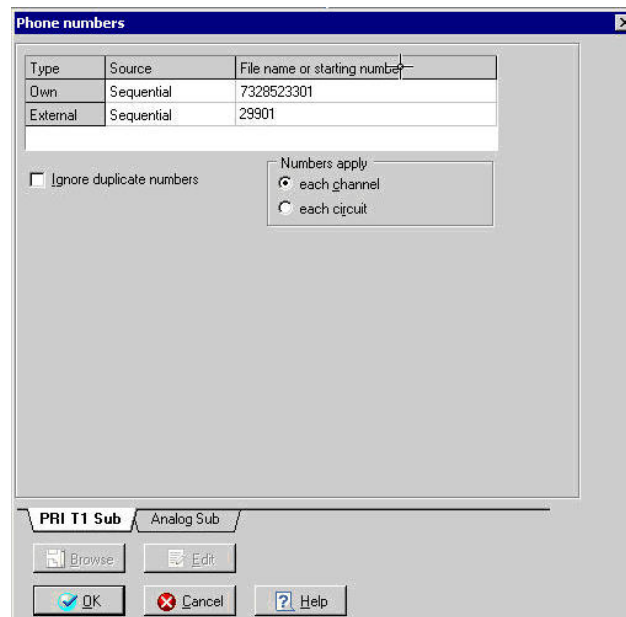
4.3.1. Administer Phones PRI

The **Phone numbers** screen is displayed. Select the **PRI T1 Sub** tab from the bottom of the screen, and administer telephone numbers for the originating PCG3B card. The **Own** row is used to administer the internal telephone numbers, and the **External** row is used to administer the external telephone numbers for the card to dial.

For the **Own** row, maintain the default value for the **Source** field. In the **File name or starting number** field, enter the desired starting digits to be passed to Avaya Communication Manager as calling party numbers.

For the **External** row, maintain the default value for the **Source** field. In the **File name or starting number** field, enter the starting analog station number from **Section 3.6**. Note that in the case that the analog station numbers are not sequential, the user needs to click on the corresponding **Source** field to select the option “File” to create a file for the external telephone numbers, and manually enter each analog station number into the file.

Maintain the default selection for the **Numbers apply** section, and click on the **Analog Sub** at the bottom of the screen.



4.3.2. Administer Phones Analog

The associated **Phone numbers** screen is displayed for the **Analog Sub** tab. The **Own** row is used to administer the internal telephone numbers, and the **External** row is used to administer the external telephone numbers for the card to dial out to.

For the **Own** row, maintain the default value for the **Source** field. In the **File name or starting number** field, enter the starting analog station number from **Section 3.6**. Note that in the case that the analog station numbers are not sequential, the user needs to click on the corresponding **Source** field to select the option “File” to create a file for the internal telephone numbers, and manually enter each analog station number into the file.

For the **External** row, maintain the default values, as the ECG3 card will not be dialing out to any numbers.

Click on **OK** at the bottom of the screen to submit these changes.

Type	Source	File name or starting number
Own	Sequential	29901
External	Sequential	5551001

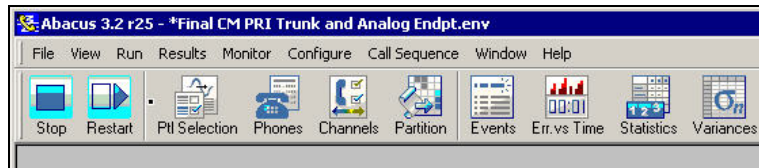
☐ Ignore duplicate numbers

PRI T1 Sub **Analog Sub**

Browse... Edit **OK** Cancel Help

4.4. Administer Channels

Click on the **Channels** icon from the main menu bar.

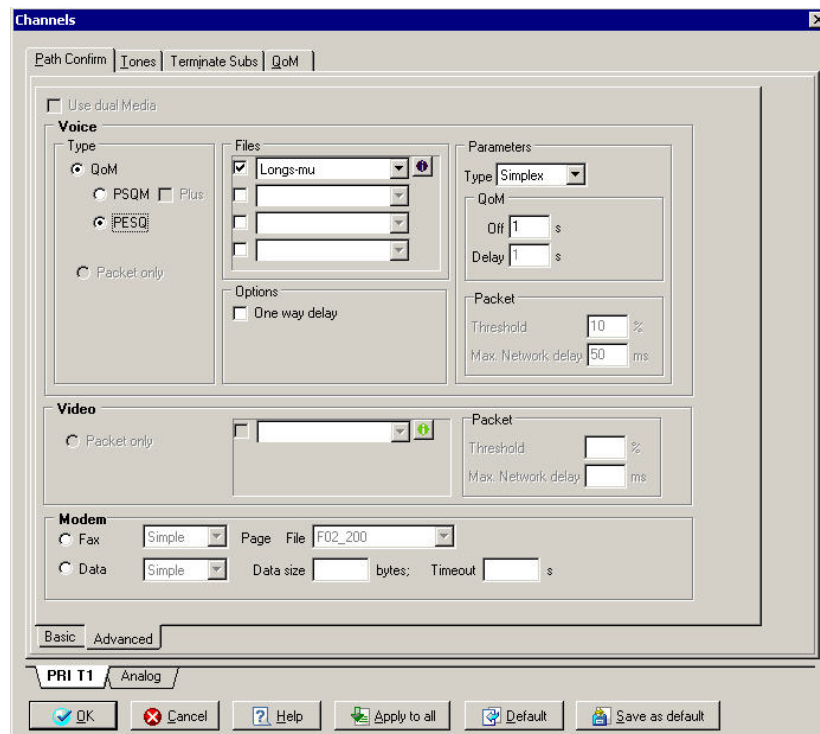


4.4.1. Administer Channels Path Confirm PRI

The **Channels** screen is displayed next. The **Path Confirm** tab is used to select the two-way speech verification mechanism for the originating and terminating channels for each call. The remaining tabs are not used and can retain the default values. Select the **Path Confirm** tab.

Select the **PRI T1** tab located at the bottom of the screen, followed by the **Advanced** sub tab. Select **QoM**, and **PESQ** in the **Voice** section of the screen. Retain the default values for all remaining fields.

Note that PSQM and PESQ are ITU standards P.861 and P.862 respectively for assessment of speech quality. PESQ is the more recent standard with a higher accuracy than PSQM, based on the comparison results published by the Audio Engineer Society Convention. If PSQM is optioned on the PCG3B and ECG3 cards instead of PESQ, then select **PSQM** and enable the **Plus** field. The "Longs-mu" file is a relatively longer WAV file to use for voice path confirmation, and other WAV files may be used.



4.4.2. Administer Channels Path Confirm Analog

Select the **Analog** tab located at the bottom of the screen, followed by the **Advanced** sub tab. Select **QoM**, and **PESQ** in the **Voice** section of the screen. Retain the default values for all remaining fields. Click on **OK** to submit these changes.

The screenshot shows the 'Channels' dialog box with the 'Path Confirm' tab selected. The 'Advanced' sub-tab is active. The 'Voice' section is configured with 'QoM' selected under 'Type', 'PESQ' selected under 'Files', and 'Simplex' selected under 'Parameters'. The 'Off' and 'Delay' values are both set to 1 second. The 'Packet' section shows a 'Threshold' of 10% and a 'Max. Network delay' of 50 ms. The 'Video' section has 'Packet only' selected. The 'Modem' section has 'Fax' selected with 'Simple' mode, 'Page File' set to 'F02_200', and 'Data size' set to 0 bytes with a 'Timeout' of 0 seconds. The 'Basic' and 'Advanced' tabs are visible at the bottom, with 'Advanced' being the active sub-tab. The 'PRI T1' tab is also visible. The 'OK', 'Cancel', 'Help', 'Apply to all', 'Default', and 'Save as default' buttons are at the bottom.

Channels

Path Confirm | Tones | Terminate Subs | QoM

☐ Use dual Media

Voice

Type

☒ QoM ☐ PSQM ☐ Plus

☒ PESQ

☐ Packet only

Files

☒ Longs-mu

☐

☐

☐

Options

☐ One way delay

Parameters

Type **Simplex**

QoM

Off **1** s

Delay **1** s

Packet

Threshold **10** %

Max. Network delay **50** ms

Video

☐ Packet only

☐

Packet

Threshold %

Max. Network delay ms

Modem

☐ Fax **Simple** Page File **F02_200**

☐ Data **Simple** Data size bytes; Timeout s

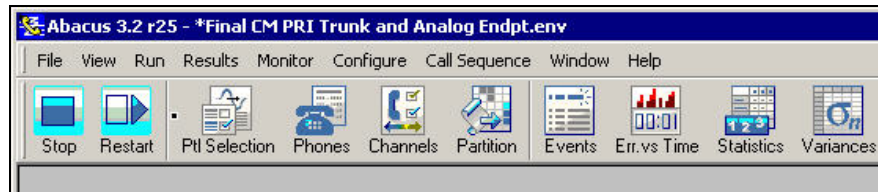
Basic Advanced

PRI T1 **Analog**

OK Cancel Help Apply to all Default Save as default

4.5. Administer Partitioning and Timing

Click on the **Partition** icon from the main menu bar.



4.5.1. Administer Association PRI

The **Partition and Timing** screen is displayed. Select the **Association** tab. Click on the **PRI T1 Subscriber: 23B + 1D** sub tab on the bottom left of the screen, and update the following fields:

- **From and To:** Update to reflect the range of B-channels used on the PCG3B card.
- **Total:** Field automatically updated by Abacus 5000.
- **Configuration:** “all originate”
- **Links:** “External”

In this case, five channels on the PCG3B card will be used to originate the ISDN PRI calls.

The “Default” value can be retained for the **Path Confirmation** field, as the path confirmation method has already been administered in **Section 4.4.1**.

Set	From	To	Total	Configuration	Toggle	Links	Path Confirmation	Attach
1 <input checked="" type="checkbox"/>	1	5	5	all originate		External	Default	
2 <input type="checkbox"/>								
3 <input type="checkbox"/>								
4 <input type="checkbox"/>								
5 <input type="checkbox"/>								
6 <input type="checkbox"/>								
7 <input type="checkbox"/>								
8 <input type="checkbox"/>								
9 <input type="checkbox"/>								
10 <input type="checkbox"/>								
11 <input type="checkbox"/>								
12 <input type="checkbox"/>								
13 <input type="checkbox"/>								
14 <input type="checkbox"/>								
15 <input type="checkbox"/>								

PRI T1 Subscriber: 23B+1D **Analog Subscriber: 5**

Map: ☐ Enable ☐ Contiguous ☐ Active terminates ☐ Attachments
☐ Non-contiguous ☒ Attachments

Phones: Sets:

Click on the **Analog Subscriber: 5** tab located on the bottom left of the screen. Enter the following values into the specified fields:

- **From and To:** Update to reflect the range of channels used on the ECG3 card.
- **Total:** Field automatically updated by Abacus 5000.
- **Configuration:** “all terminate”
- **Links:** “External”

In this case, five channels on the ECG3 card will be used to terminate the calls.

The “Default” value can be retained for the **Path Confirmation** field, as the path confirmation method has already been administered in **Section 4.4.2**.

[illegible]

4.5.3. Administer Timing and Scripts PRI

Select the **Timing and Scripts** tab. Click on the **PRI T1 Subscriber: 23B + 1D** sub tab on the bottom left of the screen, and update the **ST**, **SS**, **CL**, **IC**, and **CC** fields to the desired values. Below is a brief description of what each abbreviated field stands for from the Abacus 5000 documentation:

		Resolution	Maximum Time
ST	Start	1 second	1023 seconds
SS	Start to Start	0.1 second	99.9 seconds
CL	Call Length	1 second	99999 seconds
IC	Inter-Call	0.1 second	99.9 seconds
CC	Call to Call	1 second	1023 seconds

Note that the value for the **IC** (Inter-Call) field needs to be a minimum of “20” seconds, as this is the amount of time necessary to allow for proper tear down of calls to analog stations.

Select the script “A calls B (ISDN) and confirms for Call Length” for the **Script originate** field.

Partition and Timing

192.45.100.158

Association | **Timing and Scripts** | Protocols | Phones

Set	From	To	Total	ST	SS	CL	IC	CC	BHCA	Script originate	Script terminate
1 <input checked="" type="checkbox"/>	1	5	5	0	1	40	20	60		A calls B (ISDN) and confirms for Call Length	Default
2 <input type="checkbox"/>											
3 <input type="checkbox"/>											
4 <input type="checkbox"/>											
5 <input type="checkbox"/>											
6 <input type="checkbox"/>											
7 <input type="checkbox"/>											
8 <input type="checkbox"/>											
9 <input type="checkbox"/>											
10 <input type="checkbox"/>											
11 <input type="checkbox"/>											
12 <input type="checkbox"/>											
13 <input type="checkbox"/>											
14 <input type="checkbox"/>											
15 <input type="checkbox"/>											

PRI T1 Subscriber: 23B+1D | Analog Subscriber: 5

Map: ☐ Enable | Map

Channels: ☒ Contiguous | ☐ Active terminates
☐ Non-contiguous | ☐ Attachments

Phones: Address Book

Sets: Delete | Idy | Insert

OK | Cancel | Help | Split | Profile | Script | Edit Action | PathConf

4.5.4. Administer Timing and Scripts Analog

Click on the **Analog Subscriber: 5** sub tab located on the bottom left of the screen, and update the **CL** field to the desired value.

Maintain the default values in the **Protocols** and **Phones** tabs. Click on **OK** at the bottom of the screen to submit these changes.

Set	From	To	Total	ST	SS	CL	IC	CC	BHCA	Script originate	Script terminate
1 <input checked="" type="checkbox"/>	1	5	5	0	1	40	10	80		A calls B (DTMF) and confirms for Call Length	Default
2 <input type="checkbox"/>											
3 <input type="checkbox"/>											
4 <input type="checkbox"/>											
5 <input type="checkbox"/>											

PRI T1 Subscriber: 23B+1D **Analog Subscriber: 5**

Map: ☐ Enable Map

Channels: ☒ Contiguous ☐ Active terminates
☐ Non-contiguous ☐ Attachments

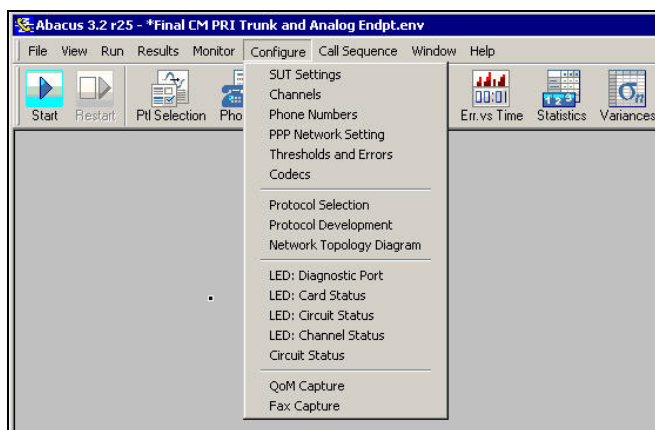
Phones: Address Book

Sets: Delete Idy Insert

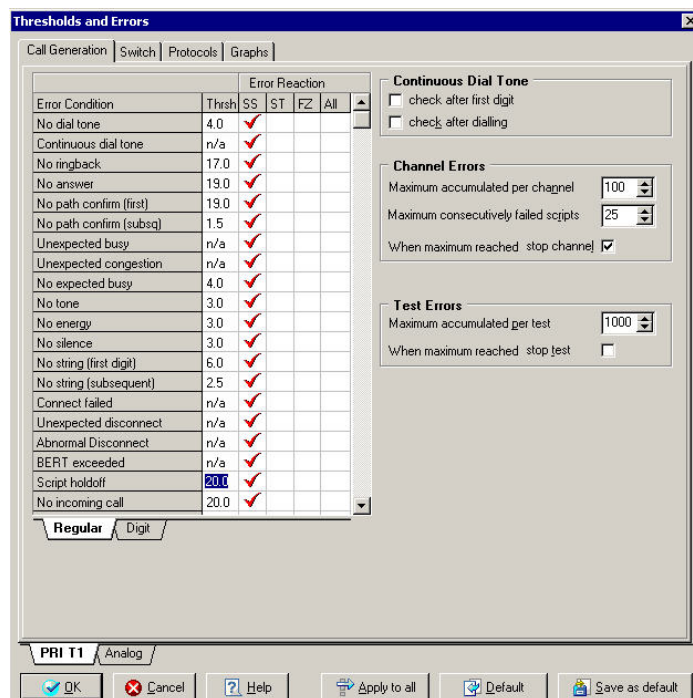
OK Cancel Help Split Profile Script Edit Action PathConf

4.6. Increase Script Holdoff Threshold

A script holdoff error can occur when the protocol has not reached the answer state within the threshold value, and occasionally an analog channel may take longer than 10 seconds to reach the answer state. For the compliance testing, the script holdoff threshold was increased to 20 seconds to minimize this random error. Select **Configure > Thresholds and Errors** from the main menu bar, to increase the threshold value for the script holdoff parameter.



The **Thresholds and Errors** screen is displayed. Click on the **PRI T1** tab at the bottom left of the screen, followed by the **Regular** sub tab. In the **Error Condition** column, locate the **Script holdoff** parameter and change the corresponding value in the **Thrsh** column from “10.0” to “20.0”, as shown below. Repeat this procedure for the **Analog** tab, and click **OK** at the end to submit the changes.



5. Interoperability Compliance Testing

The interoperability compliance testing focused on the following areas:

- Generation of moderate ISDN PRI telephony load to Avaya Communication Manager via the ISDN trunk interface, and back out to Abacus 5000 via the analog station interface.
- Voice quality as measured by PESQ scores with path confirmation.
- Recovery from adverse conditions during the load test.

5.1. General Test Approach

The feature test cases were conducted by using Abacus 5000 to originate ISDN PRI calls to Avaya Communication Manager, and to terminate the calls to analog stations on Abacus 5000. The serviceability test cases were performed by disconnecting and reconnecting the physical cables to the Abacus 5000 originating PCG3B and terminating ECG3 cards.

The verification included monitoring the various reports from Abacus 5000 during and after the test runs, and checking the status of various ISDN and analog resources on Avaya Communication Manager.

5.2. Test Results

All test cases that were executed were passed.

6. Verification Steps

This section provides the tests that can be performed to verify proper configuration of ISDN and analog interfaces between Avaya Communication Manager and Abacus 5000.

6.1. Verify Avaya Communication Manager

Verify the status of the ISDN trunk group by using the “status trunk n” command, where “n” is the trunk group number administered in **Section 3.3**. While the trunks are connected with active calls, verify the **Service State** for each connected trunk is “in-service/active” as shown below.

```
status trunk 62
```

TRUNK GROUP STATUS				
Member	Port	Service State	Mtce Connected Ports Busy	
0062/001	01B0801	in-service/active	no	01B1301
0062/002	01B0802	in-service/active	no	01B1302
0062/003	01B0803	in-service/active	no	01B1303
0062/004	01B0804	in-service/active	no	01B1304
0062/005	01B0805	in-service/active	no	01B1305

Verify the status of the ISDN signaling group by using the “status signaling-group n” command, where “n” is the signaling group number administered in **Section 3.4**. Verify that the signaling group is “in-service” as indicated in the **Group State** field shown below.

```
status signaling-group 62
```

STATUS SIGNALING GROUP	
Group ID: 62	Active NCA-TSC Count: 0
Group Type: isdn-pri	Active CA-TSC Count: 0
Signaling Type: facility associated signaling	
Group State: in-service	
Primary D-Channel	
Port: 01B0824	Level 3 State: in-service
Secondary D-Channel	
Port:	Level 3 State: no-link

Verify the status of a connected analog station during an active call using the “status station n” command, where “n” is the extension of the connected station. On **Page 1**, verify the **Service State** is “in-service/off-hook”. Also verify the analog station is connected to an ISDN trunk, as shown below in the **Connected Ports** field.

```
status station 29901                                     Page 1 of 4

                                GENERAL STATUS
Administered Type: 2500                                Service State: in-service/off-hook
Connected Type: N/A                                    Parameter Download: not-applicable
Extension: 29901                                       SAC Activated? no
Port: 01B1301                                         User Cntrl Restr: none
Call Parked? no                                       Group Cntrl Restr: none
Ring Cut Off Act? no                                 CF Destination Ext:
Active Coverage Option: 1

EC500 Status: N/A                                     Off-PBX Service State: N/A
Message Waiting:
Connected Ports: 01B0801

                                HOSPITALITY STATUS
                                Awaken at:
                                User DND: not activated
                                Group DND: not activated
                                Room Status: non-guest room
```

On **Page 3**, verify the analog station and the connected ISDN trunk have a talk path.

```
status station 29901                                     Page 3 of 4

                                SRC PORT TO DEST PORT TALKPATH
src port: 01B1301
01B1301:TX:tdm:a198
01B0801:RX:tdm:a198

dst port: 01B0801
```

Verify the status of a connected ISDN trunk by using the “status trunk x/y”, where “x” is the number of the ISDN trunk group from **Section 3.3** and “y” is the member number of a connected trunk. On **Page 1**, verify the **Service State** is “in-service/active”. Also verify the ISDN trunk is connected to an analog station, as shown below in the **Connected Ports** field.

```
status trunk 62/1                                     Page 1 of 2
                                     TRUNK STATUS

Trunk Group/Member: 0062/001           Service State: in-service/active
Port: 01B0801                         Maintenance Busy? no
Signaling Group ID: 62                 CA-TSC state: none

Connected Ports: 01B1301

Video:
Video Codec:

Authentication Type: None
```

On **Page 2**, verify the ISDN trunk and the connected analog station have a talk path.

```
status trunk 62/1                                     Page 2 of 2
                                     SRC PORT TO DEST PORT TALKPATH

src port: 01B0801
01B0801:TX:tdm:a233
01B1301:RX:tdm:a233

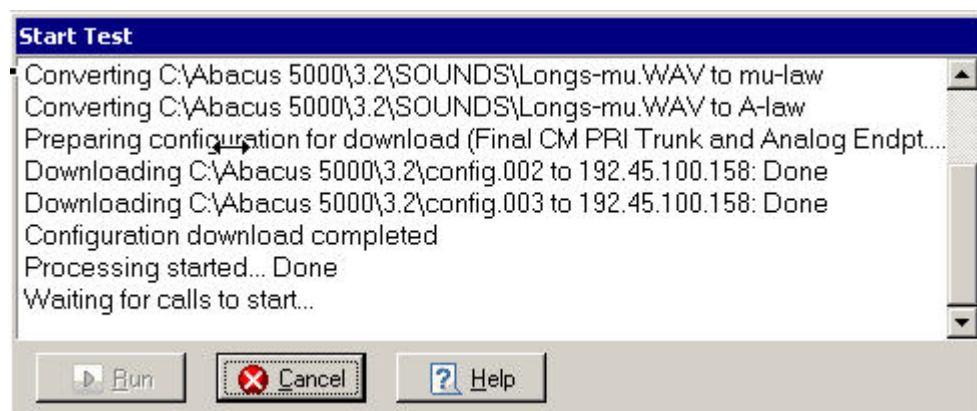
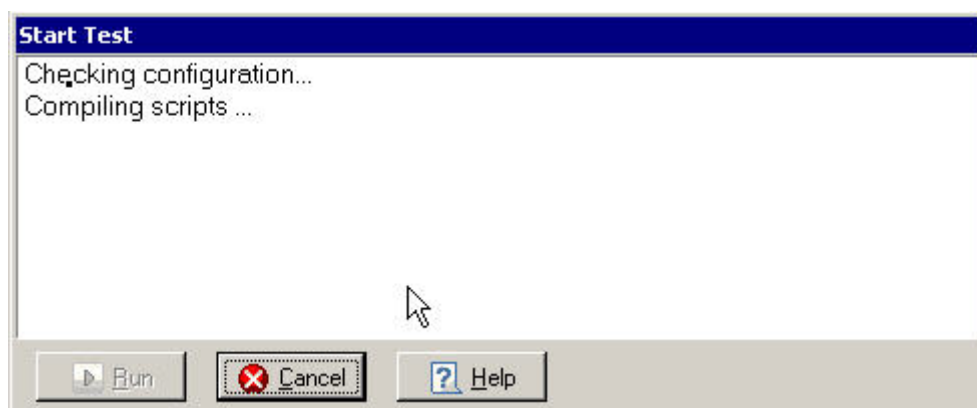
dst port: 01B1301
```

6.2. Verify Abacus 5000

Click on the **Start** icon from the main menu bar.

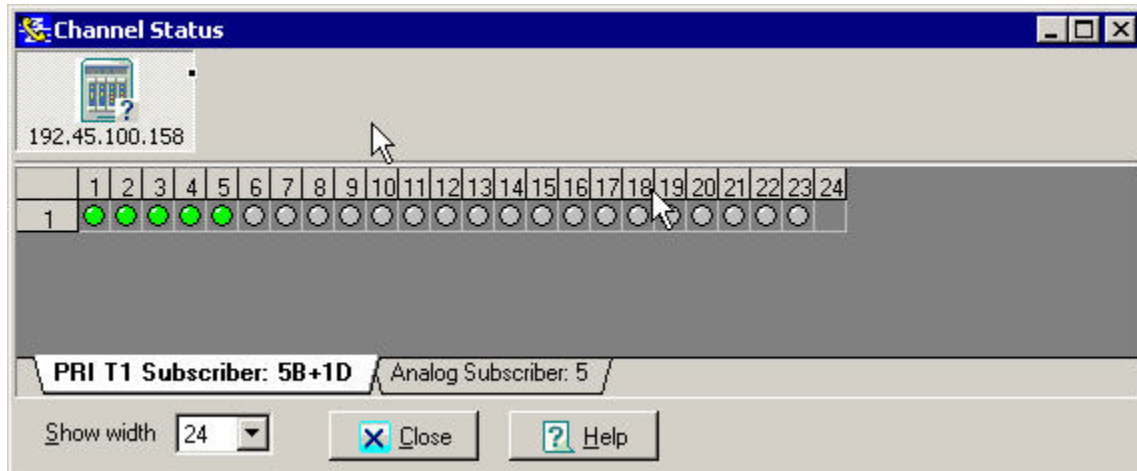


Verify that the scripts can be compiled successfully without any errors, as shown in the screens below.

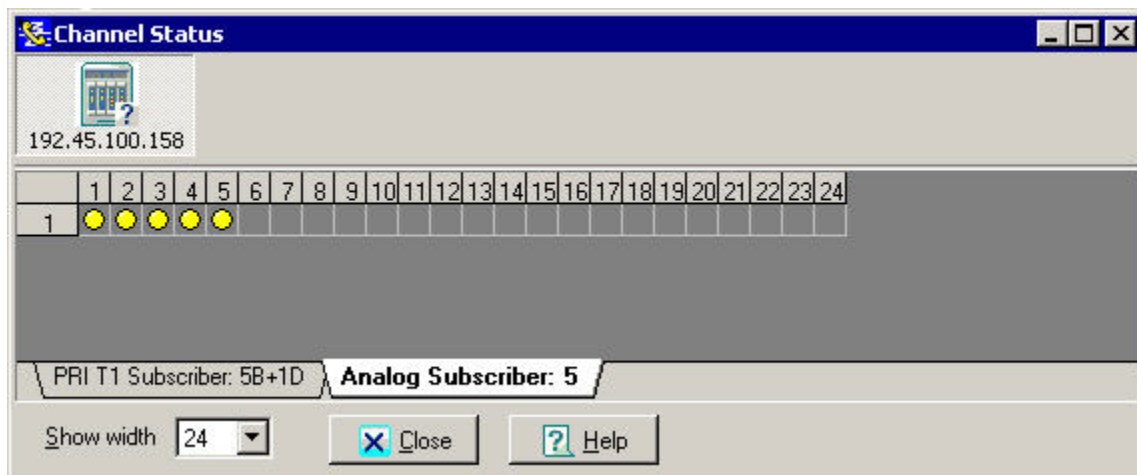


Verify the channel status by clicking on the **Channel Status** icon from the main menu bar.

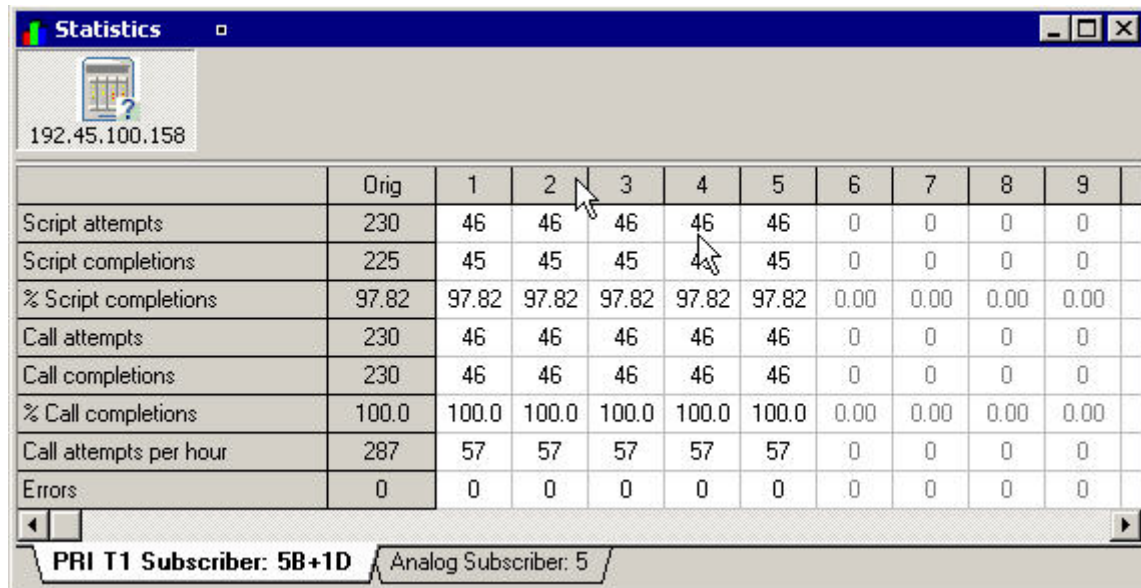
Click on the **PRI T1 Subscriber: 5B+1D** tab. When the calls have been established, then the color code for the originating channels 1-5 will turn green, as shown below.



Click on the **Analog Subscriber: 5** tab. When the calls have been established, then the color code for the terminating channels 1-5 will turn yellow, as shown below.



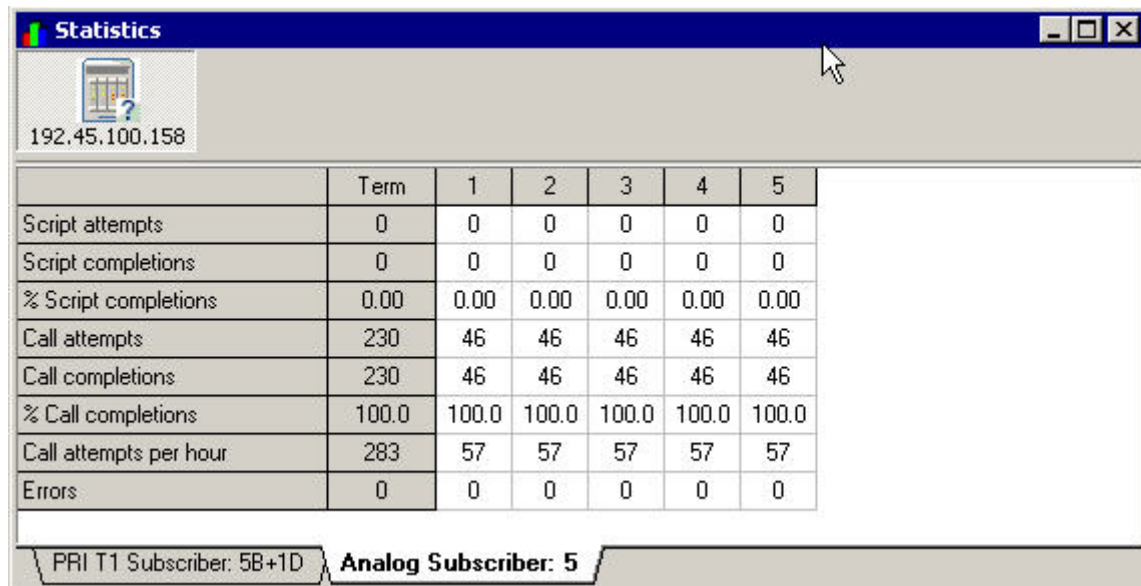
Verify the statistics by clicking on the **Statistics** icon from the main menu bar. In the **Statistics** screen displayed below for the **PRI T1 Subscriber: 5B + 1D** tab, look for **Script attempts**, **Script completions**, and the absence of any **Errors**. The **Statistics** screen below was captured during a test run, therefore the number in the **Script completions** fields shown are one behind the number in the **Script attempts** fields.



The screenshot shows a window titled "Statistics" with a toolbar and a status bar. The status bar indicates "PRI T1 Subscriber: 5B+1D" and "Analog Subscriber: 5". The main area contains a table with 11 columns: Orig, 1, 2, 3, 4, 5, 6, 7, 8, 9, and a blank column. The data is as follows:

	Orig	1	2	3	4	5	6	7	8	9	
Script attempts	230	46	46	46	46	46	0	0	0	0	
Script completions	225	45	45	45	45	45	0	0	0	0	
% Script completions	97.82	97.82	97.82	97.82	97.82	97.82	0.00	0.00	0.00	0.00	
Call attempts	230	46	46	46	46	46	0	0	0	0	
Call completions	230	46	46	46	46	46	0	0	0	0	
% Call completions	100.0	100.0	100.0	100.0	100.0	100.0	0.00	0.00	0.00	0.00	
Call attempts per hour	287	57	57	57	57	57	0	0	0	0	
Errors	0	0	0	0	0	0	0	0	0	0	

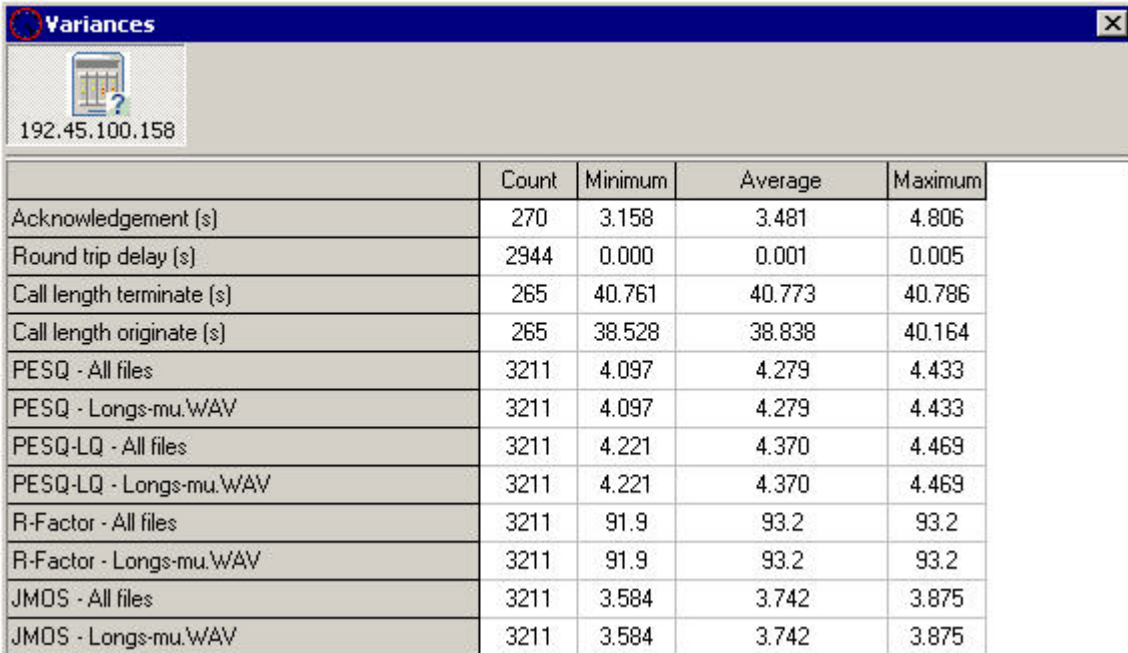
Click on the **Analog Subscriber: 5** tab on the bottom of the screen to view the statistics associated with the analog subscribers. Look for **Call attempts**, **Call completions**, and the absence of any **Errors**.



The screenshot shows the same "Statistics" window, but the status bar now indicates "Analog Subscriber: 5". The table has 7 columns: Term, 1, 2, 3, 4, 5, and a blank column. The data is as follows:

	Term	1	2	3	4	5	
Script attempts	0	0	0	0	0	0	
Script completions	0	0	0	0	0	0	
% Script completions	0.00	0.00	0.00	0.00	0.00	0.00	
Call attempts	230	46	46	46	46	46	
Call completions	230	46	46	46	46	46	
% Call completions	100.0	100.0	100.0	100.0	100.0	100.0	
Call attempts per hour	283	57	57	57	57	57	
Errors	0	0	0	0	0	0	

Verify the variances by clicking on the **Variances** icon from the main menu bar. In the **Variances** screen displayed below, look for **PESQ** scores. PESQ scores range from -0.5 to 4.5, where 4.5 indicates there is no perceptible difference between the original speech sample and the degraded signal.



	Count	Minimum	Average	Maximum
Acknowledgement (s)	270	3.158	3.481	4.806
Round trip delay (s)	2944	0.000	0.001	0.005
Call length terminate (s)	265	40.761	40.773	40.786
Call length originate (s)	265	38.528	38.838	40.164
PESQ - All files	3211	4.097	4.279	4.433
PESQ - Longs-mu.WAV	3211	4.097	4.279	4.433
PESQ-LQ - All files	3211	4.221	4.370	4.469
PESQ-LQ - Longs-mu.WAV	3211	4.221	4.370	4.469
R-Factor - All files	3211	91.9	93.2	93.2
R-Factor - Longs-mu.WAV	3211	91.9	93.2	93.2
JMOS - All files	3211	3.584	3.742	3.875
JMOS - Longs-mu.WAV	3211	3.584	3.742	3.875

7. Support

Technical support on Spirent Abacus 5000 can be obtained through the following:

- Email the Spirent support center via support@spirentcom.com.
- Call the Spirent support center at 1-800-SPIRENT.

8. Conclusion

These Application Notes describe the configuration steps required for Spirent Abacus 5000 Release 3.2 to successfully interoperate with Avaya Communication Manager 3.0.1 using the ISDN PRI and analog interfaces. All feature and serviceability test cases that were executed completed successfully.

9. Additional References

This section references the product documentation relevant to these Application Notes.

- *Administrator Guide for Avaya Communication Manager*, Document 03-300509, Issue 1, June 2005, available at <http://support.avaya.com>
- *Abacus 5000 IP Telephony Migration Test System*, available from the Spirent Abacus 5000 Version 3.2 Installation CD.

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