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ADTRAN

Configuration Guide

NetVanta 7000 Series Trunk Accounts

Trunks are digital or analog subscriber lines delivered by service providers that allows communication devices to connect to the outside world. The NetVanta 7000 series support analog, T1-RBS, T1-ISDN PRI, and SIP trunks (covered in the *NetVanta 7000 Series SIP Trunking Config Guide*). For detailed information regarding other voice features, refer to the *AOS Documentation* CD shipped with your AOS unit or visit our website at www.adtran.com.

This guide consists of the following sections:

Trunk Overview

> **NOTE** *While navigating the Web-based graphical user interface (GUI) you will notice (question mark symbols) that indicate additional information is available. Simply place your cursor over the symbol to view the additional information.*

> **WARNING** *Updated configuration must be saved to nonvolatile memory (NVRAM) to retain changes after a loss of power or a reboot. To quickly save your configuration at any time while in the GUI, select* **Save** *at the top right of your current menu.*

The illustration below is an example of various trunk connected to a NetVanta 7000 Series device.

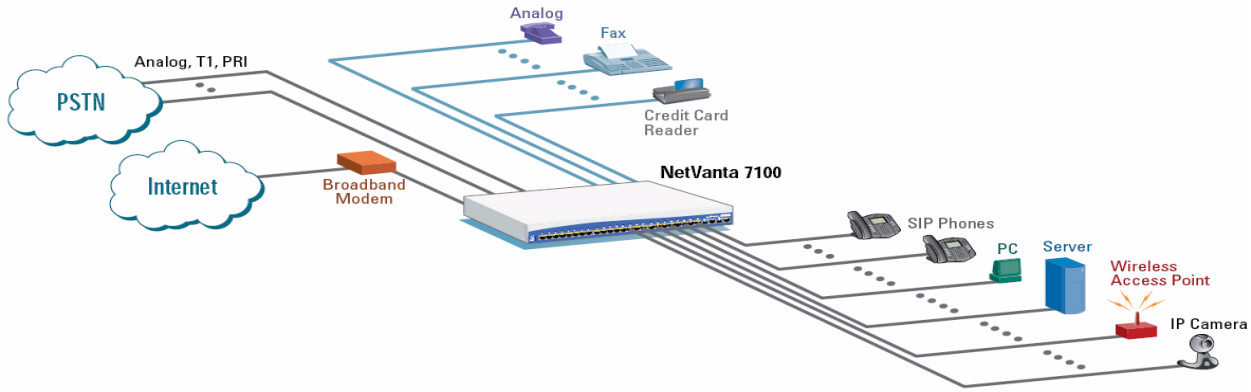


Figure 1. Example Application

Hardware and Software Requirements and Limitations

AOS firmware version A.1 or later is recommended on your NetVanta 7000 series in order to use the latest trunk features.

> **NOTE** *The default router configuration is loaded in the unit prior to factory release. Confirm that your router's Ethernet interfaces and IP addresses are configured properly. Standard router configuration must be done before continuing with the (Session Initiation Protocol (SIP) voice configuration.*

> **NOTE** *The configuration parameters used in the example are for instructional purposes only. Please replace all example settings with specific parameters to configure your application. For detailed information on specific settings, refer to the* ***Settings and Description*** *sections following each menu.*

Refer to following configuration guides available on your **AOS Documentation CD** shipped with your AOS unit or on ADTRAN's Knowledge Base at http://kb.adtran.com for more information about associated features:

- *Source and ANI Based Routing*
- *Enhanced ANI Substitution*
- *System Mode*
- *Voice Traffic over SIP Trunks*

Configuring Analog Trunks

To configure analog trunks, you must first configure the foreign exchange office (FXO) physical interface. By default, the FXO interfaces are enabled. Use the **Physical Interfaces** menu but to verify the status on the interface.

Configuring the FXO Physical Interface

1. From the main menu, navigate to the **System > Physical Interfaces** menu to display a list of physical interfaces.
2. Select the FXO interface that provides a trunk line to the system.

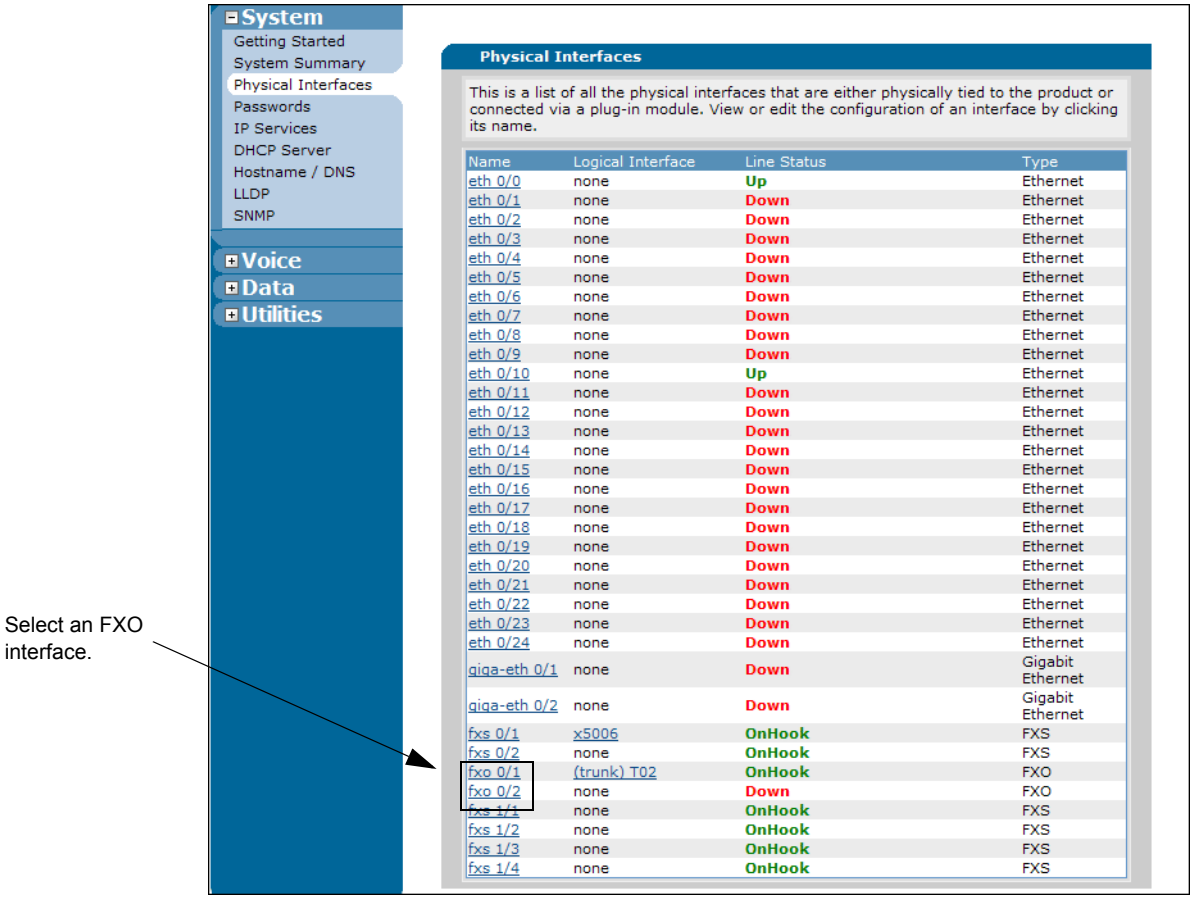


Figure 2. Physical Interfaces Menu

Settings and Descriptions

Name displays a user-selectable text description of the physical interface.

Logical Interface displays a user-selectable text description that is linked to the physical interface.

Line Status displays the network status of the physical interface.

Type displays the technical type of the physical interface.

3. Configure the FXO interface and select **Apply** to apply the settings.

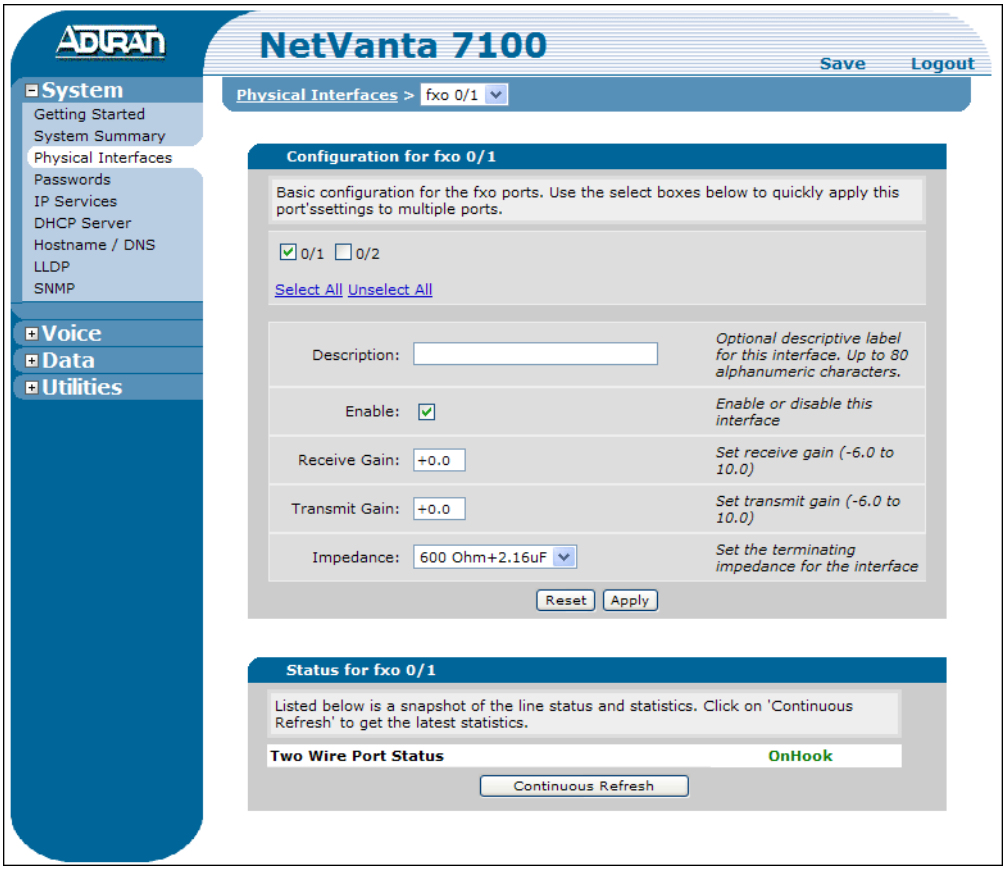


Figure 3. Physical Interfaces Menu (FXO)

Settings and Descriptions

Description (optional) specifies a descriptive label for this interface up to 80 alphanumeric characters.

Enable enables or disables this interface using the check box.

Receive Gain specifies the receive gain (-6.0 to 10.0 dB) to adjust the receiver sensitivity. Receive gain determines the amplification of the received signal before transmission from the FXO interface. By default, the receive gain is +0.0 dB. Adjusting the receiver sensitivity can improve the quality of the voice signals.

Transmit Gain specifies the transmit gain (-6.0 to 10.0 dB). Transmit gain determines the amplification of the received signal before transmission from the FXO interface toward the network. By default, the transmit gain is +0.0 dB. Increasing the value will increase the volume of the signal being transmitted. Adjusting the amplification of the received voice signal can improve the quality of the voice signals received at the remote site.

Impedance specifies the terminating AC impedance for the 2-wire interface. The following are valid settings:

- 600 Ω + 2.16 µF
- 600 Ω real
- 900 Ω + 2.16 µF
- 900 Ω real
- Rs 220 Ω, Rp 820 Ω, Cp 115 µF
- Rs 270 Ω, Rp 750 Ω, Cp 150 µF
- Rs 270 Ω, Rp 750 Ω, Cp 150 µF, Zin 600r
- 320 Ω, Rp 1050 Ω, Cp 230 µF
- Rs 350 Ω, Rp 1000 Ω, Cp 210 µF, Zin 600r
- Rs 370 Ω, Rp 620 Ω, Cp 310 µF
- Rp 800 Ω, Rs 100 Ω, Cs 50 µF

The default setting is 600 Ω + 2.16 µF. The unit may require a different setting to correct echo issues. Refer to the *Echo Return Loss Measurement Guide* on ADTRAN's Knowledge Base at http://kb.adtran.com/article.asp?article=2345&p=2.

Configuring the Analog Trunk Account

A trunk account must be created in order to make and receive calls. Create the trunk account and assign the FXO port, making sure the analog FXO settings (trunk number, supervision, etc.) match the parameters set by your service provider.

1. From the main menu, navigate to **Voice > Trunks > Trunk Accounts** to access the **Add / Modify / Delete Trunk Accounts** menu. Enter the desired **Trunk Name**, and select **Analog** as the **Type** for this trunk. The **Supervision** setting should be provided by your service provider. Leave **Role** at the default setting **User** (**Network** is not valid for analog trunks). Select the **Add** button to add the trunk account to the unit and the **Edit Trunk** menu will appear.

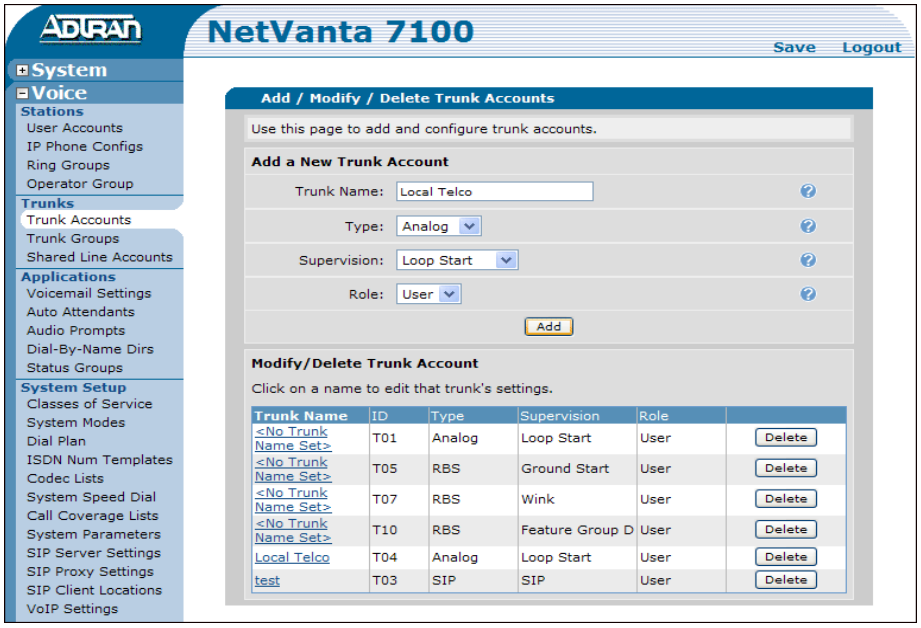


Figure 4. Trunk Accounts Menu (Analog)

Settings and Descriptions

Trunk Name specifies a name for this trunk. This is typically the assigned directory number of the associated trunk.

Type specifies the type of trunk to create.

Supervision specifies the type of signaling on the incoming trunk. Obtain this setting from the service provider of the analog trunk.

Role specifies the type of line termination for this trunk.

> **User** terminates the line at the provider (i.e., the unit acts as a user). Analog trunks can only be terminated in the **User** role.
>
> **Network** terminates the line at the unit (i.e., the unit acts as the network). Use **Network** role for configuring trunks that transmit out to a DSX port (not valid for analog trunks).

2. Edit the **Trunk Account Information** to match the settings given by your service provider.

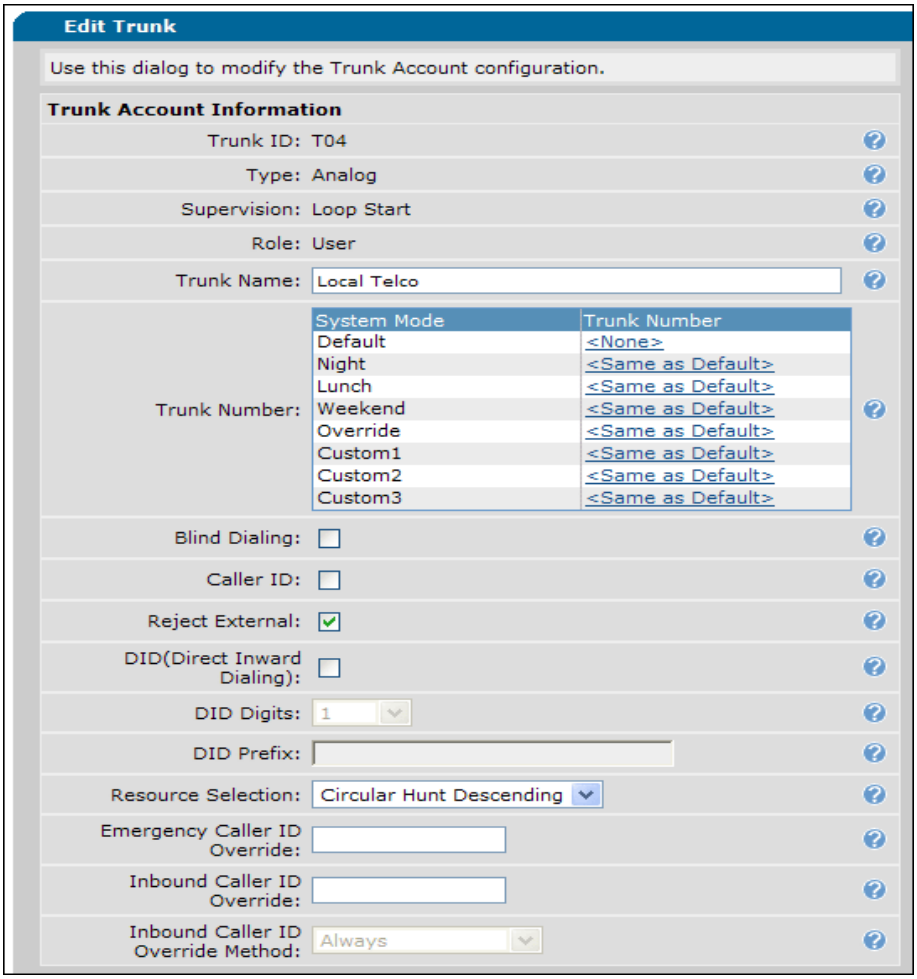


Figure 5. Edit Trunk Menu (Analog)

Settings and Descriptions

Trunk Name specifies a name for this trunk.

Trunk Number routes inbound calls to this number when direct inward dialing (DID) is disabled on this trunk. The **Trunk Number** can route calls to a particular target extension, auto attendant menu, operator group, or ring group, and controlled based on the time of day of the week using the system mode scheduler.

Blind Dialing enables calls that can be dialed even without the presence of a dial tone.

Caller ID displays inbound caller ID on this trunk.

Reject External rejects trunk-to-trunk calls.

DID (Direct Inward Dialing) enables DID for the trunk account. This option is only supported if DID and Dialed Number Identification Service (DNIS) is provided on the trunk.

DID Digits specifies the number of inbound DID digits expected on this trunk. The valid range is **1** to **16**.

DID Prefix adds a prefix to the DID digits received on this trunk. The valid range is **0** to **9**. No special characters are allowed.

Resource Selection specifies how resources will be used by the switchboard for outbound calls made on this trunk.

> NOTE
>
> *Resource Selection is **not** a valid setting for shared line account (SLA) trunks. Each SLA uses one port on an FXO trunk. Refer to the **Shared Line Account over Analog Trunks** configuration guide available on your **AOS Documentation CD** shipped with your AOS unit or online at www.adtran.com for more information about SLA configuration.*

Linear Hunt Ascending accepts calls on the lowest number DS0 or port that is available in this group at the time the call is received.

Linear Hunt Descending accepts calls on the highest number DS0 or port that is available in this group at the time the call is received.

Circular Hunt Ascending (default) distributes calls evenly among available DS0s or ports in this group beginning at the lowest numbered DS0 or port.

Circular Hunt Descending distributes calls evenly among available DS0s or ports in this group beginning at the highest numbered DS0 or port.

Emergency Caller ID Override configures the caller ID number on outbound emergency calls to be overridden with the specified value (on this trunk).

Inbound Caller ID Override configures the caller ID number on inbound calls to be overridden with the specified value (on this trunk).

Inbound Caller ID Override Method configures the caller ID override method.

Only If Not Present inserts the caller ID override value, only if no caller ID information is present in the call information.

Always replaces caller ID information with the configured caller ID override value.

3. At the bottom of the **Edit Trunk** menu (see Figure 5 on page 7), select the **Port** tab. Select the **Assign Ports** button.

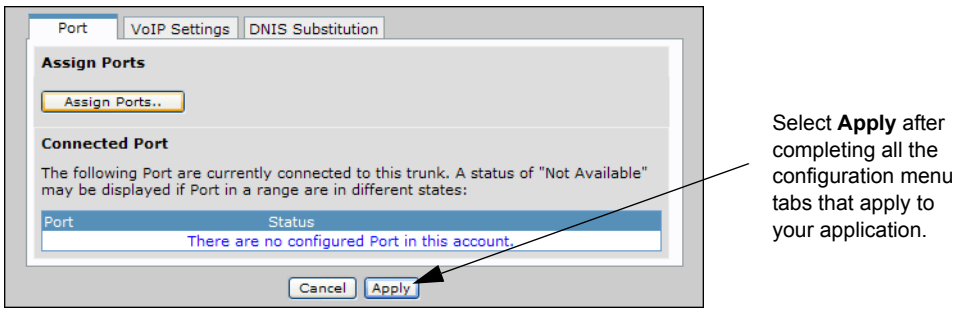


Figure 6. Port Tab

4. Select one FXO interface to add to the trunk account. Select **Add Ports** to apply the setting and return to the **Edit Trunk** menu. Select **Apply** to apply the settings or proceed to the **VoIP Settings** tab.

> NOTE
>
> *Add only one FXO port per trunk account. To configure a hunt group, add multiple trunk accounts in the trunk group configuration by adding trunk group members. Refer to the* ***Configuring the Analog Trunk Group*** *on page 12 for more information.*

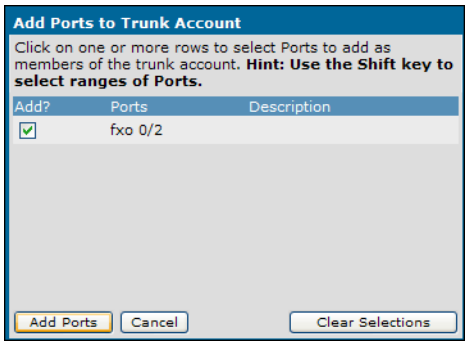


Figure 7. Add Ports to Trunk Account Menu

5. Optional. At the bottom of the **Edit Trunk** menu (see Figure 5 on page 7), select the **VoIP Settings** tab. Edit the user's Voice over Internet Protocol (VoIP) and Realtime Transport Protocol (RTP) settings. Select **Apply** to apply the settings or proceed to the **DNIS Substitution** tab.

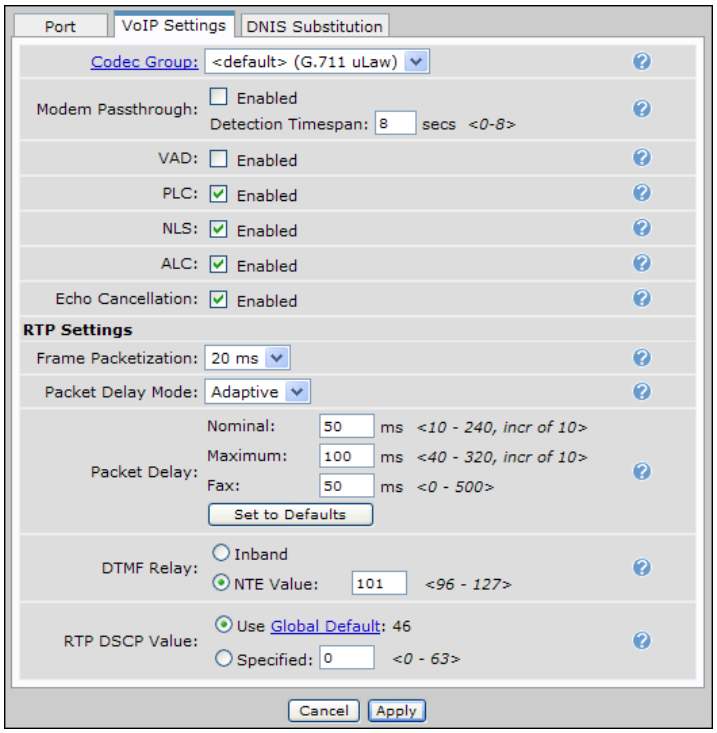


Figure 8. VoIP Settings Tab

Settings and Descriptions

Codec Group specifies the coder-decoder (CODEC) group to use for analog trunks.

Modem Passthrough renegotiates automatically with the far end to be modem compatible if the unit detects a modem or fax tone (switches to G.711, all voice improvements are turned off, packet delay is set to fax).

VAD transmits only audible speech over the network (not silence). Voice activity detection (VAD) slightly degrades the sound quality, but the connection uses much less bandwidth.

PLC enables packet loss concealment (PLC). When enabled, the unit will try to reconstruct sound lost from dropped packets.

NLS enables the echo canceller's non-linear suppression (NLS). When enabled, acoustic echo should be reduced.

ALC enables the automatic leveling control (ALC). When enabled, ALC reduces received RTP signals to a predefined level.

Echo Cancellation cancels reflected noise from the transmitted voice signal. Normally, echo cancellation should only be disabled if the voice station is connected to a fax machine or modem.

Frame Packetization selects the number of audio samples in milliseconds (1 frame/sample is 10 ms) included in a single RTP packet.

Packet Delay Mode configures the operation mode of the jitter buffer for VoIP calls on this trunk account.

Adaptive starts the buffer's delay at the nominal delay setting and increases it up to the delay setting if it detects that an unacceptable number of packets are being discarded due to jitter. Conversely, the buffer will decrease the amount of delay if it can afford to.

Fixed causes the buffer's delay to remain at the nominal setting at all times.

Packet Delay configures various packet delay settings for this account.

Nominal specifies the nominal packet delay mode. For voice calls, the nominal delay value represents the desired amount of packet delay. In **Adaptive** mode, the buffer may increase this value up to the maximum delay. In **Fixed** mode, the delay is constantly set at this value.

Maximum specifies the maximum packet delay mode. For voice calls, the maximum delay value represents the maximum delay to which the adaptive jitter buffer can increase.

Fax specifies the fax packet delay mode. If **Modem Passthrough** is enabled and modem/fax tones are detected, the packet delay setting will be switched to this value.

DTMF Relay specifies how DTMF tones are to be transmitted over RTP. Select either **Inband** or out-of-band (**NTE Value**). The value range is **96** to **127**.

RTP DSCP Value specifies the DiffServe code point (DSCP) for this station's RTP packets. Either use the global default (which is subject to change as the global default setting changes) or specify a static value for this station only.

6. Optional. At the bottom of the **Edit Trunk** menu (see Figure 5 on page 7), select **Apply** to apply the settings or proceed to the **DNIS Substitution** tab. Specify **DNIS Substitution** of an outgoing trunk number by replacing it with a specific number of your choice as the outbound identification

number (number displayed on caller ID). Multiple **DNIS Substitution** entries can be added to each trunk. Order of input is important. The first valid match that is found for outbound numbers will be used. Select **Apply** to apply the settings.

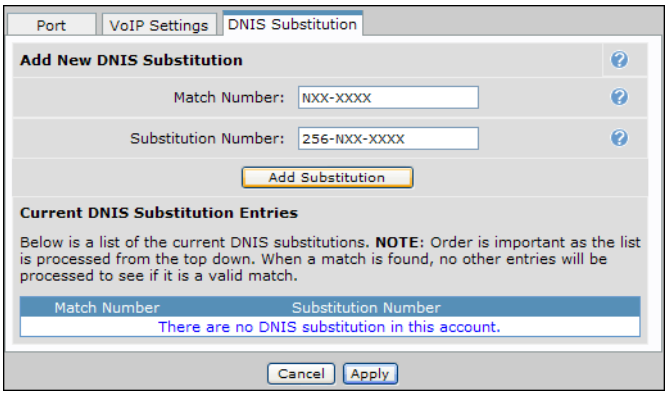


Figure 9. DNIS Substitution Tab

Settings and Descriptions

Match Number specifies the dialed number that you want to match.

Substitution Number specifies the number that will be sent in place of the number that was matched.

Example Substitutions

Function: Formats a call for 10-digit dialing.
Match Number: NXX-XXXX **Substitution Number**: 256-NXX-XXXX

Function: Formats a long distance call for 10-digit dialing.
Match Number: 1-NXX-XXX-XXXX **Substitution Number**: NXX-XXX-XXXX

Function: Inserts a long distance call PIC code for a particular service provider.
Match Number: 1-NXX-NXX-XXXX **Substitution Number**: 10-10-220-NXX-NXX-XXXX

Function: Redirects 411 information calls.
Match Number: 411 **Substitution Number**: 256-555-1212

Examples of Wildcard Characters

0-9	Match exact digit only.
X	Match any single digit 0-9.
N	Match any single digit 2-9.
[ ]	Match any digit in the list. For example [1,4,6], matches 1, 4, and 6 only, while [1-3,5] matches 1 through 3 and 5.
$	Match any number, must occur at end of pattern.
( )	Punctuation characters ignored unless used within [ ].

Configuring the Analog Trunk Group

Trunk groups combine one or more trunk accounts and assign outbound call characteristics. Individual trunk groups can be created for each trunk account. The trunk group is assigned outbound call capabilities (local calls, long distance calls, etc.). Additionally, a cost is assigned to each attribute in the outbound call template. The cost is a preference and can be used for applications, such as least cost routing, where the lowest cost receives the highest priority for the specified call templates. For example, a **Low Cost** is set for long distance calls in Trunk Group A and a **High Cost** is set for long distance calls in Trunk Group B. In this case, long distance calls will go out of Trunk Group A first because it has a lower cost. If there are no available channels on the member(s) of Trunk Group A, long distance calls will go out of Trunk Group B.

1. Navigate to the **Voice > Trunks > Trunk Groups** menu and enter a new **Group Name** and select **Add**. To edit an existing trunk, select the trunk from the list under **Modify / Delete Trunk Group**.

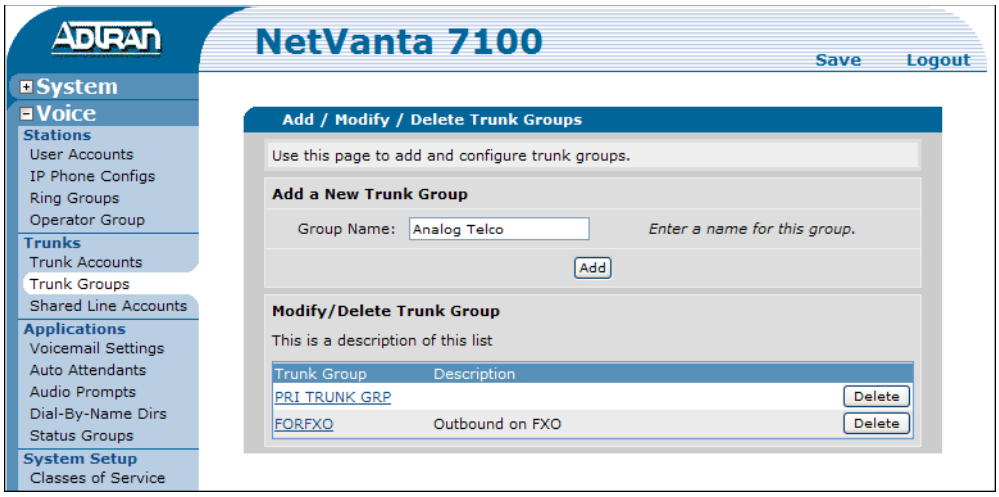


Figure 10. Trunk Groups Menu

2. Configure the new trunk group. Enter a **Description** for the trunk group and set the **Resource Selection** method.

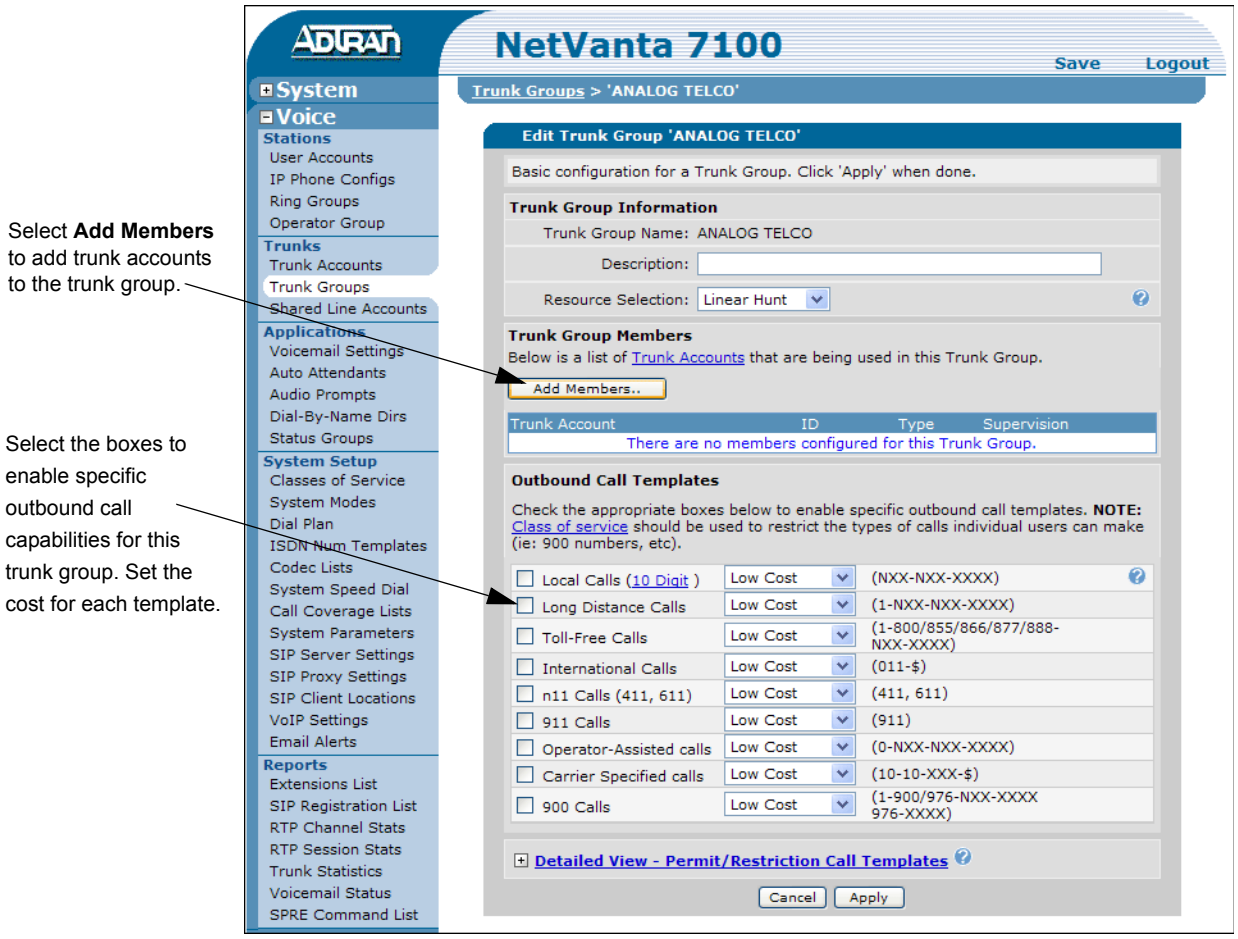


Figure 11. Edit Trunk Group Menu

Resource Selection controls how outbound DS0s or ports are selected by the switchboard during call routing.

Linear Hunt (default) accepts calls on the lowest number DS0 or port that is available in this group at the time the call is received.

Circular Hunt distributes calls evenly among available DS0s or ports in this group beginning at the lowest numbered DS0 or port.

3. To add new members to the trunk group, select the **Add Members** button. The **Add Members to Trunk Group** menu will appear. Add members by selecting one or more **Trunk Account** row(s). Use the shift key to select a range of members to add.

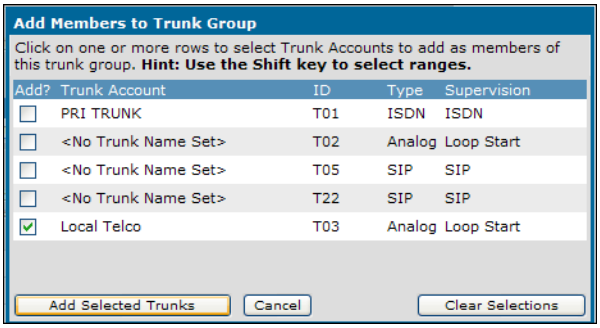


Figure 12. Add Members to Trunk Group Menu

4. Select **Add Selected Trunks** to append the new member selection(s) and return to the **Edit Trunk Group** menu. Select the appropriate check boxes under **Outbound Call Templates** to enable specific outbound call templates. Outbound call templates are the types of calls to allow from this trunk.
5. Select **Apply** at the bottom of the screen to append the new settings.

Configuring T1-RBS Trunks

The term T1 circuit is commonly used to identify a multiplexed 24-channel, 1.544 Mbps digital data circuit, providing communications between two facilities or from a local service provider. T1 refers to the transport of a DS1-formatted signal onto a copper, fiber, or wireless medium for deploying voice, data, or video conferencing services. T1 connections provide up to twenty-four 64 kbps DS0 channels, and use the robbed bit signaling (RBS) scheme to pass call signaling status information.

RBS is the process where the least significant bit in the sixth and twelfth frame (of an SF T1) and the sixteenth and twentieth frame (of an ESF T1) is *robbed* for voice A, B, C, and D signaling bits. These signaling bits indicate on-hook or off-hook conditions, among other signaling states.

The T1-RBS trunk can terminate a line from the service provider or be a termination point acting as the network to a private branch exchange (PBX) or key system requiring a T1 circuit.

Configuring the T1-RBS Physical Interface

1. Navigate to the **System > Physical Interfaces** menu to display a list of physical interfaces.
2. Select the name of the trunk connected to the T1 interface (see Figure 13 below).

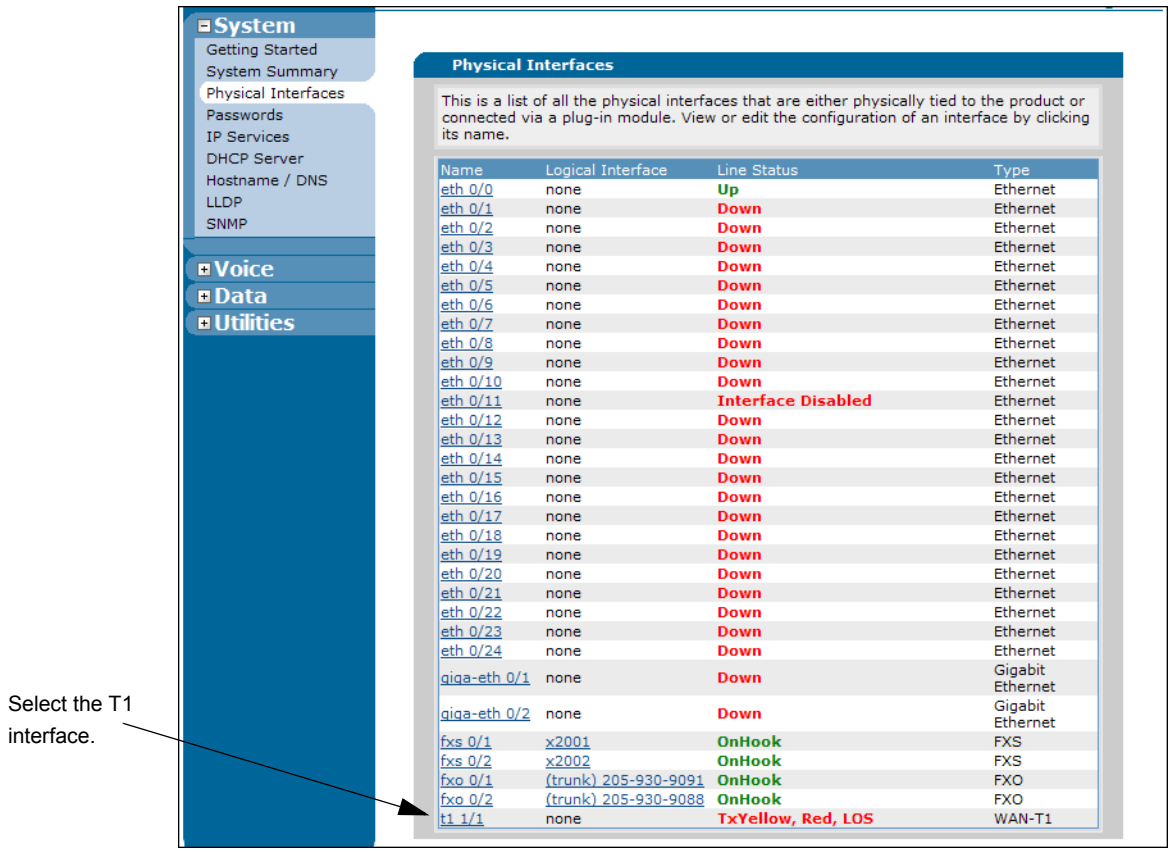


Figure 13. Physical Interfaces Menu

Settings and Descriptions

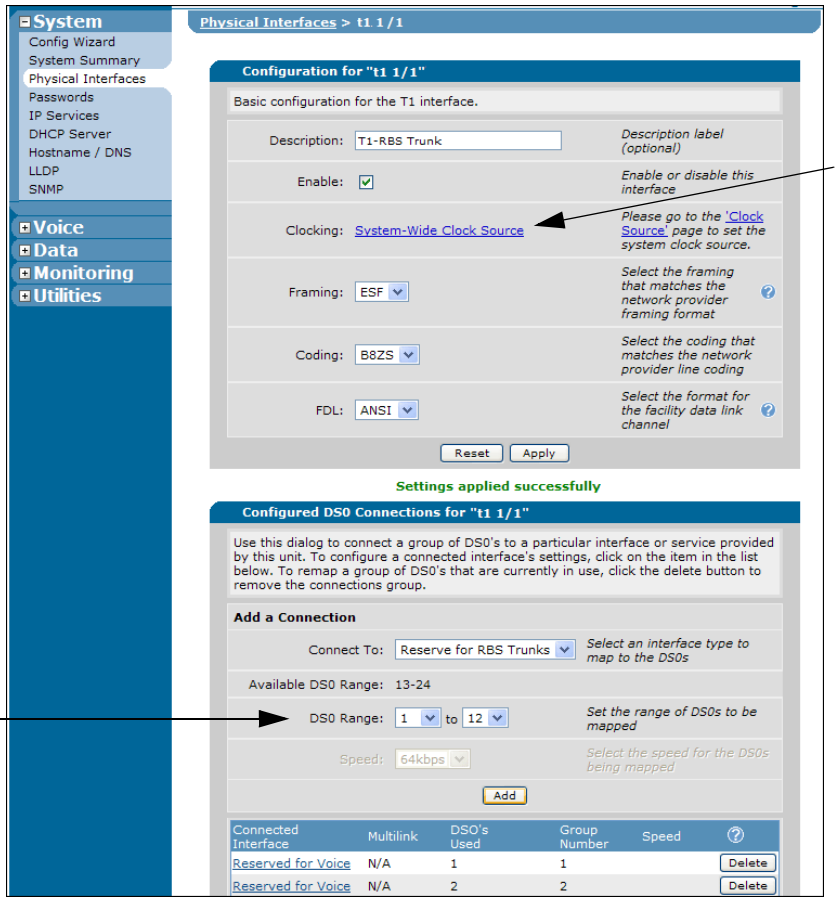
Name displays a user-selectable text description of the physical interface.

Logical Interface displays a user-selectable text description that is linked to the physical interface.

Line Status displays the network status of the physical interface.

Type displays the technical type of the physical interface.

3. Enable the T1 interface by selecting the check box next to **Enable**. Use the text on the right side of the menu to assist with the additional settings and select **Apply** to append the new settings.



Select the **System-Wide Clock Source** hyperlink to configure the system timing source if it has not been previously set. The hyperlink will route you to the **System Summary** menu. On this menu, select the T1 interface as the **Primary Clock Source**.

In this example, we used 12 available DS0s (1 to 12).

Figure 14. Physical Interfaces Menu (T1-RBS)

4. Under **Add a Connection** in Figure 14 (above), select **Reserve for RBS Trunks** from the **Connect To** drop-down menu to map the DS0s to the T1-RBS trunk. Set the **DS0 Range** to be mapped and select **Add** to apply the map.

5. An updated menu will appear with a list of connected DS0s and their status at the bottom.

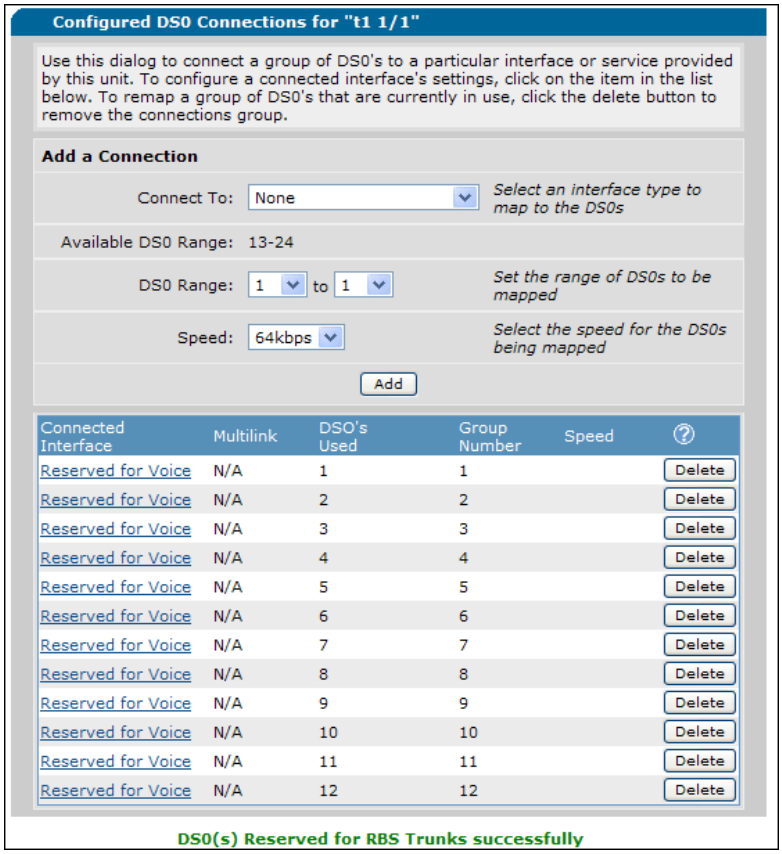


Figure 15. Updated DS0 Connections Menu

Configuring the T1-RBS Trunk Account

A trunk account must be created in order to make and receive calls. Create the trunk account and assign the T1-RBS interface. The **Supervision** types supported are **E&M Wink**, **E&M Immediate**, **Loop Start**, **Ground Start**, and **Feature Group D** (ANI/DNIS). Make sure the T1-RBS settings (**Supervision**, **Type**, etc.) match the parameters set by your service provider.

1. From the main menu, navigate to **Voice > Trunks > Trunk Accounts** to access the **Add / Modify / Delete Trunk Accounts** menu. Enter the desired **Trunk Name**, and select **T1-RBS** as the **Type** for this trunk. The **Supervision** setting should be provided by your service provider. Leave **Role** at the default setting **User**. Select the **Add** button to add the trunk account to the unit and the **Edit Trunk** menu will appear.

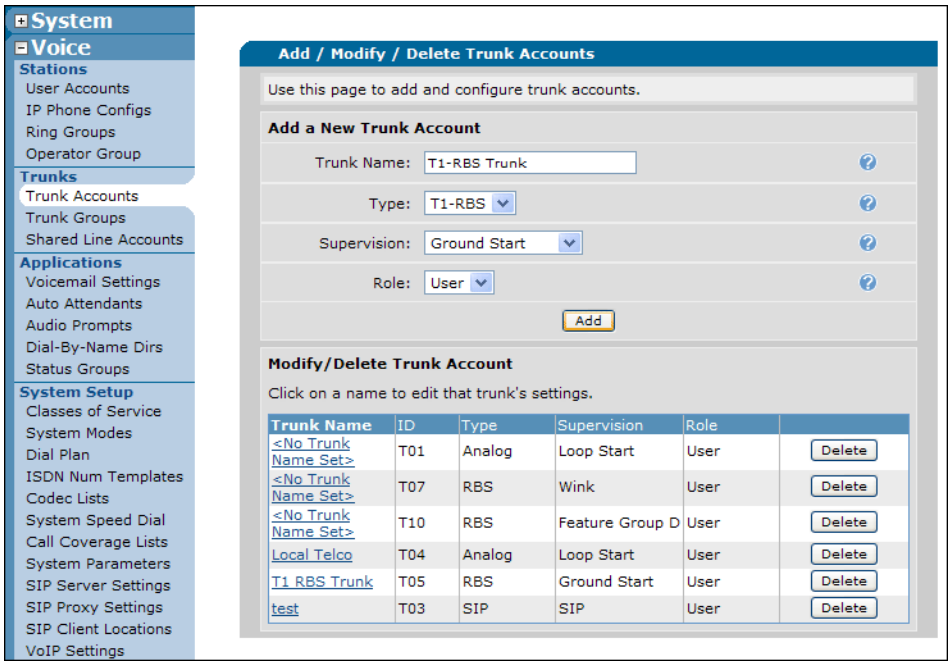


Figure 16. Trunk Accounts Menu (T1-RBS)

Settings and Descriptions

Trunk Name specifies the name for this trunk.

Type specifies the type of trunk to create.

Supervision specifies the signaling type set by the service provider.

Role specifies the type of line termination for this trunk. A T1-RBS trunk can only function in the **User** role.

User terminates the line at the provider (i.e., the unit acts as a user).

Network terminates the line at the unit (i.e., the unit acts as the network). Use **Network** role for configuring trunks that transmit out to a DSX port.

2. After selecting **Add** to add the new trunk account, the **Edit Trunk** menu appears. Configure the T1-RBS trunk. If complete, select **Apply** to save the settings or select the **DS0** menu tab to configure the DS0s to use on this trunk.

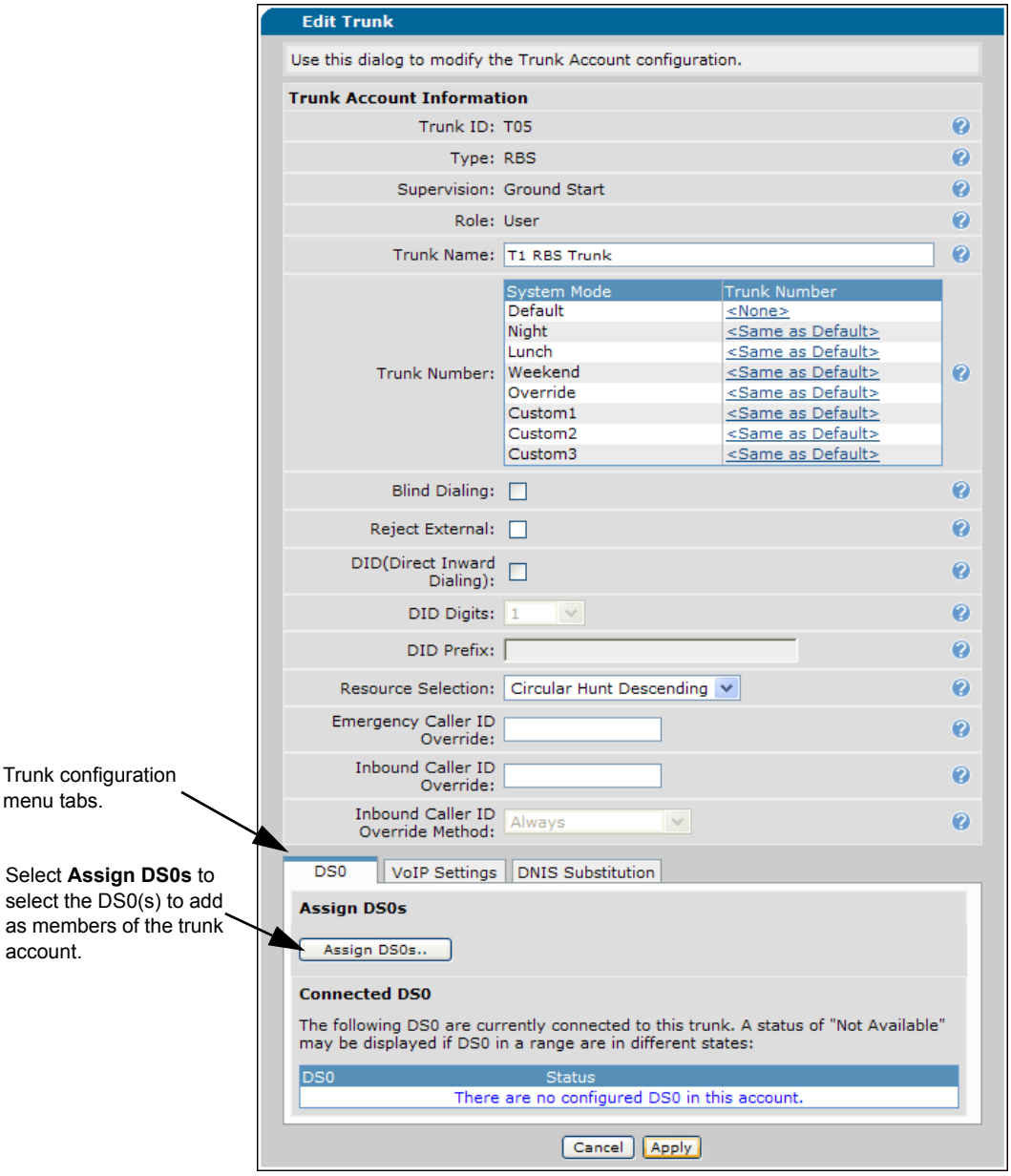


Figure 17. Edit Trunk Menu DS0 Tab (T1-RBS)

NOTE

Refer to the Settings and Descriptions on page 7 for explanations of the trunk account parameters or use the question mark symbols.

3. Optional. Select the **VoIP Settings** tab to edit the user's VoIP settings such as CODEC group, VAD, and RTP settings. Select **Apply** to apply the settings, or proceed to the **DNIS Substitution** tab.

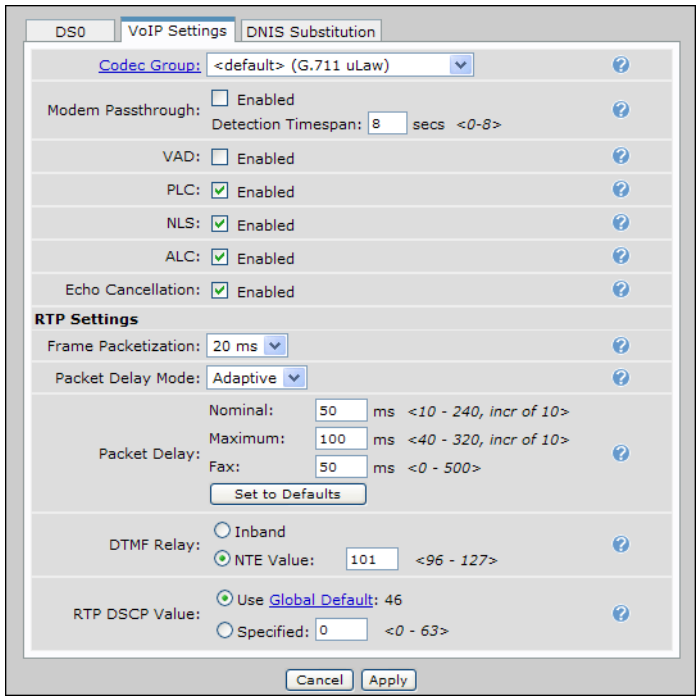


Figure 18. T1- RBS VoIP Setting Tab

Settings and Descriptions

Codec Group sets the coder-decoder (CODEC) group to use for T1-RBS trunks.

Modem Passthrough renegotiates automatically with the far end to be modem compatible (switches to G.711, all voice improvements are turned off, packet delay is set to fax).

VAD when enabled, silence is not transmitted over the network, only audible speech. When voice activity detection (VAD) is enabled, the sound quality is slightly degraded, but the connection monopolizes much less bandwidth.

PLC enables or disables packet loss concealment (PLC). When enabled, the unit will try to reconstruct sound lost from dropped packets.

NLS enables the echo canceller's non-linear suppression (NLS). When enabled, acoustic echo should be reduced.

ALC enables the automatic leveling control (ALC). When enabled, ALC reduces received RTP signals to a predefined level.

Echo Cancellation when enabled, reflected noise is cancelled from the transmitted voice signal. Echo cancellation should normally only be disabled if the voice station is connected to a fax machine or modem.

Frame Packetization sets the number of audio samples in milliseconds (1 frame/sample is 10 ms) included in a single RTP packet.

Packet Delay Mode configures the operation mode of the jitter buffer for VoIP calls on this trunk account.

Adaptive starts the buffer's delay at the nominal delay setting and increases it up to the delay setting if it detects that an unacceptable number of packets are being discarded due to jitter. Conversely, the buffer will decrease the amount of delay if it can afford to.

Fixed causes the buffer's delay to remain at the nominal setting at all times.

Packet Delay configures various packet delay settings for this account.

Nominal specifies the nominal packet delay mode. For voice calls, the nominal delay value represents the desired amount of packet delay. In **Adaptive** mode, the buffer may increase this value up to the maximum delay. In **Fixed** mode, the delay is constantly set at this value.

Maximum specifies the maximum packet delay mode. For voice calls, the maximum delay value represents the maximum delay to which the adaptive jitter buffer can increase.

Fax specifies the fax packet delay mode. If **Modem Passthrough** is enabled and modem/fax tones are detected, the packet delay setting will be switched to this value.

DTMF Relay specifies how DTMF tones are to be transmitted over RTP. Select either **Inband** or out-of-band (**NTE Value**). The value range is **96** to **127**.

RTP DSCP Value specifies the DiffServe code point (DSCP) for this station's RTP packets. Either use the global default (which is subject to change as the global default setting changes) or specify a static value for this station only.

4. Optional. Use **DNIS Substitution** if a dialed number should be replaced with a specific number of your choice. Select **Apply** to apply the settings. Multiple **DNIS Substitution** entries can be added to each trunk. Order of input is important. The first valid match that is found for outbound numbers will be used.

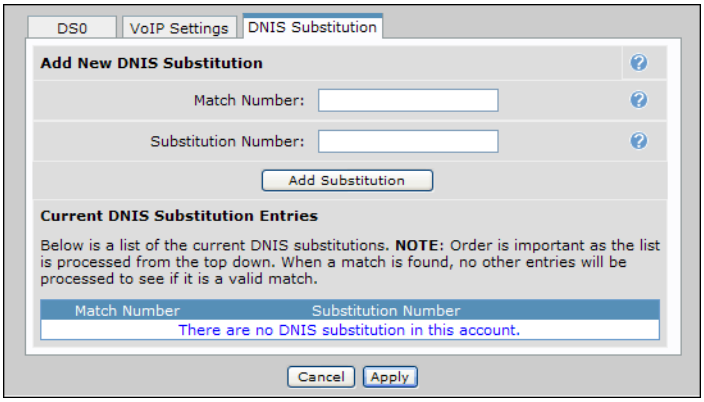


Figure 19. T1-RBS DNIS Substitution Tab

Settings and Descriptions

Match Number specifies the dialed number that you want to match.

Substitution Number specifies the number that will be sent in place of the number that was matched.

Example Substitutions

Function: Formats a call for 10-digit dialing.
Match Number: NXX-XXXX **Substitution Number**: 256-NXX-XXXX

Function: Formats a long distance call for 10-digit dialing.
Match Number: 1-NXX-XXX-XXXX **Substitution Number**: NXX-XXX-XXXX

Function: Inserts a long distance call PIC code for a particular service provider.
Match Number: 1-NXX-NXX-XXXX **Substitution Number**: 10-10-220-NXX-NXX-XXXX

Function: Redirects 411 information calls.
Match Number: 411 **Substitution Number**: 256-555-1212

Examples of Wildcard Characters

0-9	Match exact digit only.
X	Match any single digit 0-9.
N	Match any single digit 2-9.
[ ]	Match any digit in the list. For example [1,4,6], matches 1, 4, and 6 only, while [1-3,5] matches 1 through 3 and 5.
$	Match any number, must occur at end of pattern.
( )	Punctuation characters ignored unless used within [ ].

Configuring the T1-RBS Trunk Group

Create the trunk group. Add the trunk account members to the group and define the outbound call templates and costs. The steps are the same as creating a trunk group for other trunk types. When adding members to the trunk group, select the newly created T1-RBS trunk.

Refer to *Configuring the Analog Trunk Group* on page 12 for assistance configuring the trunk group.

Configuring ISDN (PRI) Trunks

The Integrated Digital Service Network (ISDN) primary rate interface (PRI) is a circuit composed of 23 bearer (B) channels and 1 data (D) channel. ISDN PRI is an international standard for digital communications, allowing a full range of enhanced services supporting voice and data. The 23 B channels are used to transmit voice or data over an all-digital public switched telephone network (PSTN). The D channel is used to transmit out-of-band signaling for the B channels that controls dialing numbers and features such as call waiting.

The NetVanta 7000 series can support the following ISDN PRI switch types: **National ISDN**, **AT&T 4ESS**, **Lucent 5ESS**, **Nortel DMS-100**, and **Euro ISDN**.

Configuring the ISDN PRI Physical Interface

1. Navigate to the **System > Physical Interfaces** menu to display a list of physical interfaces.
2. Select the name of the trunk line connected to the T1/PRI (ISDN) interface from your service provider.

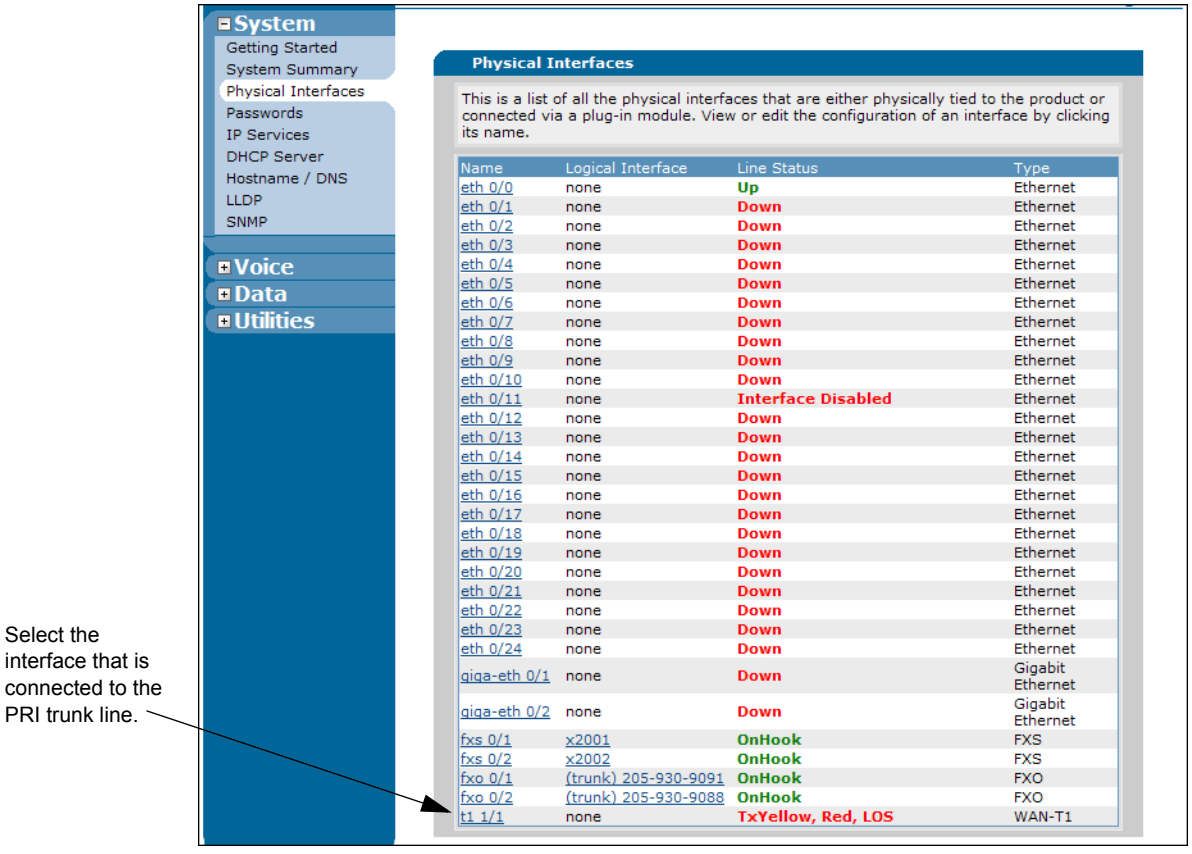


Figure 20. Physical Interfaces (PRI) Menu

Settings and Descriptions

Name displays a user-selectable text description of the physical interface.

Logical Interface displays a user-selectable text description that is linked to the physical interface.

Line Status displays the network status of the physical interface.

Type displays the technical type of the physical interface.

3. Enable the PRI interface by selecting the check box next to **Enable** and configure the PRI interface. Use the right side of the menu to assist with each setting. Select **Apply** to append the new settings.
4. Under **Add a Connection** in Figure 21 (below), select **PRI** from the **Connect To** drop-down menu to map the DS0s to the PRI trunk. Set the **DS0 Range** to be mapped and select **Add** to apply the map.

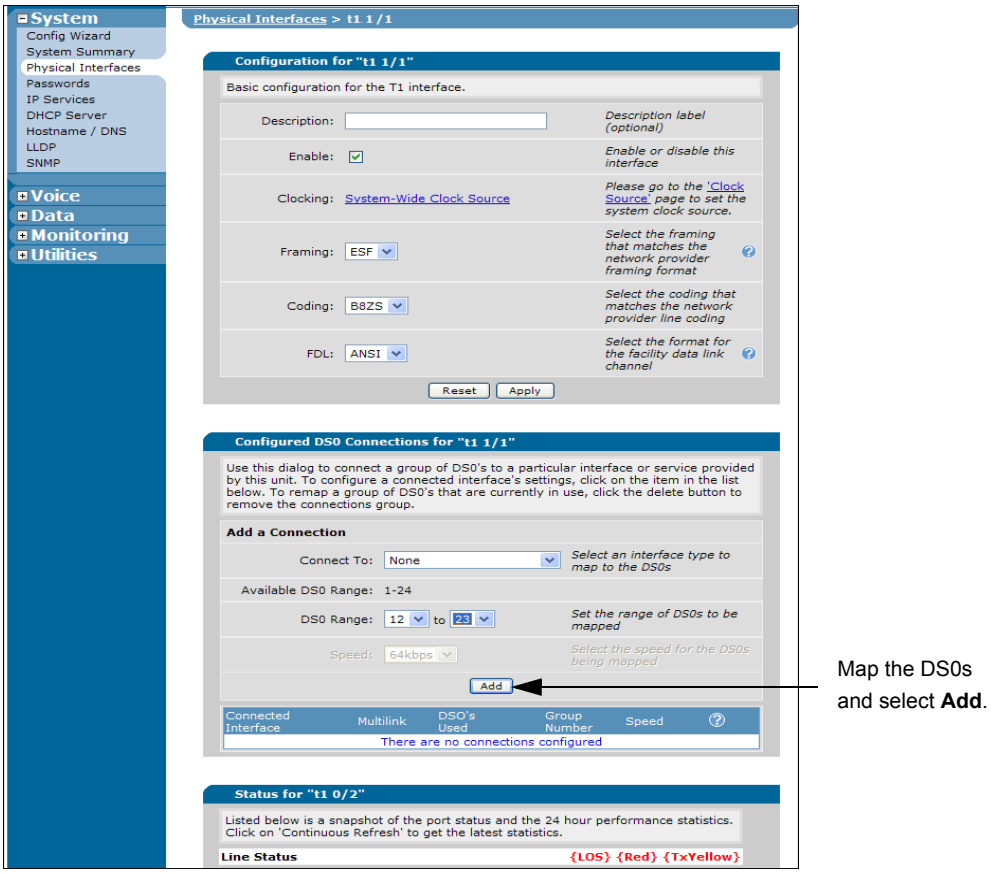


Figure 21. Physical Interfaces Configuration Menu (PRI)

5. Enable the interface and configure the required parameters for your trunk. The service provider should provide a list of settings for the PRI, such as the **Switch Type**.

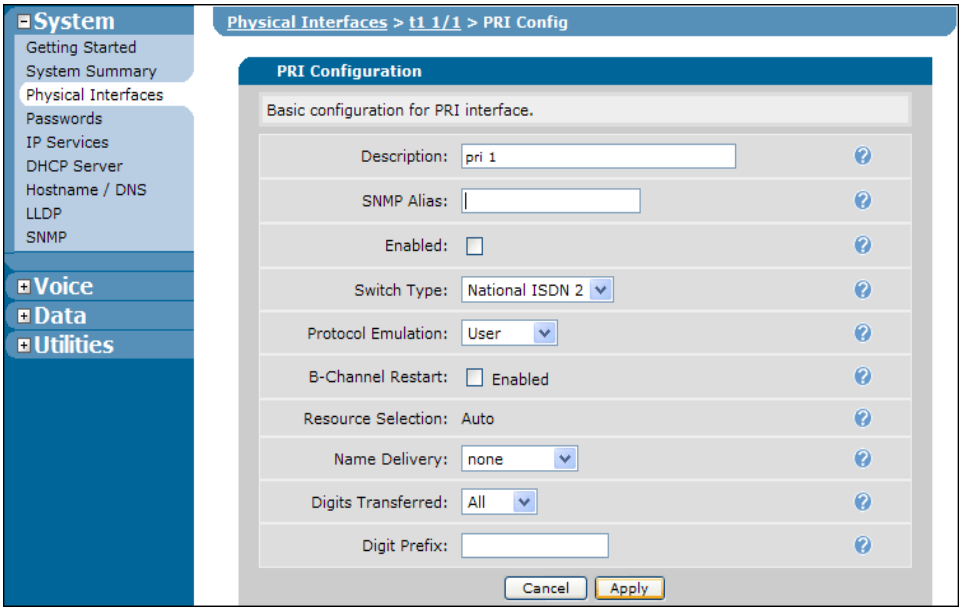


Figure 22. Logical PRI Interface Configuration Menu

Settings and Descriptions

SNMP Alias sets a text name assigned by a Simple Network Management Protocol (SNMP) network management system (NMS).

Switch Type configures the switch type. Choose from **National ISDN 2**, **AT&T 4ESS**, **Lucent 5ESS**, **Nortel DMS-100**, or **Euro ISDN**.

Protocol Emulation sets the emulation mode for this interface to one of the following:

Network operates as an NT/qsig master port.

User operates as a TE/qsig slave port.

B-Channel Restart enables or disables B-channel restarts if the protocol emulation is set to **Network**.

Resource Selection selects the manner in which resources are selected for use. The default setting is **Auto**.

Name Delivery configures the manner in which the calling party name is delivered. Calling party name can be delivered to customer premise equipment (CPE) in the **Setup** message by means of a facility IE or by means of a **Display** IE. It can also be delivered in a facility message after the **Proceeding** message has been received from the CPE.

Digits Transferred sets the number of inbound DID digits to transfer for internal call routing (**0**, **3**, **4**, **7**, **ALL**). Use varies based on **Protocol Emulation** mode:

Network role is not applicable in the NetVanta 7000 series. Sets the number of digits sent in the setup message to the CPE.

User role sets how many digits of the called party number received in the setup message are used by the internal switchboard to route the call to its destination.

Digit Prefix adds a prefix to the digits transferred for internal call routing.

Configuring the ISDN/PRI Trunk Account

A trunk account must be created in order to make and receive calls. Create the trunk account and assign the PRI interface. Make sure the PRI settings (trunk number, caller ID, etc.) match the parameters set by your service provider.

1. Navigate to **Voice** > **Trunks** > **Trunk Accounts** to access the **Add/ Modify / Delete Trunk Accounts** menu. Enter a name for the trunk and set the **Type** to **ISDN**. Select **Add** to append the settings and create the new trunk account.

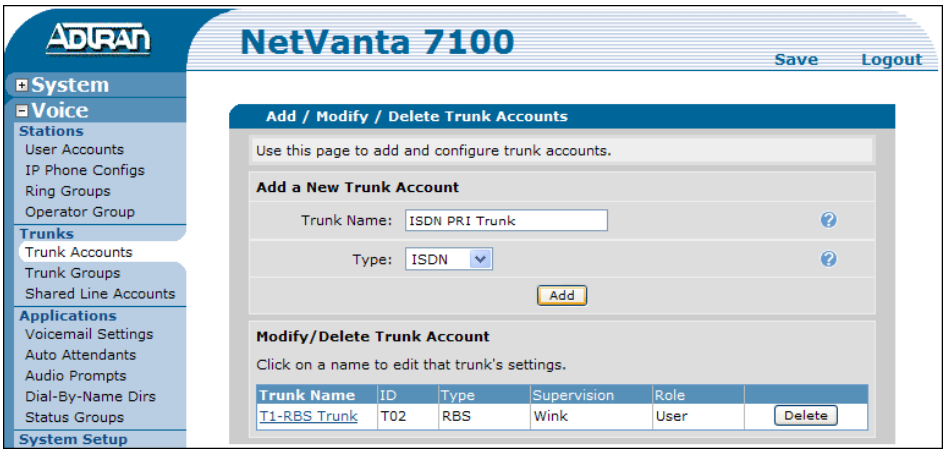


Figure 23. Trunk Accounts Menu (ISDN/PRI)

Settings and Descriptions

Trunk Name specifies a name for this trunk.

Type specifies the type of trunk to create.

2. After selecting **Add** to add the new trunk account, the **Edit Trunk** menu appears. Configure the ISDN trunk. Select the **ISDN Interface** and configure **VoIP Settings**.

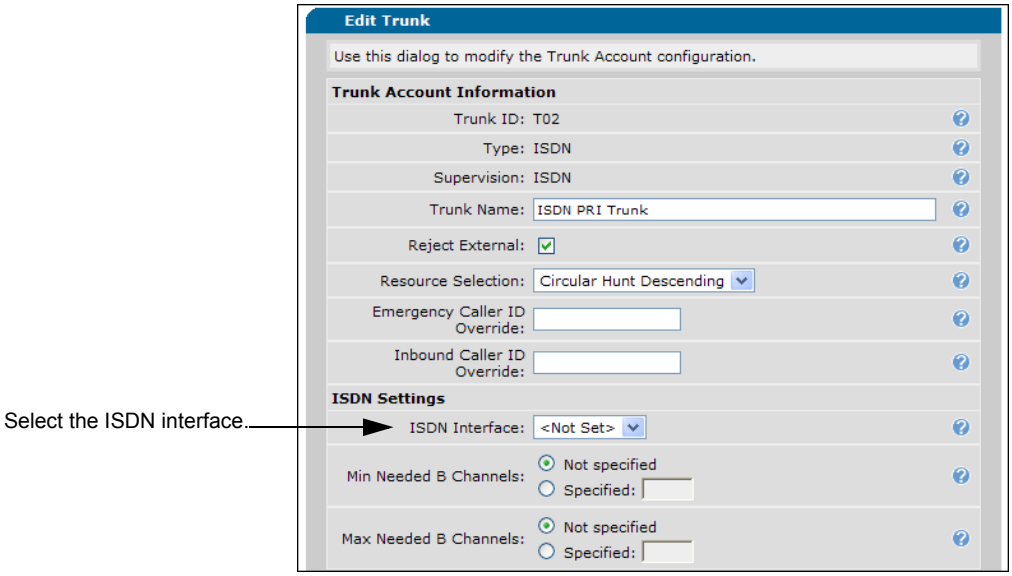


Figure 24. Edit Trunk Menu (ISDN/PRI)

NOTE

Refer to the Settings and Descriptions on page 7 for explanations of the trunk account parameters or use the question mark symbols.

3. Optional. At the bottom of the **Edit Trunk** menu, select the **VoIP Settings** tab. Edit the VoIP and RTP settings. Select **Apply** to apply the settings, or proceed to the **DNIS Substitution** tab.

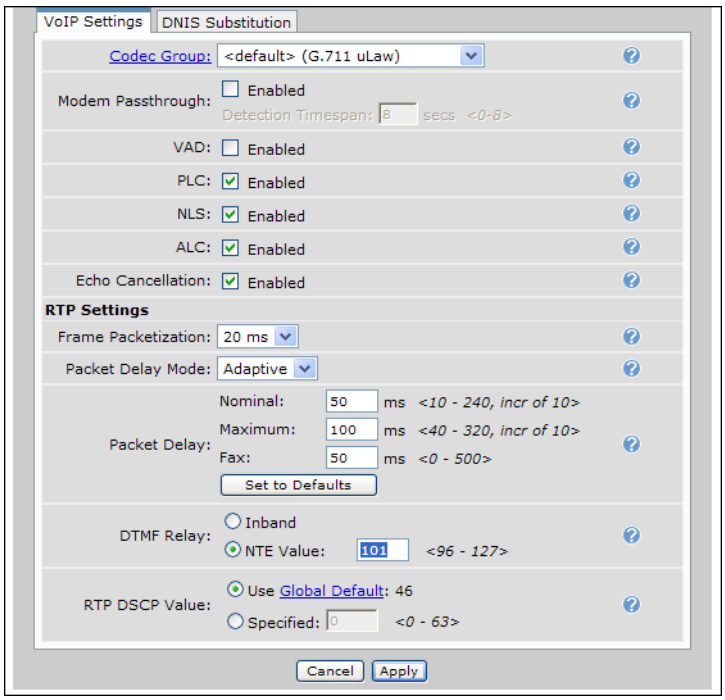


Figure 25. VoIP Settings Tab

4. Optional. Use **DNIS Substitution** if a dialed number should be replaced with a specific number of your choice. Select **Apply** to apply the settings. Multiple **DNIS Substitution** entries can be added to each trunk. Order of input is important. The first valid match that is found for outbound numbers will be used.

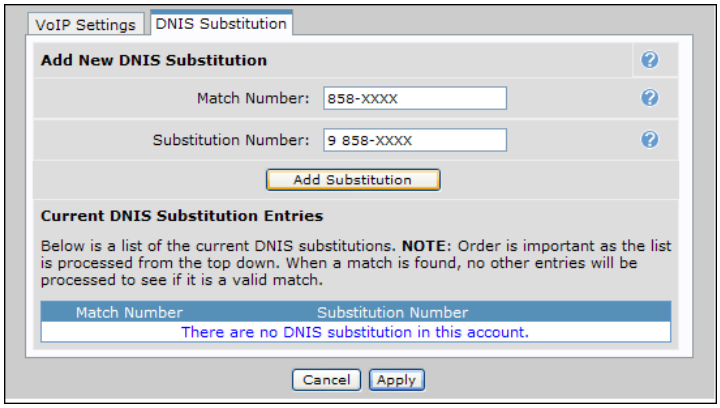


Figure 26. DNIS Substitution Tab

Settings and Descriptions

Match Number specifies the dialed number that you want to match.

Substitution Number specifies the number that will be sent in place of the number that was matched.

Example Substitutions

Function: Formats a call for 10-digit dialing.
Match Number: NXX-XXXX **Substitution Number**: 256-NXX-XXXX

Function: Formats a long distance call for 10-digit dialing.
Match Number: 1-NXX-XXX-XXXX **Substitution Number**: NXX-XXX-XXXX

Function: Inserts a long distance call PIC code for a particular service provider.
Match Number: 1-NXX-NXX-XXXX **Substitution Number**: 10-10-220-NXX-NXX-XXXX

Function: Redirects 411 information calls.
Match Number: 411 **Substitution Number**: 256-555-1212

Examples of Wildcard Characters

0-9	Match exact digit only.
X	Match any single digit 0-9.
N	Match any single digit 2-9.
[ ]	Match any digit in the list. For example [1,4,6], matches 1, 4, and 6 only, while [1-3,5] matches 1 through 3 and 5.
$	Match any number, must occur at end of pattern.
( )	Punctuation characters ignored unless used within [ ].

Configuring the ISDN/PRI Trunk Group

Create the trunk group. Add the trunk account members to the group and define the outbound call templates and costs. The steps are the same as creating a trunk group for other trunk types. When adding members to the trunk group, select the newly created ISDN/PRI trunk.

Refer to *Configuring the Analog Trunk Group* on page 12 for assistance configuring the trunk group.

Troubleshooting

Example 1: GUI Interface Troubleshooting

Navigate to **System > Physical Interfaces** and select a trunk interface to view its **Line Status**.

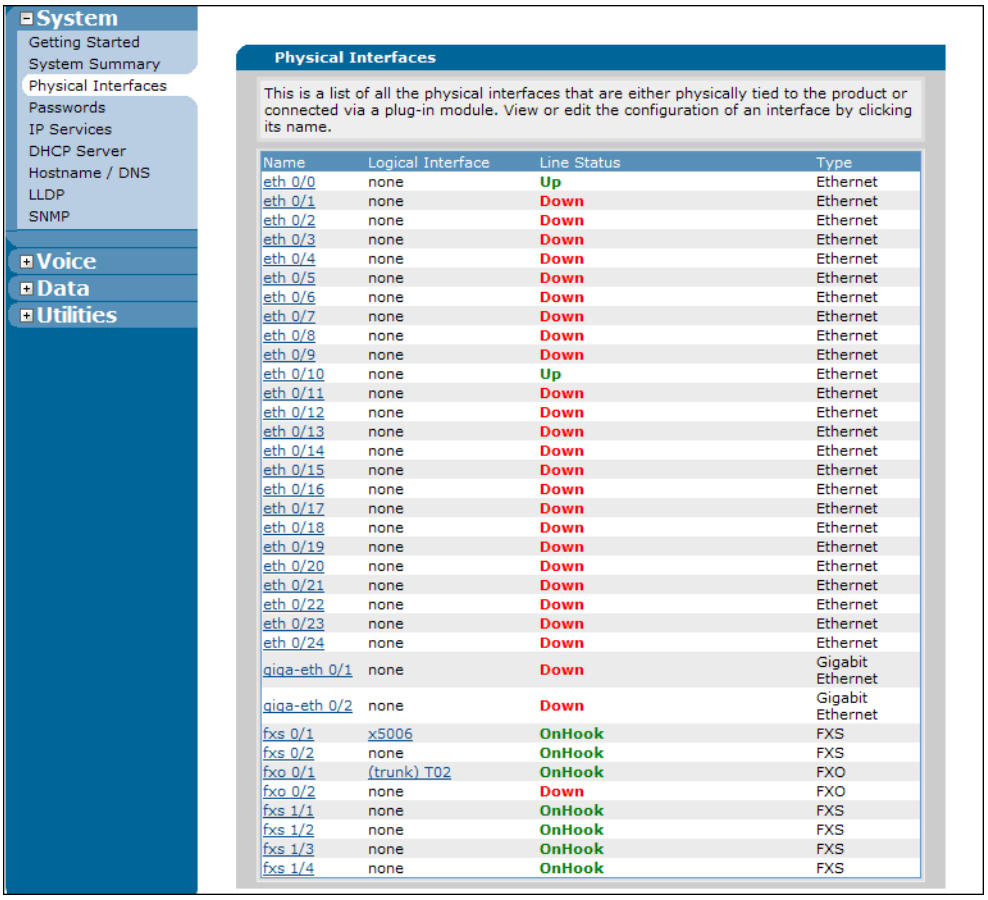


Figure 27. Physical Interfaces Port Statistics

Example 2: CLI Interface Troubleshooting

Issue the **show interface** <*interface*> <*slot/port*> command at the Global configuration mode prompt (#) to view the statistics for the specified interface.

Sample Output

```
#show interface fxo 0/2
  fxo 0/2 is UP
    Two-wire Status is: Onhook
    Test Status is INACTIVE
      No Tests
    Impedance is:  600 ohms +2.16uF
    Transmit Gain is:  +6.0dB
    Receive Gain is:  +0.0dB


#show interface pri 1
pri 1 is UP
  Description: pri 1
  Switch protocol:  National ISDN 2
  Signaling role:  user (TE)
  Calling-party override:  disabled
  Calling-party presentation:  allowed
  Calling-party number:  (no number configured)
  digits transferred all
  ISDN name-delivery:  disabled
  Connected interface: t1 2/1 tdm-group 1
  Channel status 12345678901234567890123
                 .......................D
    Legend: - = Unallocated        . = Inactive
            A = Active B channel   B = Backup D channel
            D = Active D channel   M = Maintenance
            R = Restart
    0 packets input, 0 bytes, 0 no buffer
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame
    0 abort, 0 discards, 0 overruns
    0 packets output, 0 bytes, 0 underruns
```

