

Configuring the ADTRAN ATLAS for a “Rabbit-Hole” Application

Description: This configuration allows an ADTRAN ATLAS to convert PRI to FXS and pass ANI/DNIS information as DTMF digits toward a receiver in a *ANI*DNIS* format.

Introduction: The ADTRAN ATLAS series supports both Primary Rate ISDN (PRI) and T1 Robbed Bit Signaling (RBS) services. A PRI provides up to 23 bearer (B) channels and one signaling channel (D channel). The ATLAS T1/PRI interface uses a standard RJ-48C connector. T1 connections provide up to 24 DS0 channels and use the RBS scheme to pass call signaling status information. The ATLAS 550, 830, and 890 also support FXS modules that provide 2 wire analog service to telephones, PBXs, or alarm receivers.

Before You Begin:

Before you begin configuration of the ADTRAN ATLAS you need some basic information.

1. Information needed from the PRI service provider:
 - a. Switch Type of the PRI line (Ex: National ISDN (NI-2), DMS-100, Lucent 5E, or AT&T 4ESS)
 - b. Number of B channels in service and on which DS0s the B channels reside
 - c. Phone number(s) assigned to the PRI line
 - d. Number of digits being provided
2. Information needed from the end user/customer:
 - a. Actual phone numbers to be used on the alarm receiver or other equipment (in the range of the PRI)
 - b. Number of digits to be transferred to the end equipment
 1. Feature Group D Signaling is similar to E&M Wink except for the fact that after receiving the Wink from the CPE device, the Atlas will transmit *ANI*DNIS* as DTMF tones.

Configuration of the ATLAS

The ATLAS in this example is an ATLAS 550, however the 830 or 890 can be configured similarly for this application. In this example the ATLAS has a Dual T1 module in slot 1 with a T1 cross-over cable connecting port 1 to port 2 creating the “rabbit hole.” The other three user slots have Octal FXS modules installed. Other ATLAS models may differ or your specific site configuration may need to be different from this example. To create the network shown in **Figure 1**, configure the PRI side of the network in the **Network Term** portion of the **Dial Plan** using the Network 1 module. Then, configure an RBS T1 in the **User Term** portion with slot 1 port 1. Finally **Ded Map** the FXS ports to the T1 slot 1 port 2.

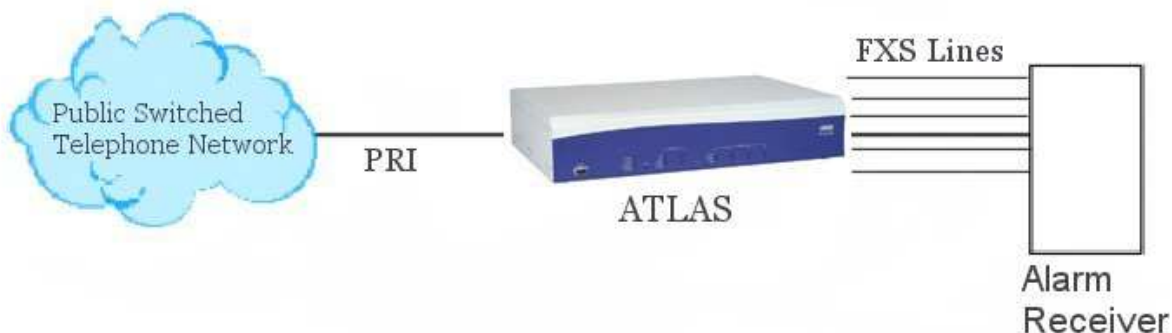


Figure 1

Configuring the PRI

The PRI is configured in the **Network Term** of the **Dial Plan**. The **Network Term** configuration consists of the following fields:

1. **Out # Accept**
2. **Out # Reject**
3. **Signaling**
4. **Ifce Config**
 - A. **Switch Type**
 - B. **First DS0**
 - C. **Number of DS0s**

NOTE: This is not a complete list of the **Ifce Config** features. For simplicity, any field not mentioned in this document remains in the default state.

Figure 2 shows an overview of the Network Term menu:

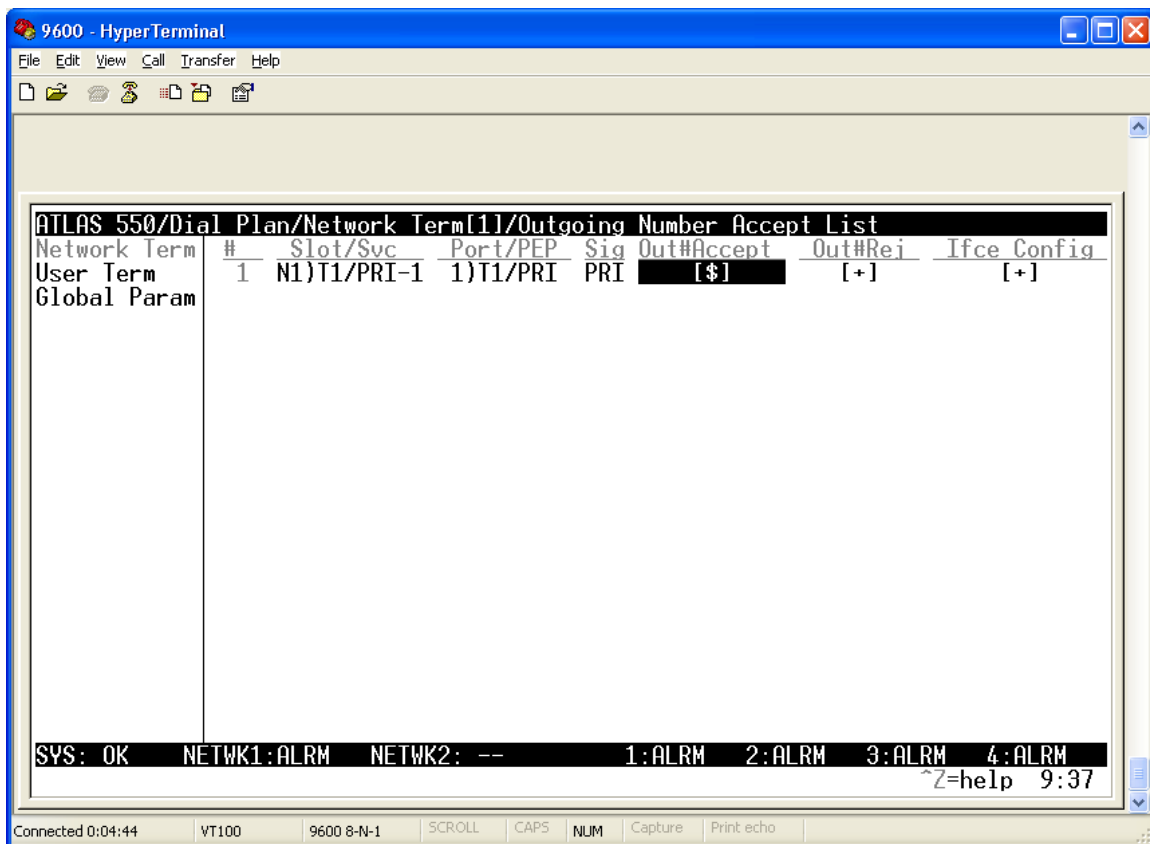


Figure 2

1. Select the appropriate Slot and Port in the first two columns of the Network Term entry.
 2. Leave Sig set to PRI (the default)
 3. Hit <Enter> on the Out#Accept field. You will typically enter in '\$' for the Accept Number, which represents 'all calls'.
 4. Arrow back out to the Network Term menu and go over to the Ifce Config column and hit <Enter>.
- Figure 3** is a screen shot of the menu and a brief description of each of the fields follows:

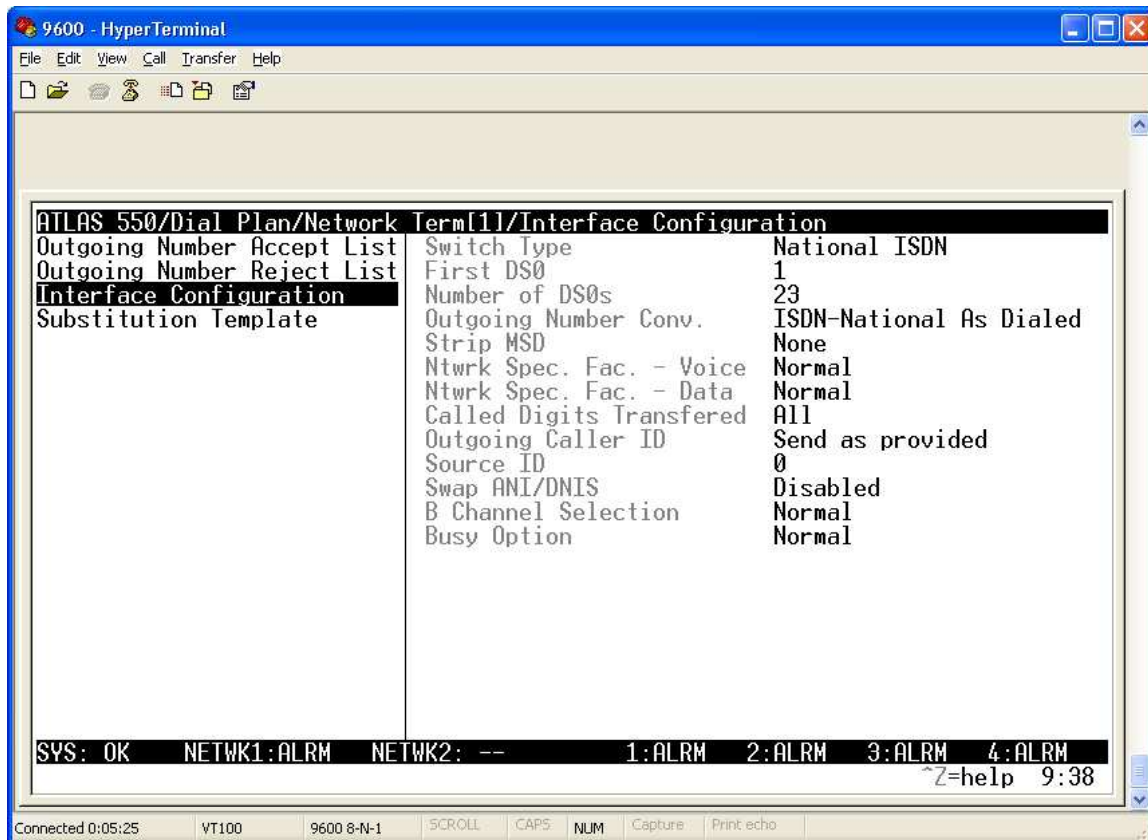


Figure 3

- a. Switch Type – This is the Switch Type that the carrier is supplying you. The possible options are National ISDN, Lucent 5E, Northern DMS 100, and AT&T 4ESS (National ISDN is normally used)
- b. First DS0 – This needs to be the number of the first B-channel that is going to be in use (Usually 1)
- c. Number of DS0s – This is used to specify the number of DS0s to use including the first DS0 (Usually 23 for a full PRI)
- d. Outgoing Number Conversion – This is used by the Atlas to format certain Setup message Information Elements when outbound calls are made on the PRI. Hitting the Ctrl key and the ‘A’ key at the same time will give you a brief description of each. ISDN-National As Dialed and As Dialed are the two most commonly used.
- e. Strip MSD – This field is rarely used but can be utilized to strip the Most Significant Digit(s) from an outbound call (Almost always set to None)
- f. Network Specific Facility – Voice/Data – These should be set to Normal unless the carrier explicitly requests that a Network Specific Facility be used
- g. Called Digits Transferred – Set to All to pass all digits to the Central Office
- h. Outgoing Caller ID – This can be used to override Caller ID information on outbound calls (Setting to Send As Provided will send the Caller ID information supplied by the PBX in the call setup process out to the carrier)
- i. Source ID – This can be used to further restrict/fine tune Switchboard behavior (This setting is rarely changed)
- j. Swap ANI/DNIS – This option will cause the Switchboard to use the Calling Party Number (ANI) to route the call rather than the Called Party Number (DNIS) on an inbound call (This setting is almost never enabled except in certain circumstances).
- k. B Channel Selection – This option determines how the Switchboard uses B Channels for outbound Call Routing. Setting to Normal will always start with the highest available channel and work down. Setting to Circular will start with the highest channel and works its way

down contiguously until it gets to channel 1 and then start over again. (Usually set to Normal to avoid glare issues with the Central Office)

1. Busy Option – Not applicable to this configuration

Configuring the T1 Feature Group D Connection

The T1 is configured in the User Term portion of the Dial Plan.

Figure 4 shows an overview of the User Term menu:

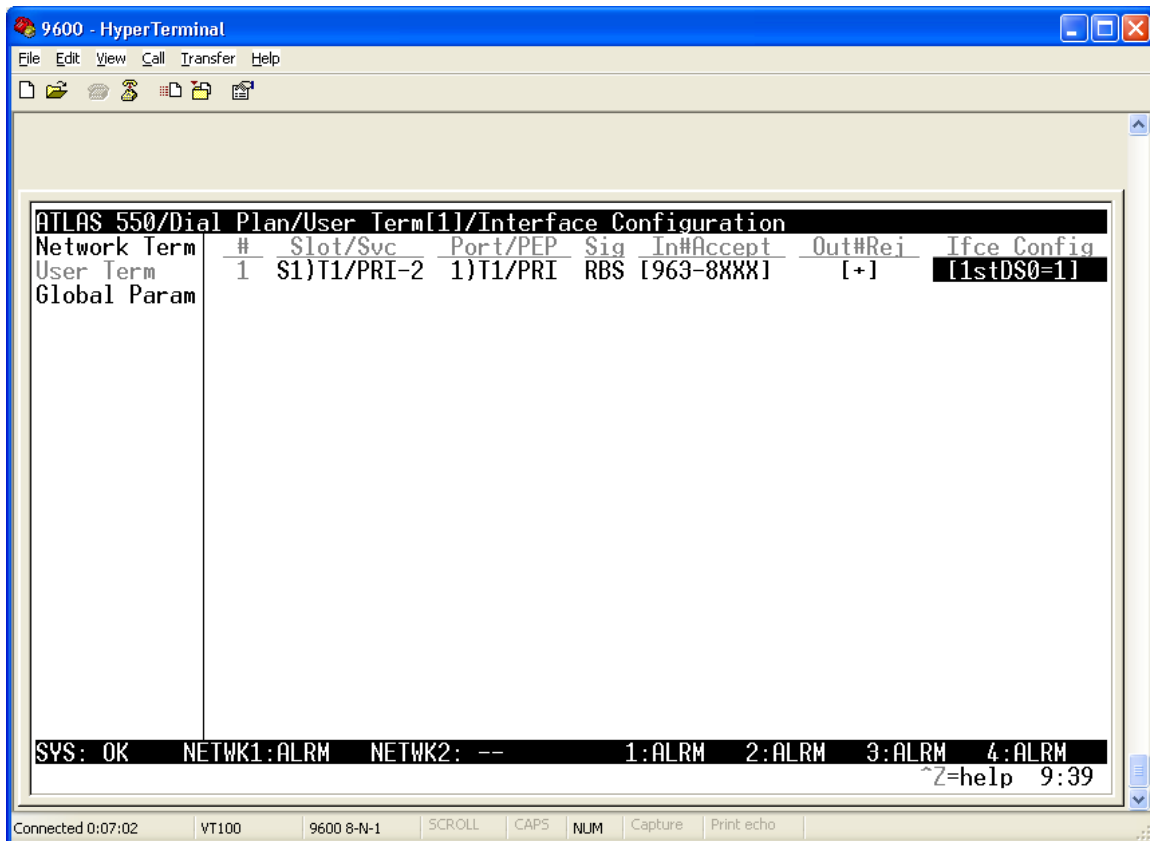


Figure 4

1. Select the appropriate Slot and Port in the first two columns of the User Term entry.
2. Set the Sig column to 'RBS'
3. Hit <Enter> on the In#Accept field. You will typically enter in '\$' for the Accept Number, which represents 'all calls'. This example uses 963-8XXX which allows 9638000 through 9638999.
4. Arrow back out to the User Term menu and go over to the Ifce Config column and hit <Enter>. **Figure 5** is a screen shot of the menu and a brief description of each of the fields follows:

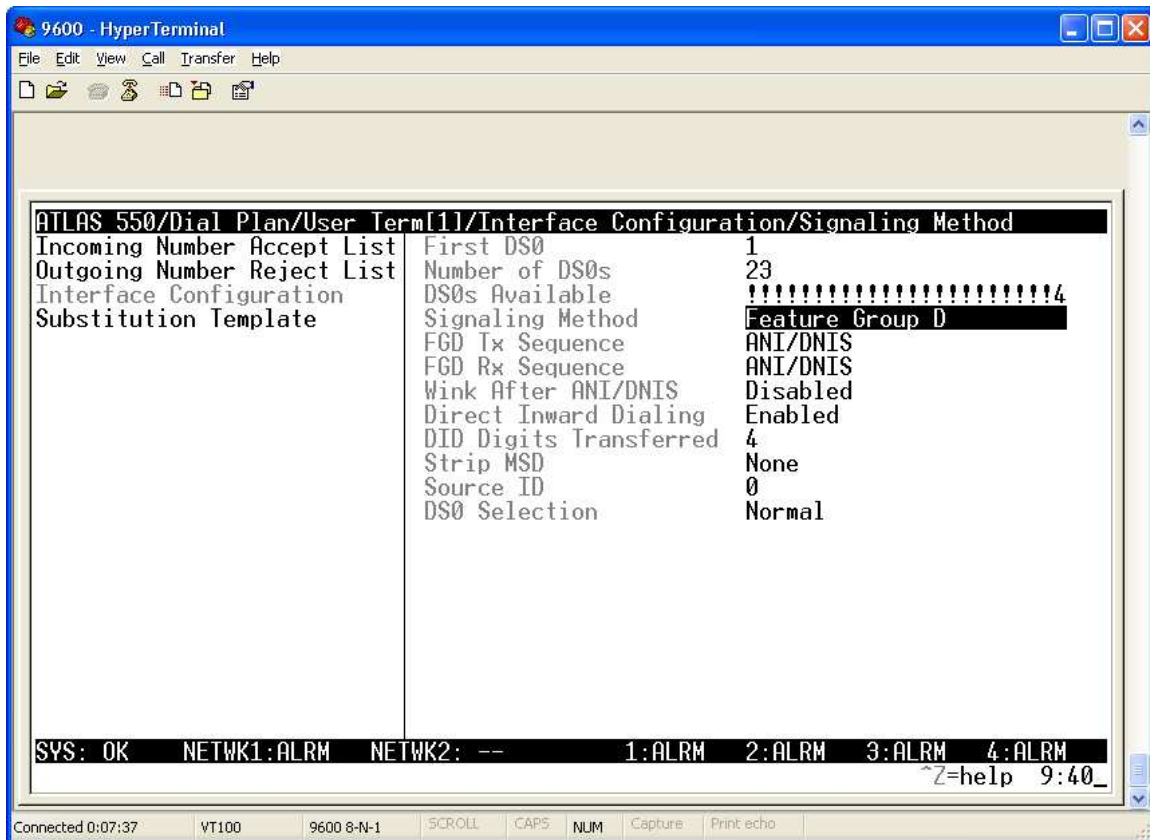
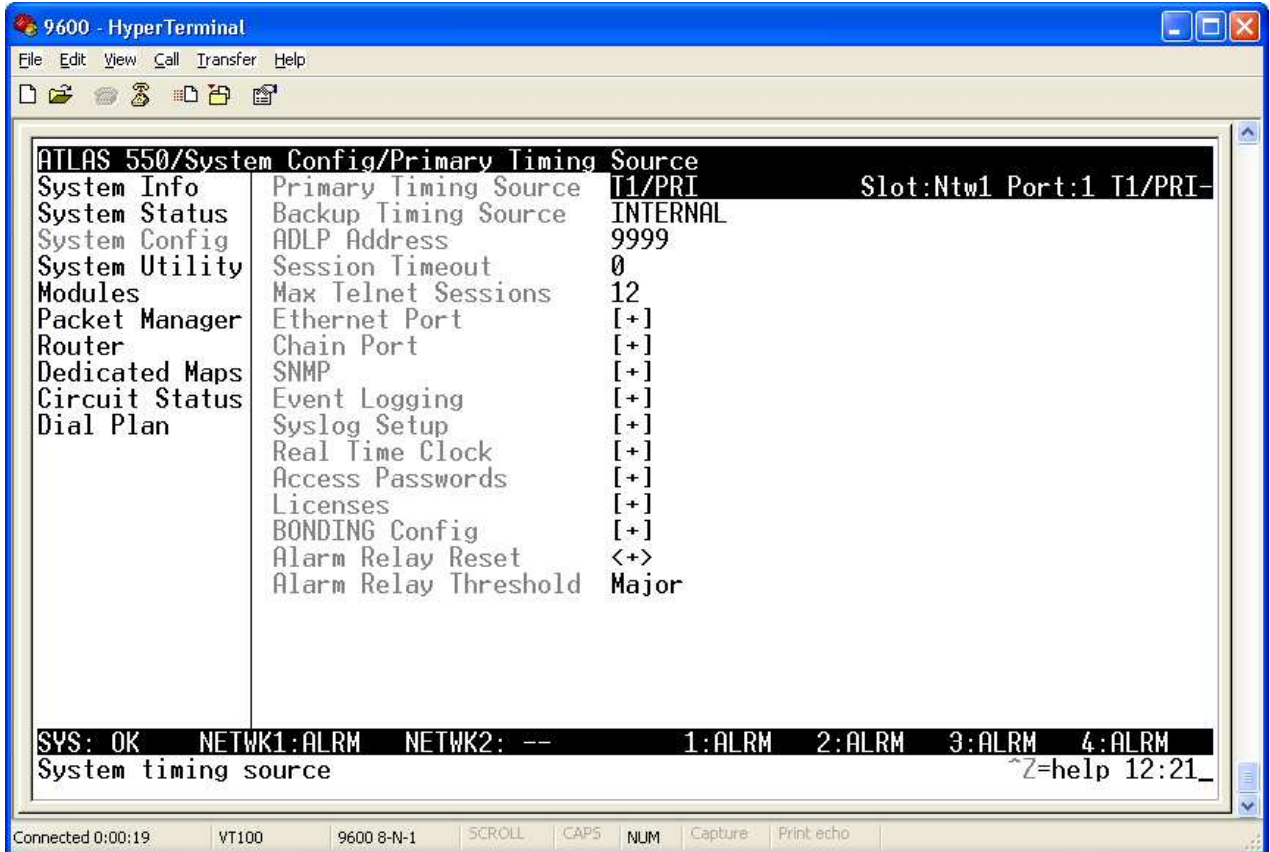


Figure 5

- a. First DS0 – This needs to be the number of the first B-channel that is going to be in use (Usually 1)
- b. Number of DS0s – This is used to specify the number of DS0s to use including the first DS0 (Usually 24 for a full T1)
- c. Signaling Method – Will need to be set to ‘Feature Group D’ for this application
- d. FGD Tx/Rx Sequence – These options specify the DTMF tones Transmitted (Tx) on an inbound call to the CPE and Received (Rx) on an outbound call from the CPE. Options are Disabled (which doesn’t send anything), ANI/DNIS (which sends a pattern of *ANI*DNIS*), DNIS (which sends *DNIS*), and ANI (which sends *ANI*). Normally these are both set to ANI/DNIS. If the PBX is only expecting *ANI*DNIS* and is only going to transmit the DNIS information on an outbound call, set the Rx Sequence to just DNIS. If only inbound calls are going to be made, then the Rx Sequence option is not applicable.
- e. Wink After ANI/DNIS – This can be enabled if the CPE device requires a wink after the Atlas receives the *ANI*DNIS* pattern on an outbound call (Normally this is disabled).
- f. Direct Inward Dialing – This option should be Enabled to allow the transmission of DNIS digits to the CPE on an inbound call.
- g. DID Digits Transferred – This option allows you to specify how many DNIS digits will be sent to the CPE device. This should correspond to how many digits the carrier is supplying you with on the PRI (usually 4).
- h. Strip MSD – This field is rarely used but can be utilized to strip the Most Significant Digit(s) from an inbound call to the CPE device (Almost always set to None)
- i. Source ID – This can be used to further restrict/fine tune Switchboard behavior (This setting is rarely changed)
- j. DS0 Selection – This option determines how the Switchboard selects DS0s on this interface during Call Routing. The Normal (default) setting means that calls being delivered to this interface will be put on the lowest available channel. The Circular setting will cause the call to be routed out contiguous DS0s starting with DS0 1 and working up. The Aligned setting cannot be used in this application

Configuring the Primary Timing Source

The primary timing source will most likely need to be set to the module terminating the PRI from the carrier (in this scenario, Network 1). To configure this, go to the System Config menu and press <Enter> on the Primary Timing Source selection (Internal by default) and navigate to the Network 1 entry (as shown in **Figure 6**).



```
9600 - HyperTerminal
File Edit View Call Transfer Help
ATLAS 550/System Config/Primary Timing Source
System Info Primary Timing Source T1/PRI Slot:Ntw1 Port:1 T1/PRI-
System Status Backup Timing Source INTERNAL
System Config ADLP Address 9999
System Utility Session Timeout 0
Modules Max Telnet Sessions 12
Packet Manager Ethernet Port [+]
Router Chain Port [+]
Dedicated Maps SNMP [+]
Circuit Status Event Logging [+]
Dial Plan Syslog Setup [+]
Real Time Clock [+]
Access Passwords [+]
Licenses [+]
BONDING Config [+]
Alarm Relay Reset <+>
Alarm Relay Threshold Major
SYS: OK NETWK1:ALRM NETWK2: -- 1:ALRM 2:ALRM 3:ALRM 4:ALRM
System timing source ^Z=help 12:21_
Connected 0:00:19 VT100 9600 8-N-1 SCROLL CAPS NUM Capture Print echo
```

Figure 6

Configuring the Dedicated Map

Figure 7 shows an overview of the Dedicated Map menu:

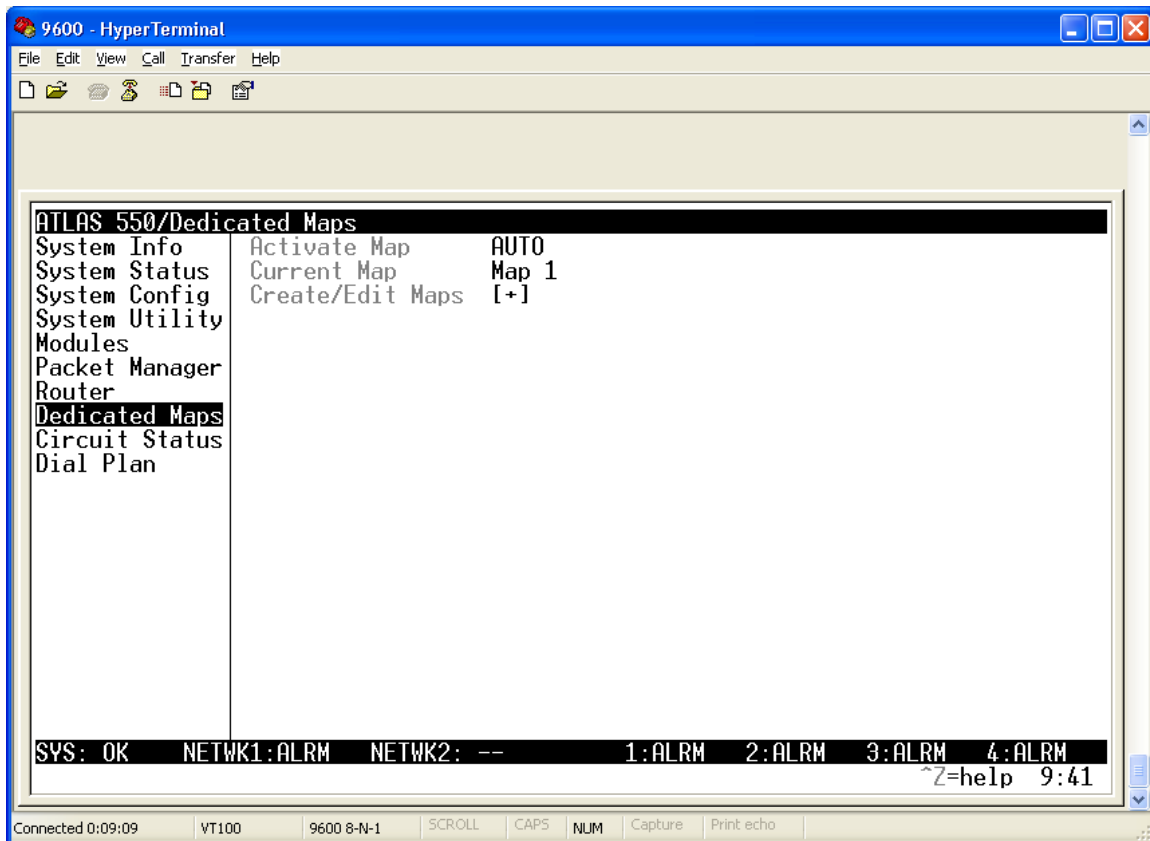


Figure 7

1. Arrow over and down to Create/Edit Maps and hit <Enter>
2. You will then see the five maps as shown in Figure 8. Right arrow over to the Connects for Map 1 and hit <Enter>

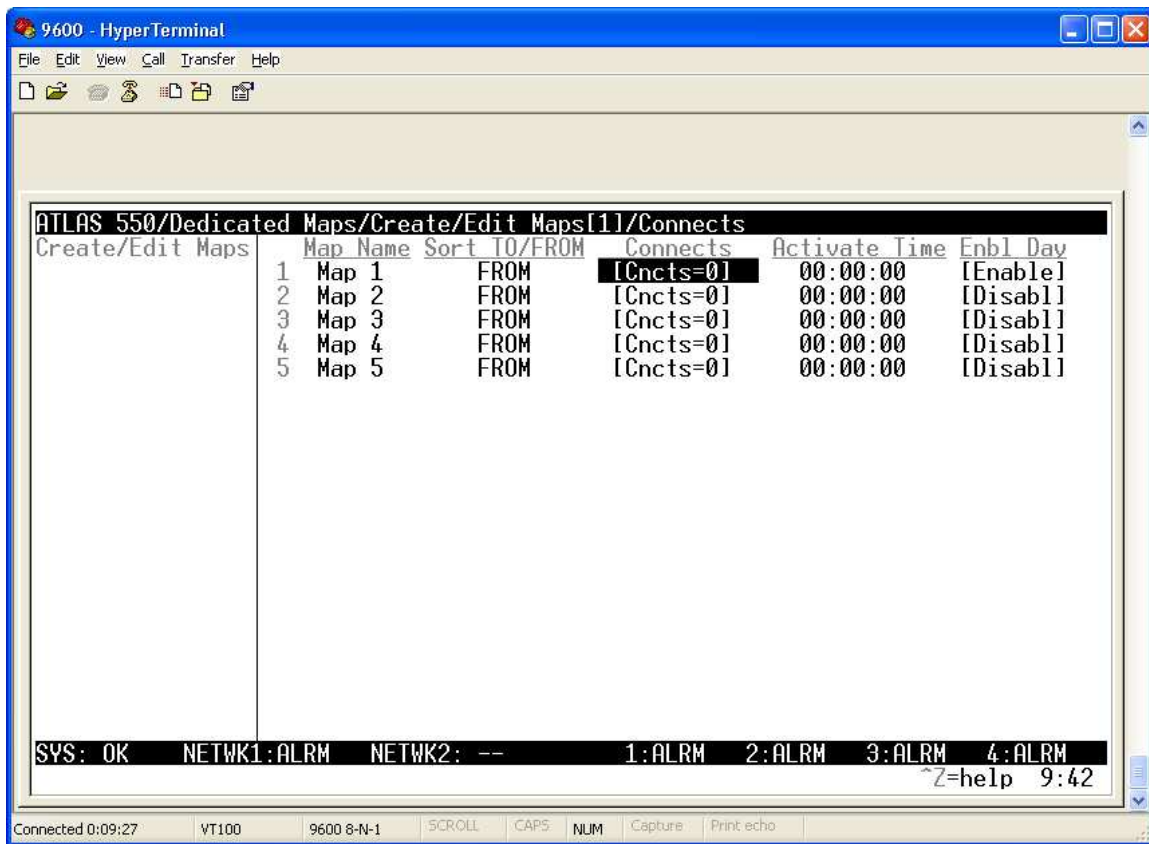


Figure 8

3. Right arrow and create the first entry in the connects for Map 1.
4. Here you will map the FXS ports to the DS0s of the T1 interface receiving the Feature Group D signaling. In our example this will be slot 1 port 2. (Slot 1 port 1 is in the Dial Plan sending the FGD signaling OUT of the ATLAS and the T1 cross-over cable then connects to slot 1 port 2 to RECEIVE the signaling.) **Figure 9** shows how the first entry should look. **Note:** The FXS port must be in the FROM Slot with the T1/PRI in the TO Slot.

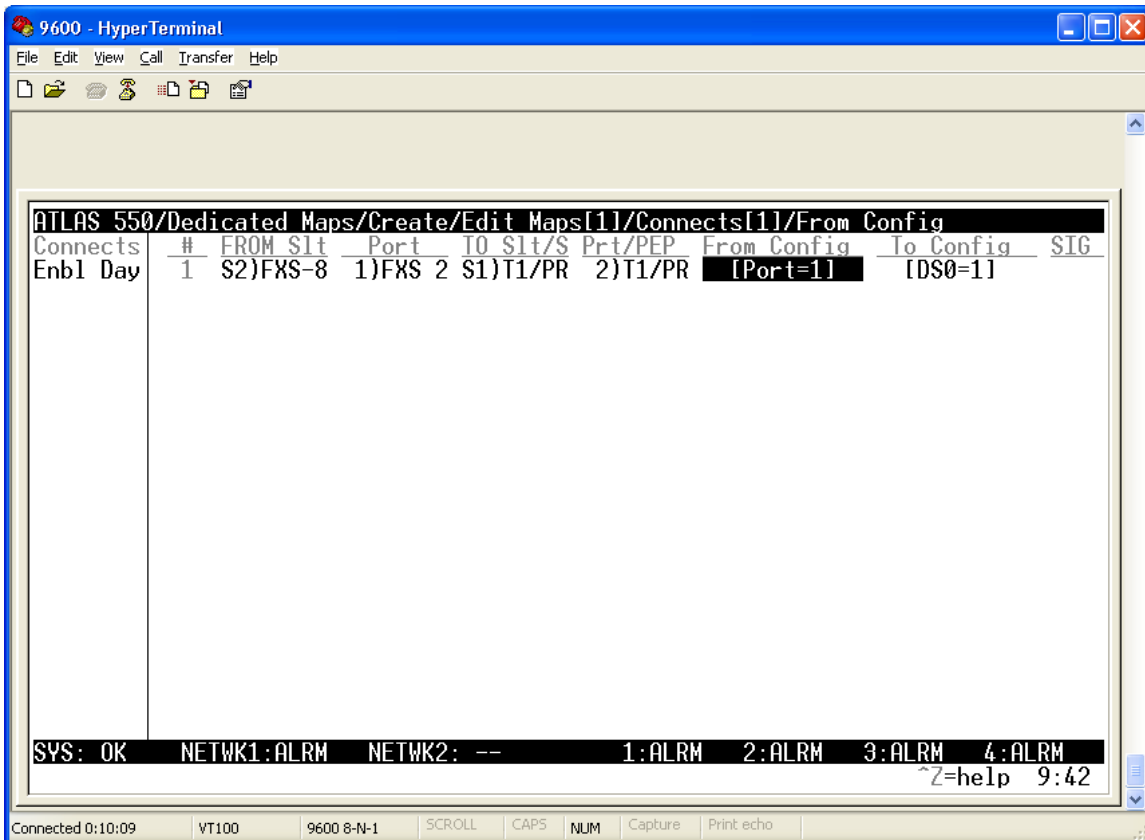


Figure 9

- Hit <Enter> on the From Config entry to configure the FXS ports. **Figure 10** shows the FXS options

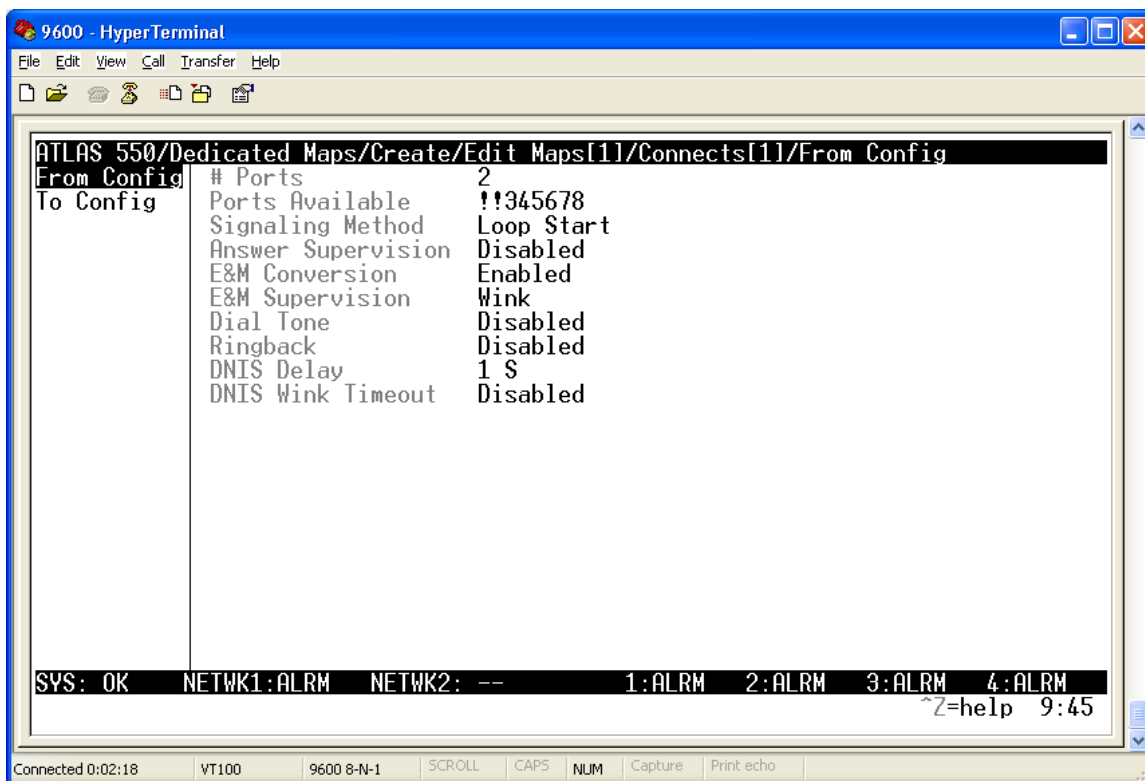


Figure 10

- # Ports – this is how many ports on the FXS module are to be configured in this connection. ADTRAN recommends no more than 2 FXS ports be configured on each connection.
- Ports Available – is a visual indication of the ports on the module that are available. “!” indicates

the ports being configured in this connection. “n” indicates the ports are configured in another Dedicated (nailed) Map connection. “s” indicates the port is used elsewhere in the switched dial plan.

- C. Signaling Method – defines the mode of operation for the voice port. (Loop Start is normally used)
 - D. Answer Supervision – this option configures answer supervision for the appropriate voice ports. Answer supervision (when the far end answers a call) is indicated by using reverse battery polarity. This is valid for an outbound call only. (Almost always set to Disabled)
 - E. E&M Conversion – allows the signaling on the T1 to be E&M even though the FXS module is using a different Robbed Bit Signaling method (Must be Enabled for this application)
 - F. E&M Supervision – this configures the E&M trunk as either Immediate start or Wink Start. (set to Wink in this application)
 - G. Dial Tone – use this option to generate dial tone out the associated FXS port in response to the 2-wire going off hook (outgoing call).
 - H. Ringback – this option generates a ring back tone to the far end while the associated FXS port is ringing
 - I. DNIS Delay – this option defines the time the ATLAS delays after transmitting a wink in response to the 2-wire going off hook (after ringing) before sending off hook in the RBS signaling. (allows for transmission of DID digits after the wink before “seizing” the channel) (ADTRAN recommends 1 second)
 - J. DNIS Wink Timeout – used in conjunction with DNIS Delay. When the DNIS delay option is set, a wink will be returned to the originating switch after 5 seconds if the FXS port does not detect an off hook state. When DISABLED it allows the FXS port to ring without winking until the call is answered.
6. Left arrow out of the From Configuration and then go to the To Configuration and hit <Enter>. **Figure 11** shows an example of this menu

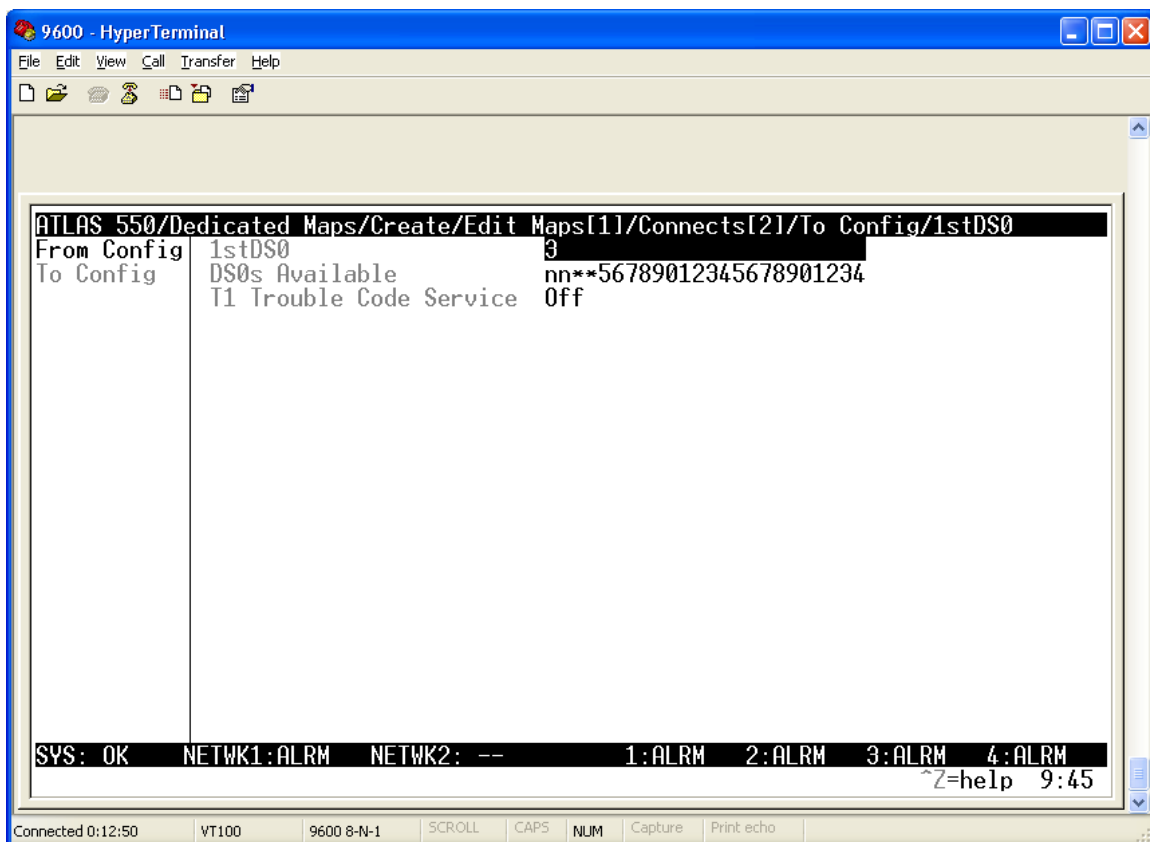


Figure 11

- A. 1st DS0 – this is the 1st channel of the T1 that the FXS port(s) in this connection will use. Since

we are mapping 2 FXS ports with each connection, the 1st DS0 will increase by two on each connection. Figure 11 shows the To Config for the second connection (channels 1 & 2 are “nailed,” 3 & 4 have the “*,” and 5-24 show as not configured)

- B. DS0s Available – a representation of the DS0s for the T1 in this connection. “!” indicates the DS0 is used by this endpoint. “*” indicates the DS0 is requested by this endpoint but has not yet been applied. “s” indicates it is used elsewhere in the switched dialplan. “n” indicates it is used in another connection in the dedicated (nailed) map
- C. T1 Trouble Code Service – sets known values in the signaling bits and the data field for outgoing DS0s which are cross-connected to a T1 port experiencing alarms

Figure 12 shows all 24 FXS ports mapped to the T1 interface:

Connects	#	FROM SlT	Port	TO SlT/S	Prt/PEP	From Config	To Config	SIG
Enbl Day	1	S2)FXS-8	1)FXS	2 S1)T1/PR	2)T1/PR	[Ports=1-2]	[DS0=1]	
	2	S2)FXS-8	3)FXS	2 S1)T1/PR	2)T1/PR	[Ports=3-4]	[DS0=3]	
	3	S2)FXS-8	5)FXS	2 S1)T1/PR	2)T1/PR	[Ports=5-6]	[DS0=5]	
	4	S2)FXS-8	7)FXS	2 S1)T1/PR	2)T1/PR	[Ports=7-8]	[DS0=7]	
	5	S3)FXS-8	1)FXS	3 S1)T1/PR	2)T1/PR	[Ports=1-2]	[DS0=9]	
	6	S3)FXS-8	3)FXS	3 S1)T1/PR	2)T1/PR	[Ports=3-4]	[DS0=11]	
	7	S3)FXS-8	5)FXS	3 S1)T1/PR	2)T1/PR	[Ports=5-6]	[DS0=13]	
	8	S3)FXS-8	7)FXS	3 S1)T1/PR	2)T1/PR	[Ports=7-8]	[DS0=15]	
	9	S4)FXS-8	1)FXS	4 S1)T1/PR	2)T1/PR	[Ports=1-2]	[DS0=17]	
	10	S4)FXS-8	3)FXS	4 S1)T1/PR	2)T1/PR	[Ports=3-4]	[DS0=19]	
	11	S4)FXS-8	5)FXS	4 S1)T1/PR	2)T1/PR	[Ports=5-6]	[DS0=21]	
	12	S4)FXS-8	7)FXS	4 S1)T1/PR	2)T1/PR	[Ports=7-8]	[DS0=23]	

SYS: OK NETWK1:ALRM NETWK2: -- 1:ALRM 2:ALRM 3:ALRM 4:ALRM
INS/DEL ^Z=help 9:49

Figure 12

The ATLAS is now configured so as to provide DID digits out the FXS ports in the *ANI*DNIS* format using DTMF tones.