



## TECH NOTE

# Configuring T1 and E1 Internet Access in AOS

## Overview

This guide explains how to configure an Adtran Operating System (AOS) router for T1/E1 Internet access. You should use this guide only if your AOS device will be directly connected to your ISP's T1 or E1.



**Figure 1 - T1/E1 Internet Access**

Your AOS device can provide all of the functionality (T1/E1 Access, Firewall, NAT and Routing) needed to act as a stand alone Internet Access Device. You may also use the AOS Device as a T1 Access Device and use an External Firewall Device to provide Firewall and Network Address Translation functionality.

## Hardware/Software Requirements

You will need the following list of information before you can properly configure your AOS router. Only your service provider and your Network Administrator can provide you this information.

- Public/WAN IP Address and Subnet Mask
  - o Sometimes referred to as "Customer Serial Address"
- LAN IP Address
  - o The router's address on the LAN
- Framing (ESF or D4) Format
- Coding (B8ZS or AMI) Format
- Data DS0s (Channels)
  - o You must know specifically what channels, not just a number of channels (Example: 8 through 14, not just '7 channels')
- Layer 2 Encapsulation Type (PPP, HDLC or Frame-Relay)

*For PPP Connections:*

- Username and Password for Layer 2 (not normally implemented)

*For Frame-Relay Connections:*

- DLCI Number for Internet Access (Example: 16)

### Private IP Scheme Considerations

If you plan to use private addressing (Examples: 10.x.x.x, 192.168.x.x or 172.16.x.x), you will need to use Network Address Translation (NAT). The AOS router can provide NAT or you can use an External Firewall Device to provide NAT. If you wish to use an External Firewall Device, you will need a block of Public IP Addresses assigned to you by your ISP. If you wish to use an External Firewall Device, you will not need to use the Firewall in the AOS.

*For External Firewall Device:*

- Block of Public IP Addresses assigned by ISP

## Hardware Requirements

You will need all of the following hardware to establish an Internet Connection using your AOS router.

- AOS Router and T1 or E1 NIM
- T1/E1 Cable for the WAN port
- Ethernet Cable for LAN Connection
- AOS Device Power Adapter/Cable

*For Console Access:*

- 9 Pin Male to 9 Pin Female Straight Through Serial Cable
  - o Not a NULL Modem Cable

If you are connecting the AOS device directly to another Ethernet Router, you may need an Ethernet cross-over cable. Crossover cables are used when connecting to like devices; routers and PCs should be considered like devices. For example, when connecting a PC directly to a router, a cross over cable must be used. A cross-over cable must be used when connecting two switches. It is important to note that NetVanta 1000 and 7000 series devices are switches with router functionality and therefore, when connecting to a PC, do not require a cross-over cable.

## Software Requirements

The following software will be needed for configuring your AOS router.

*For Web Interface Access:*

- A Web Browser w/ Javascript Support (Example: Internet Explorer or FireFox)

*For Console Port Access:*

- A VT100 Terminal Program (Example: HyperTerminal)

## Configuration Steps

To configure your AOS device, you will need either Web Interface access using a Web Browser (this does not require Internet Access), or a VT100 Terminal program (Example: HyperTerminal) to access the Console Port. You do not need to use both methods; choose one or the other. You can use the Console Port to configure IP Addresses and Enable the Web GUI if necessary. Please consult the guide "Enabling the Web GUI in AOS" for more information.

## Example Settings

This document will use the following settings as examples. You should not use these settings verbatim for your own network. Please review this document thoroughly and apply the information to your own network using your own settings.

*Example T1 Settings:*

- Coding: B8ZS
- Framing: ESF

- Data Channels (DS0s): 1 through 24

*Example IP Settings:*

- Private LAN: 10.10.10.0 with a 255.255.255.0 Subnet Mask
  - AOS Router: 10.10.10.1
  - PC used for Configuring: 10.10.10.2
  - Default Gateway for Computers in LAN: 10.10.10.1
- WAN IP Address: 65.65.65.65 with a 255.255.255.252 Subnet Mask
  - ISPs Gateway: 65.65.65.66

*Example Frame Relay Settings:*

- DLCI: 99

## Configuring via the Web Interface

From the factory your AOS comes with an IP Address of 10.10.10.1 on the private interface. If you have not altered the Private IP Address, configure your computer with an IP Address of 10.10.10.2. If the Private IP Address of the AOS router has been altered, configure your PC with an IP in the same subnet (range).

Use the table below to determine which Ethernet or switch port should be connected to your PC, and which type of cable to use.

**Table 1 - Private Port and Cable Type**

Product	Port to Connect	Ethernet Cable Type
NetVanta 1000 Series	Any Port	Straight Through
NetVanta 3200, 3205, 3305, 3430	Eth 0/1	Cross-Over
NetVanta 3448	Any switchport	Straight Through
NetVanta 4000 Series	Eth 0/1	Cross-Over
NetVanta 5000 Series	Eth 0/1	Cross-Over
NetVanta 7000 Series	Any Port	Straight Through

After configuring your computer's IP address and connecting the appropriate cable, open a web browser on your computer. In the web browser's address bar, enter the AOS device's private IP Address. If you do not receive a Login Prompt or you receive an error, please consult the Trouble Shooting section at the end of the guide.

The AOS device will prompt you for a user name and password. From the factory, AOS is configured with:

**Username:** admin  
**Password:** password

If you are unable to login, because the username and password are not working, please consult the guide titled "I lost the password to my AOS device".

Configuring Local Area Network Interface:

Click '**IP Interfaces**'.

Your LAN interface will vary based on your product, and port choice. If you are using a NetVanta 1000 or 7000 Series Router, your LAN interface will be a VLAN. Click on the Interface that has the IP Address you entered to access the Web Interface. It will either be an Ethernet port (Example: 'Eth 0/1') or a VLAN interface (Example: 'Default').

Scroll down to '**IP Settings**'.

Set '**IP Address Type**' to 'Static'.

Enter the **IP Address** and **Subnet Mask** that you would like to give your AOS router on your LAN. If you wish to have an External Firewall Device, you should enter an IP Address in the block of IPs given to you by your ISP; this will be different from the Public WAN IP (or Customer Serial IP). The IP Address you choose to enter, will be the Default Gateway for all of the devices on your LAN.

When you click **Apply**, you will immediately lose connection to your AOS router; you will not see an additional page. Close the Web Browser, reconfigure your computer's IP Address to be in the new subnet, open the web browser and access the AOS device using its new IP Address.

**IP Settings**

Address Type:

IP Address:  .  .  .

Subnet Mask:  .  .  .

Dynamic DNS:

**Secondary IP Settings**

IP Address	Mask
<a href="#">Add a new Secondary IP Address</a>	

Configuring the T1/E1 Interface:

Click '**Physical Interfaces**'.

Click '**T1 1/1**', where 1/1 in this example stands for *slot 1* and *port 1*. Your T1 or E1 may be in a different slot or port.

Check '**Enable**'

Set **clock source** to 'Line'. Your ISP should provide clocking.

Enter the appropriate **Framing**, **Coding** and **FDL**. Only your T1/E1 carrier can tell you the appropriate settings.

Select the first and last channels of your **Data DS0s**. If you have a 'Full T1' choose 1 to 24.

Choose the appropriate **DS0 Speed**; most likely 64Kbps, but your carrier can tell you.

Choose the Layer 2 **Encapsulation** type specified by your carrier.

Enable:

Clocking:

Framing:

Coding:

FDL:

Data DS0s:  to

Do not check the **Multilink** option, unless your carrier has told you otherwise. Multilink will only be used when using multiple T1s for a single Internet link.

Skip to the appropriate “Configuring...” section based on your Layer 2 Encapsulation protocol. Only your provider can tell you the appropriate T1 Layer 2 protocol to use.

#### Configuring PPP:

PPP is your WAN interface for Internet Access. On this screen you will configure your Layer 2 Encapsulation options and configure your routers Public IP Address (or Customer Serial Address).

Check '**Enabled**'.

Check '**Weighted Fair Queuing**'.

Set **MTU** to 1500, unless your ISP tells you otherwise.

Your ISP may tell you to set a **Default Peer Address**, and give you the appropriate address. Ignore this option unless your ISP tells you otherwise.

If your ISP has not given you a **Username and Password** specifically for PPP, skip this paragraph. If you have a Username/Password for PPP, you will also need to know the Authentication type (either PAP or Chap). Choose the appropriate Type, and enter the correct Username and password.

Set '**Peer Authentication Type**' to None.

Set '**IP Address Type**' to 'Static' if you have been given a static address. If your ISP has told you that you will not need to configure an IP Address on the T1 (not likely), choose 'Negotiated'.

Enter the Public WAN **IP Address** (or Customer Serial IP) and **Subnet Mask** given to you by your ISP.

Set **Dynamic DNS** to '<disabled>'.

Click '**Apply**'.

Skip to the “Adding a Default Route” section of this guide.

#### Configuring HDLC:

HDLC is your WAN interface for Internet access. On this page you will configure your Layer 2 Encapsulation Options, and configure your routers' Public IP Address (or Customer Serial Address).

Check '**Enabled**'.

Check '**Weighted Fair Queuing**'.

Set **MTU** to 1500, unless your ISP tells you otherwise.

**IP Settings**

Address Type: Static

IP Address: 65 . 65 . 65 . 65

Subnet Mask: 255 . 255 . 255 . 255

Dynamic DNS: <disabled>

**Secondary IP Settings**

IP Address	Mask
<a href="#">Add a new Secondary IP Address</a>	

Reset Apply

**IP Settings**

Address Type: Static

IP Address: 65 . 65 . 65 . 65

Subnet Mask: 255 . 255 . 255 . 255

Set **IP Address Type** to 'Static'.

Enter the Public WAN **IP Address** (or Customer Serial IP) and **Subnet Mask** given to you by your ISP.

Set **Dynamic DNS** to '<disabled>'.

Click **'Apply'**.

Skip to the "Adding a Default Route" section of this guide.

#### *Configuring Frame-Relay:*

Frame-Relay consists of a Frame-Relay interface and a Frame-Relay sub-interface. Your ISP will give you a DLCI number to use for Internet Access. The Frame-Relay Sub-Interface will be your WAN interface for Internet Access. On this page you will configure your Layer 2 Encapsulation Options, and on the Frame-Relay Sub-Interface page you will configure your routers Public IP Address (or Customer Serial Address).

Check **'Enabled'**.

Set **'Link Management Protocol'** to 'Auto'.

Check **'Weighted Fair Queuing'**.

Set **'Interface Type'** to 'Connect to a Switch (DTE)'.

Click **'Apply'**.

Scroll down to **'Configured Permanent Virtual Circuits for FR...'**.

Click **'Add'**.

Enter a **Description**, such as "Internet Access".

Enabled:

Link Management Protocol: Auto

Weighted Fair Queuing:

Interface Type: Connect to a switch (DTE)

Add a PVC

Add Detect PVCs ?

Enter the appropriate Fragment, Burst Size (BS), Excess Burst (BE) given to you by your ISP. Note that you may need to convert from bytes to bits (8 bits in a byte) if your ISP gives you these settings in bytes. You may leave these at zero.

Enter the **'DLCI Number'** given to you by your ISP.

Scroll down to **IP Settings**.

Set **IP Address Type** to 'Static'.

Enter the Public WAN **IP Address** (or Customer Serial IP) and **Subnet Mask** given to you by your ISP.

Set **Dynamic DNS** to '<disabled>'.

Click **'Apply'**.

IP Settings

Address Type: Static

IP Address: 65 . 65 . 65 . 65

Subnet Mask: 255 . 255 . 255 . 255

Dynamic DNS: <disabled>

Adding a Default Route:

Your AOS router needs a default route that tells it how to route traffic to your ISP.

Click **'Route Table'** in left menu.

Enter a **'Destination Address'** and **'Destination Mask'** of 0.0.0.0 and 0.0.0.0

Set the **Gateway** to type 'Interface'. Select the WAN Interface that you created above; either PPP, HDLC or FR.

Leave **'Administrative Distance'** blank.

Click **'Add'**.

Configuring the Firewall:

If you plan to use private IPs (Example: 10.x.x.x, 192.168.x.x or 172.16.x.x) you will need a router to provide NAT functionality. You can setup the Firewall and enable NAT on the AOS router by running the **Firewall Wizard**.

If you plan to use an External Firewall Device, you should not enable the firewall or run the Firewall Wizard on the AOS device. Simply configure the External Firewall Device with an IP Address from the Block of Public IPs, given to you by your ISP, and set the External Firewall Device's default gateway to be the LAN IP Address of the AOS device. The External Firewall Device's IP Address, and the AOS device's LAN Address will be in the same Public IP Subnet given to you by your ISP.

If you wish to enable the AOS device's firewall, click **'Firewall Wizard'**.

Click **'Next'** after reading the first screen.

Choose the **Public Interface** (HDLC, PPP or FR) that you configured above. Click **Next**.

If you plan to have servers on your Private Network that you would like to access from the Internet, you can use the Firewall Wizard to configure Port Forwards. For more advanced options, complete the firewall wizard and consult the "Configuring Port Forwarding in the Web Interface" guide.

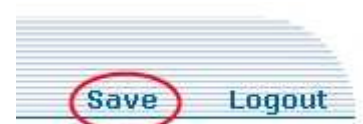
Click **Next**.

Click **Finish**.

Saving the Configuration:**It is important that you save your configuration!**

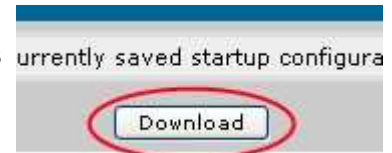
After you have completed configuring your AOS router, click the **'Save'** button in the top right corner.

You should also consider downloading the configuration to your desktop. This ensures that you will always have a backup copy of the configuration for your router.



Click '**Configuration**' in the left hand menu.

Click '**Download Configuration**'. Save this file on your computer, and create backup copies. You can use this file to restore your router to its current settings.



## Configuring via the Command Line Interface

Your AOS device can be completely configured in the Command Line Interface via its Console Port or a Telnet Session. Those users unfamiliar with the Command Line Interface are advised to use the Web Interface for configuration. To learn how to enable the Web Interface, consult the guide titled "Enabling the Web GUI".

### Command Line Help Information:

You can find a list of all commands available at any time, by typing a question mark. For example, simply type '?' at any command prompt to see a list of commands for that prompt. You can also use '?' to show sub commands. For example, in enable mode type 'configure', press the space bar, and then type '?'. You will see all of the sub commands for the command 'configure'; the most commonly used is 'terminal'.

### Accessing the Command Line Interface:

To access the unit via Telnet, simply use a Telnet program (Example: 'telnet' in a dos prompt). From the factory your AOS device comes with an IP Address of 10.10.10.1 on its first Ethernet interface. If you are unable to telnet to the unit, you will need to use the console port.

To access the unit via the Console Port, connect a PC with a 9 Pin Male to 9 Pin Female straight through serial cable. Use a VT 100 Emulator (Example: HyperTerminal) and set the connection properties to 9600 Baud, 8 data bits, No Start Bits, 1 Stop Bit and No Flow control. After starting the session, you may need to press Return once to view the first prompt.

By default all passwords are the word password. If you are not able to enter the correct password, consult the guide title "I lost the password to my AOS device".

After you have gained access to the Command Line Interface, via Console or Telnet, use these instructions.

Type the command **enable** to access Enable Mode.

Type the command **configure terminal** to enter Global Configuration Mode.

### Configure the Private LAN Interface:

Depending on your AOS product, the private LAN interface type will vary. Use the table below to determine which interface to use as the private interface.

**Table 2 - Private Interfaces**

Product	Private Interface Name
NetVanta 1000 Series	Vlan 1
NetVanta 3200, 3205,	Eth 0/1



3305, 3430	
NetVanta 3448	Vlan 1
NetVanta 4000 Series	Eth 0/1
NetVanta 5000 Series	Eth 0/1
NetVanta 7000 Series	Vlan 1

For NetVanta 1000 series, 7000 series, and 3448:

Type **interface vlan 1**

For All Other AOS Products:

Type **interface eth 0/1**

Choose an IP Address you would like to assign to this private interface. If you plan to use an External Firewall Device, you should assign the Ethernet port of your AOS device an IP from the Block of Public IPs given to you by your ISP. You may also use a private IP Address. In this example we will use the private IP 192.168.1.1, and the subnet mask 255.255.255.0

Type the command **ip address 192.168.1.1 255.255.255.0**

Enable this interface. Type the command **no shutdown**.

Configure the T1/E1 Interface:

Determine the appropriate Interface Type (T1 or E1), the slot and the port number of your T1 interface. This example uses a T1 interface in Slot 1 and Port 1.

Type **interface t1 1/1** to access configuration mode for the T1.

First, set the framing mode (either ESF or D4). Only your provider can tell you the correct setting; most likely ESF. For this example we will use Extended Super Frame (ESF).

Type **framing esf**

Next, set the T1 line coding mode (either B8ZS or AMI). Only your provider can tell you the correct setting; most likely B8ZS. For this example we will use B8ZS.

Type **coding b8zs**

Set the T1 clock source to line. Your provider should be providing T1 clocking.

Type **clock source line**

Create a TDM Group that identifies which T1 channels to use for data transport. Only your service provider can tell you exactly which channels to use. Note that this command specifies at which timeslots the range starts and ends, not how many timeslots to use. The digit after "tdm-group" is called the 'tdm-group number', and can be anything you like; this example creates tdm-group number 9. In this example we will use all 24 T1 channels for data.

Type **tdm-group 9 timeslots 1-24**

Turn on the T1 interface with the command **no shutdown**.

Configure the WAN Layer 2 Interface (PPP, HDLC or Frame-Relay):

The T1 Layer 2 Encapsulation type determines how data is transported over your T1, and will vary with your provider. Only your provider can tell you the appropriate T1 Layer 2 Encapsulation type to select; either PPP, HDLC or Frame-Relay. Use the sections below to configure the appropriate Layer 2 Encapsulation Type.

#### *Configuring PPP:*

Create a PPP interface with the command **interface ppp 1**.

Your ISP will assign your router a WAN IP Address, sometimes named the 'Customer Serial Address'. This IP Address will be outside the 'block' or 'range' of Public IP Addresses also assigned to you by your ISP. Assign the WAN IP Address to the PPP interface. This example uses 65.65.65.65 as the WAN IP Address, and a subnet mask of 255.255.255.252.

Type **ip address 65.65.65.65 255.255.255.252**

Enable the interface with the command **no shutdown**.

#### *Configuring HDLC:*

Create a PPP interface with the command **interface hdlc 1**.

Your ISP will assign your router a WAN IP Address, sometimes named the 'Customer Serial Address'. This IP Address will be outside the 'block' or 'range' of Public IP Addresses also assigned to you by your ISP. Assign the WAN IP Address to the PPP interface. This example uses 65.65.65.65 as the WAN IP Address, and a subnet mask of 255.255.255.252.

Type **ip address 65.65.65.65 255.255.255.252**

Enable the interface with the command **no shutdown**.

-

#### *Configuring Frame-Relay:*

Frame-Relay consists of two interfaces. The Frame-Relay interface and the Frame-Relay sub-interface. The sub-interface will specify your WAN IP Address, and DLCI number.

Type **interface fr 1** to create a Frame-Relay interface.

Type **frame-relay lmi-type auto**, to automatically detect the appropriate LMI type.

Enable the Frame-Relay interface with the command **no shutdown**.

Type **interface fr 1.1** to create a Frame-Relay sub-interface.

Your ISP will assign your router a WAN IP Address, sometimes named the 'Customer Serial Address'. This IP Address will be outside the 'block' or 'range' of Public IP Addresses also assigned to you by your ISP. Assign the WAN IP Address to the PPP interface. This example uses 65.65.65.65 as the WAN IP Address, and a subnet mask of 255.255.255.252.

Type **ip address 65.65.65.65 255.255.255.252**

Your provider will give you a DLCI number to use for your Internet Access PVC. Apply the DLCI number to this frame-relay subinterface. This example uses frame-relay DLCI 16.

Type **frame-relay interface-dlci 16**

Create a Cross-Connect:

Create a cross-connect between the Layer 2 Encapsulation Interface and the 'tdm-group' in the T1 interface. This logically connects this Layer 2 Encapsulation interface with the T1 for transport. Each cross-connect in your router must have a unique cross-connect number; this example creates cross-connect number 7. The cross-connect command specifies a T1 interface, including slot and port number; this example uses t1 1/1. The cross-connect command also specifies the 'tdm-group number' for the T1 interface; this example uses tdm-group number 9 (created above). The cross-connect command also specifies the logical interface. This example shows three different cross-connects, one for each Layer 2 Encapsulation type; choose only one based on your own Layer 2 Encapsulation type.

*For PPP:*

**cross-connect 7 t1 1/1 9 ppp 1**

*For HDLC:*

**cross-connect 7 t1 1/1 hdlc 1**

*For Frame-Relay:*

**cross-connect 7 t1 1/1 fr 1**

Note that the frame-relay cross connect specifies the Frame-Relay interface (FR 1), not the Frame-Relay Sub Interface (FR 1.1).

Create a Default Route:

Your AOS router needs a default route that tells it how to route traffic to your ISP.

Return to configuration mode by pressing **CTRL-Z** and typing **configure terminal**.

A default route is defined as all zeros (Example: 0.0.0.0) for both the destination and subnet, and points to the ISP. You can substitute a destination IP address, with the WAN interface that is connected to your ISP. The examples below show three different default routes, one for each Layer 2 Encapsulation type; choose only one.

*For PPP:*

**ip route 0.0.0.0 0.0.0.0 ppp 1**

*For HDLC:*

**ip route 0.0.0.0 0.0.0.0 hdlc 1**

*For Frame-Relay:*

**ip route 0.0.0.0 0.0.0.0 fr 1.1**

Note that the Frame-Relay default route specifies the Frame-Relay Sub-Interface (FR 1.1) not the Frame-Relay Interface (FR 1).

### Configure the Firewall:

If you plan to use private IPs (Example: 10.x.x.x, 192.168.x.x or 172.16.x.x) you will need a router to provide NAT functionality. The following instructions will configure the firewall and NAT.

If you are not going to use a firewall, and do not need NAT, skip to “Save the Configuration.”

If you plan to use an External Firewall Device, you should not enable the AOS device’s firewall. Simply configure the External Firewall Device with an IP Address from the Block of Public IPs, given to you by your ISP, and set the External Firewall Device’s default gateway to be the LAN IP Address of the AOS device. The External Firewall Device’s IP Address, and the AOS device’s LAN Address will be in the same Public IP Subnet given to you by your ISP.

Note that the AOS device’s firewall is very flexible and these configuration steps only briefly describe its capabilities. To learn more about the firewall please consult the guide title “Configuring Access Control Policies and Lists”.

Return to configuration mode by pressing **CTRL-Z** and typing **configure terminal**.

You will create a policy class that controls the AOS device’s private interface. You will create two rules. One that allows access to the AOS device and one that provides NAT functionality.

#### *Create the Private Policy Class:*

Type **ip policy-class Private** to create the Private policy-class.

Type **allow list MATCHALL self** to create a rule that will allow access to the AOS device from your LAN.

The next rule will create a Network Address Translation rule. These examples show how to create the NAT rule for all three Layer 2 Encapsulation types; choose only one.

*For PPP:*

**nat source list MATCHALL interface ppp 1 overload**

*For HDLC:*

**nat source list MATCHALL interface hdlc 1 overload**

*For Frame-Relay:*

**nat source list MATCHALL interface fr 1.1 overload**

Note that the Frame-Relay example references the Frame-Relay Sub-Interface (FR 1.1) not, the Frame-Relay Interface (FR 1).

Type **exit** to leave the policy-class configuration.

#### *Create MATCHALL Access List:*

Type **ip access-list standard MATCHALL** to create an access-list named ‘MATCHALL’. This is used by the rules in the Private policy-class created above.

Type **permit ip any** to allow all hosts on the LAN to use both rules.

Type **exit** to leave the access-list configuration.

*Apply the Private Policy Class:*

Next, the Private policy class must be applied to the private interface. Remember that 1000 & 7000 Series products use vlans.

*For NetVanta 1000 & 7000 Series:*

Type **interface vlan 1**

*For All Other AOS Products:*

Type **interface eth 0/1**

Type **access-policy Private**, to apply the Private policy class to the Eth 0/1 interface.

Type **exit** to leave the Ethernet interface.

*Enable the Firewall:*

Finally, the firewall must be enabled. If you are in a telnet session you may loose connection to the router. Simply close the telnet session and open a new session.

Type **ip firewall**

Save the Configuration:

**It is important that you save your configuration!**

Press **CTRL-Z**.

Type the command **write**. Your configuration has now been saved.

You should create a backup copy of the routers configuration on your computer. To create a backup of the running configuration use the command start a log capture of the console output.

Type **show run**

Press **Space Bar** until then end of the running configuration; noted by returning to a command prompt.

Save the output of show run as a text file. This text file can later be used to restore the configuration to the router.

## Example Configuration

N/A

## Troubleshooting

*I am unable to connect to the Web Interface.*

If after entering the AOS device's IP Address, you do not receive a login prompt, you will need to use the Console Port to configure the router for Web Interface access. The guides "I lost the password to my AOS device" and "Enabling the Web GUI" explain how to use the Console port to gain access to

your AOS router, and how to enable the web interface.

*I have finished the guide, but my Internet Access doesn't work.*

Troubleshooting the AOS router should be performed in this order. The following guide will go over these steps.

- 1) Check T1 Status and Errors
- 2) Check Layer 2 Encapsulation Status and Errors
- 3) Attempt to ping the ISP from the AOS device
- 4) Attempt to ping the ISP from a PC
- 5) Attempt to ping DNS Server from a PC

*Check T1 Status and Errors:*

In the Web Interface click **Physical Interfaces** and then click **T1 1/1** (remember to choose the appropriate T1 for your router). Scroll down to **Status for T1 1/1**. Look for the Line Status.

In the Command Line Interface type the command **show interface t1 1/1**. The interface status is on the first line ("T1 1/1 is..."). The Line Status is indicated half way down the first screen. The Interface statistics are listed in the paragraph that starts with "Current Performance Statistics".

*Check T1 Status:*

If the T1 interface status is UP, skip to "Checking T1 Errors". If the T1 Line Status is not 'UP', there will be an error code that determines the next troubleshooting step. Read the following bullet points in order. If the Error code is in the T1 Line Status list, read the associated instructions.

- Error Code: Blue
  - Call your T1 Service Provider, report the blue alarm
- Error Code: Yellow (not Tx Yellow)
  - Double check or change your T1 wiring
  - Contact AdTran Tech. Support
  - Call your service provider, ask for an onsite technician to hard loop the Smart Jack
- Error Code: Red LOS, Tx Yellow
  - Double check your T1 wiring
  - Call the service provider, have them perform a hard loopback test on the customer side of the smart jack
- Error Code: Red LOF, Tx Yellow
  - Double check that the T1 clock source is set to 'line'
  - Double check that the T1 framing setting on the AOS device matches the carriers specifications
  - Call the provider and ask them to check their framing and clocking

*Checking T1 Errors:*

If your AOS device's T1 interface is continually reporting Errored seconds, follow these instructions; otherwise skip to "Check Layer 2 Encapsulation Status and Errors". The main bullet point describes a symptom, and each sub-bullet describes a series of solutions. Check for each of these symptoms, and

perform the solutions in order.

- Continually Counting “Controlled Slip Seconds”
  - Double check the AOS device’s T1 clock source is set to “line”
  - Ask carrier to double check their clocking
- Continually Counting Line Code Violations
  - This test is best done when passing traffic
  - Test the Wiring between the smart jack and the AOS device
  - Perform a loopback test on the AOS device; guide named “Performing a T1/E1 Loopback Test on a AOS Router”
  - Ask the carrier to perform a hard loop test on the customer side of their Smart Jack
- Continually Counting Path Code Violations & no Line Code Violations
  - The error does not exist with your router, call the carrier

#### *Check Layer 2 Encapsulation Status:*

In the Web Interface click **Physical Interfaces** and then click **PPP 1, HDLC 1 or FR 1** (this will be directly to the right of your T1 interface). Scroll down to “**Status for ...**” Look for the Link State.

In the Command Line Interface type the command “show interface ...” that corresponds with the Layer 2 Encapsulation interface you created while configuring the router. For example, if you created the interface PPP 1, type **show interface ppp 1**.

#### *For PPP:*

If the link state says “UP” and the “Peer IP Address” is not 0.0.0.0, skip to “Ping the ISP from the AOS device”. Otherwise, login via the command line (instructions are at the top of ‘Configuring via the Command Line), issue these commands and forward the output to AdTran Technical Support.

```
enable
show version
show run
show interface
debug ppp verbose
```

#### *For HDLC:*

If the “Line Status” says “UP”, skip to “Ping the ISP from the AOS device”. Otherwise login via the command line (instructions are at the top of ‘Configuring via the Command Line’), issue these commands and forward the output to AdTran Technical Support.

```
enable
show version
show run
show interface
```

#### *For Frame Relay:*

If the “Frame Relay LMI Status” says UP check the Frame-Relay Sub Interface status. The frame-relay sub interface status can be found under “Configured Permanent Virtual Circuits...” in the Web Interface, and in the output of the **show interface fr 1.1** command in the Command Line Interface. If

the Frame-Relay Sub Interface status says "Active" skip to "Ping the ISP from the AOS device". Otherwise login via the command line (instructions are at the top of 'Configuring via the Command Line'), issue these commands and forward the output to AdTran Technical Support.

```
enable
show version
show run
show interface
debug frame-relay events
debug frame-relay lmi
```

*Ping the ISP from the AOS device:*

After verifying that the T1 is UP, and the Layer 2 Interface is UP or Active, use a ping test to verify IP connectivity between the AOS device and the ISP. Login via the command line of the AOS router (instructions are at the top of 'Configuring via the Command Line'). You will need to know your ISP's gateway IP Address; only your ISP can give you this information. Ping the ISP's gateway IP Address; in this example it is 5.5.5.5.

```
ping 5.5.5.5
```

If the output shows five exclamation marks (Example: !!!!!) towards the bottom, the ping was successful and you should skip this paragraph. If the output shows five asterisks (Example: \*\*\*\*\*), the ISP's gateway is not responding. Please contact the ISP. If the output shows five hyphens (Example: -----), double check that you have added a default route, and that the T1 and Layer 2 interfaces are UP or Active.

*Ping the ISP from a PC:*

From the command line of your Windows PC ping your ISP's gateway. In this example, the ISP's gateway is 5.5.5.5, you will need to contact your ISP to ask for their gateway IP Address.

```
ping 5.5.5.5
```

If the ping is successful, your AOS device is properly configured; be sure to save the configuration. If the ping is not successful, check your computer's "Default Gateway" setting. Your computer's default gateway should be the AOS device's LAN IP Address. Your computer's IP and the AOS device's LAN IP should be in the same IP Subnet.

If you experience any problems using your ADTRAN product, please contact [ADTRAN Technical Support](#).

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