TECHNICAL SUPPORT NOTE
Configuring PPP over a T-1 to a Remote Site in AOS

Introduction

The following steps outline configuring a PPP virtual Interface on the corporate router. This example is for a point to point T1 connection between two sites using DS0s 1 - 10 and where clocking is provided on the circuit.

*Before You Begin

Prior to configuring PPP in your NetVanta router, obtain all necessary IP address assignments from the network administrator for the LAN and WAN at each site. All circuits should be installed and tested prior to the installation of your router.

The global configuration mode must currently be active and can be verified at the prompt of your unit displays **Router(config)#**.

If you are not currently in config mode, please type **config terminal** at the router# privileged prompt.

Configuring the T1 Network Interface:

For this example we will configure a T1 network interface with DS0's 1 – 10 for data.

1 - Enter interface t1 1/1 to activate the interface configuration mode for the T1 network interface.

2 - Enter clock source line to configure the router to recover clocking from the T1 network connection (this is the default setting).

```
Router(config)# interface t1 1/1
Router(config-t1 1/1)# clock source line
Router(config-t1 1/1)# no shutdown
```

Figure 1: T1 Network Interface Configuration Example

Creating the T1 Interface TDM Group:

This section shows how to create a TDM group of 10 DS0's (1 – 10, 640 Kbps) on the T1 network connection.

1- Enter **tdm-group 1 timeslots 1-10** to create a TDM group for DS0's 1 – 10 on the T1 network connection (t1 1/1).

NOTE: For a full T1 the command **tdm-group 1 timeslots 1-24** would be used instead.

2 - Enter **exit** to return to the global configuration mode.

```
Router(config-t1 1/1)# tdm-group 1 timeslots 1-10
Router(config-t1 1/1)# exit
```

Figure 2: T1 Interface TDM-Group Configuration Example

Configuring the PPP Interface:

This section shows how to create a virtual PPP endpoint named PPP 1.

1 - Enter **interface ppp 1** to create a virtual Interface named PPP 1.

2 - Enter **no shutdown** to activate the interface to pass data.

```
Router(config)# interface ppp 1
Router(config-ppp 1)# no shutdown
```

Figure 3: PPP Interface Command Example

Configuring the PPP Interface IP Parameters:

This section shows how to configure the virtual PPP endpoint labeled 1 with an IP address.

1 - Enter **ip address 192.22.72.1 255.255.255.252** (for example) to assign an address to the PPP endpoint using a 30 bit mask.

```
Router(config-ppp 1)# ip address 192.22.72.1
255.255.255.0
```

Figure 4: PPP IP Configuration Example

Configuring Authentication:

This section covers the (optional) authentication commands for the PPP interface. Authentication methods must match at both ends of a PPP connection.

Using PAP:

1 - Set the transmitted PAP username and password with the **ppp pap sent-username PAP-USERNAME password PAP-PASSWORD** command. Replace "PAP-USERNAME" and "PAP-PASSWORD" with the proper credentials.

2 - If the remote peer will be authenticating to the local router using PAP enter the **ppp authentication pap** command to enable PAP authentication on the local router's PPP virtual interface. Next, set the receive username and password with the **username USERNAME password PASSWORD** command. Replace "USERNAME" and

"PASSWORD" with the proper credentials.

```
Router(config-ppp 1)# ppp pap sent-username PAP-USERNAME password PAP-
PASSWORD
Router(config-ppp 1)# ppp authentication pap
Router(config-ppp 1)# username USERNAME password PASSWORD
```

Figure 5: PAP Authentication Configuration Example

Using CHAP:

1 - If CHAP is being used set the transmitted CHAP username with the **ppp chap hostname CHAP-USERNAME** command, and set the transmitted CHAP password with the **ppp chap password CHAP-PASSWORD** command. Replace "CHAP-USERNAME" and "CHAP-PASSWORD" with the proper credentials.

2 - If the remote peer will be authenticating to the local router using CHAP enter the **ppp authentication chap** command to enable CHAP authentication on the local router's PPP virtual interface. Next, set the receive username and password with the **username USERNAME password PASSWORD** command. Replace "USERNAME" and "PASSWORD" with the proper credentials.

```
Router(config-ppp 1)# ppp chap hostname CHAP-USERNAME
Router(config-ppp 1)# ppp chap password CHAP-PASSWORD
Router(config-ppp 1)# ppp authentication chap
Router(config-ppp 1)# username USERNAME password PASSWORD
```

Figure 6: CHAP Authentication Configuration Example

Creating the Cross-Connect:

This section shows how to create a cross-connect to map the TDM group containing the 10 DS0s on t1 1/1 to the virtual PPP interface.

1 - Enter **cross-connect 1 t1 1/1 1 ppp 1** to connect DS0s 1 – 10 of the T1 network connection (t1 1/1 TDM group 1) to the virtual PPP interface 1. The cross-connect "1" is a label.

2 - Enter **exit** to return to the global configuration mode.

```
Router(config-ppp 1)# cross-connect 1 t1 1/1 1 ppp 1
Router(config-ppp 1)# exit
Router(config)#
```

Figure 7: Cross-Connect Command Example

Creating a Static Route:

This section shows how to create a static route to the network on the opposite side of the T1.

1 - For example, enter **ip route 192.168.2.0 255.255.255.0 ppp 1** to create a static route to the far side network. In this example we are assuming the 192.168.2.0 /24 network is on the other side of the T1 connection.

```
Router(config)# ip route 192.168.2.0 255.255.255.0 ppp 1
```

Figure 8: Static Route Configuration Example

Saving the Configuration:

1 - Verify that the prompt of your unit displays **Router#**. If you are still in configuration mode, type **end** and hit enter.

2 - Enter **copy running-config startup-config** to save the configuration. The command **copy run start** is also acceptable to perform the same task.

```
Router(config)# end
Router# copy running-config startup-config
```

Troubleshooting:

This section covers debug options for PPP.

1 - Use the **debug ppp** command to activate debug messages associated with Point-to-Point Protocol (PPP) operation in the ADTRAN OS. Debug messages are displayed (real-time) to the terminal (or telnet) screen. Use the **no** form of this command to disable the debug messages.

a. **debug ppp authentication -** Activates debug messages pertaining to PPP authentication (CHAP, PAP, EAP, etc.)
b. **debug ppp errors -** Activates debug messages that indicate a PPP error was detected (mismatch in negotiation, authentication, etc.)
c. **debug ppp negotiation -** Activates debug messages associated with PPP negotiation
d. **debug ppp verbose -** Activates detailed debug messages for PPP operation.

Router# debug ppp [authentication | errors | negotiation | verbose]

Figure 10: Debug Commands

1 - Use the **show interface (T1 1/1, or DDS 1/1, or Serial 1/1)** command to indicate the state of the physical layer

2 - Use the **show int ppp 1** command to show the state of the PPP connection.

```
Router#show int ppp 1

PPP 1
Link state is OPENED
Internet address is 192.168.1.1, Mask is 255.255.255.0
Far end internet address is 192.168.1.2
MTU is unknown
BW 1544 Kbit
Keepalive set (10 sec)
Authentication protocol is NONE
OPEN: LCP, IPCP
CLOSED: Bridge
8 packets input, 134 bytes
```

```
Received 8 broadcasts
0 input errors, 0 discards
9 packets output, 162 bytes
0 output errors, 0 discards
```

Figure 11. Show Interface Command

If you experience any problems using your ADTRAN product, please contact ADTRAN Technical Support.

DISCLAIMER

ADTRAN provides the foregoing application description solely for the reader's consideration and study, and without any representation or suggestion that the foregoing application is or may be free from claims of third parties for infringement of intellectual property rights, including but not limited to, direct and contributory infringement as well as for active inducement to infringe. In addition, the reader's attention is drawn to the following disclaimer with regard to the reader's use of the foregoing material in products and/or systems. That is:

ADTRAN SPECIFICALLY DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL ADTRAN BE LIABLE FOR ANY LOSS OR DAMAGE, AND FOR PERSONAL INJURY, INCLUDING BUT NOT LIMITED TO, COMPENSATORY, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES.