V.90 Modem Testing with the TSP

The Telecom Simulation Platform (TSP) gives the ability to test V.90 modems with a remote access server (RAS). The block diagram below shows a RAS connected to the T-1 port on the TSP and a modem connected to a POTS port on the TSP. This diagram also shows a FTP server for use in downloading files to the dial in client for determining the speed of the connection.

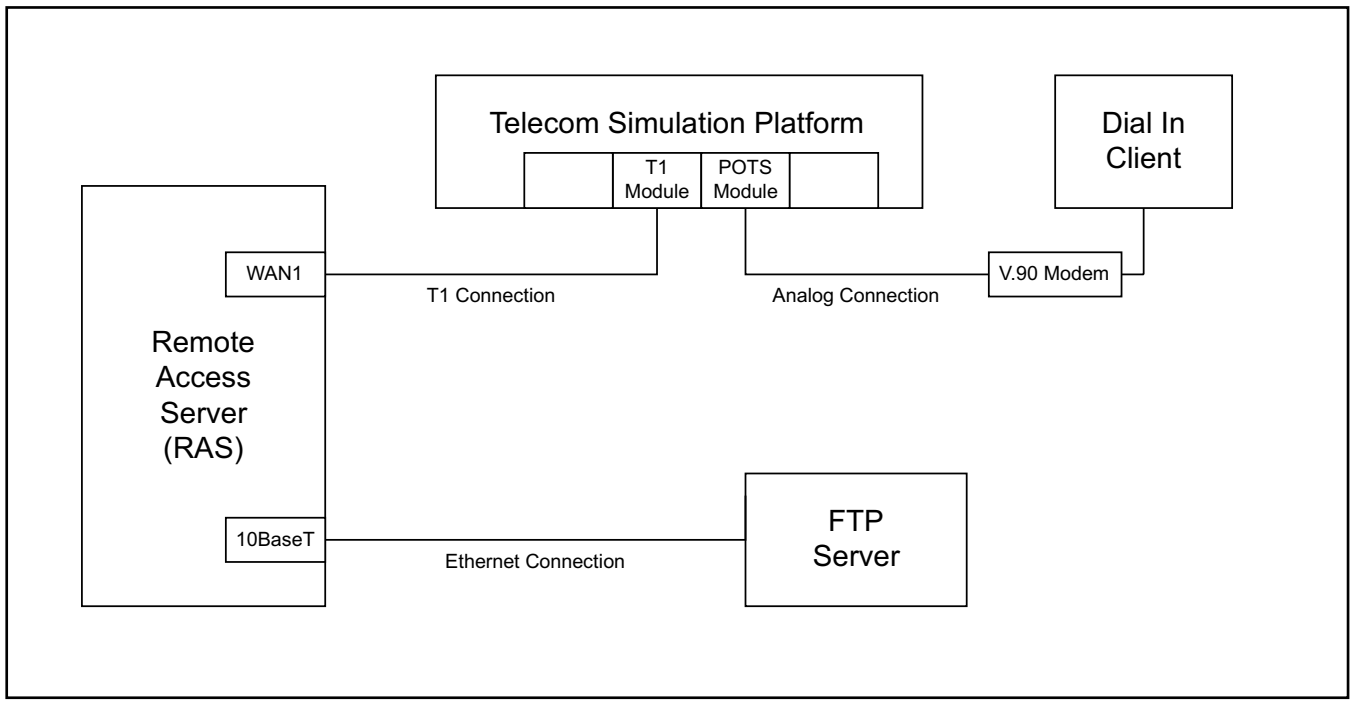

Figure 1 Block Diagram

Equipment Needed

1. TSP base unit with a Single or Dual T-1 module and a 4 or 8 channel POTS module
2. A Remote Access Server (RAS) with T-1 connectivity and V.90 capability.
3. A FTP server with an Ethernet connection to the RAS
4. A V.90 modem with a PC connected

Set-up

1. Connect the V.90 modem to a port on the POTS module. Multiple modems can be tested simultaneously by connecting each modem to a separate POTS channel.
2. Connect the T-1 port on the RAS to a port on the T-1 module of the TSP. A cable that is wired per the RJ-48C standard for T-1 (an ethernet cable will not work).
3. Connect the appropriate Serial or Ethernet cable for controlling the TSP to the PC or Network. See Basic Hardware Setup section in the TSP manual for more details.
4. Power up the TSP.
5. Launch the TSP Software.
6. Go to the Units menu and choose New. Give the TSP a name and click OK.

7. On the General tab of the Units screen choose the appropriate connection that will be used for programming and control. If using Serial, select the appropriate CommPort. For Network, input the IP that has been previously assigned to that TSP. See Units section of the TSP manual for more details.
8. Click Query Card Types.
9. Click on Slot 2 and verify it is configured for a T-1 module. Configure the TSP framing and line coding to match the RAS and assign one unit to internal clock and the other to external clock. Configure the T-1 parameters on the TSP software accordingly. Click OK.

Note: To avoid timing slips, configure the TSP for Internal clocking if the RAS is using external clock. The TSP needs to be set for External clocking if the RAS is providing clocking.

10. On the same screen, assign a Phone Number for each channel of the T-1. 2 to 16 digits can be used. The Wizard option can also be used to assign a number to all channels at once. See the Channel Configuration Wizard section of the TSP manual for more details.
11. Click on Slot 3 and verify it is configured for a POTS module. It's not necessary to assign Phone Numbers to the POTS channels since the calls will only be from the POTS channel to the T-1 channel. Click OK.
12. It this point, verify there is a green light on the T-1 module in the TSP next to where the T-1 cable is connected. If red, troubleshoot the configuration. See Troubleshooting section of the TSP manual.

Note: Ensure the RAS is powered on and its T-1 is configured accordingly. If using a Dual T-1 Module and only one port is connected to equipment under test, there will be a red alarm on the module and on the main TSP screen for the T-1 port not being used.

13. Verify on the TSP main screen there is a green circle next to the T-1 port being used for testing on the Display tree. If red, try re-initializing the unit by going to the Units menu, choose Initialize then the name of the unit.
14. Go to Control Sets menu and choose New. Give the control set a name and click OK.
15. Configure the TSP for Dialed at the Control Set Type field. Two template fields will appear.
16. Create two New templates for the control set. This can be done by clicking on the New button next to the template fields. Click on the top New button. Name the template for the POTS channel and click OK. A Template screen will appear.
17. Choose Analog Loop Start for the Channel Protocol.
18. Click on the Dialed radio button for the Default Timing Set. Click OK. The top template field will automatically populate with the template just created.
19. Click on the lower New button. Name the template for the T-1 channel protocol and click OK. A Template screen will appear. Choose the T-1 protocol matching the robbed bit signaling used by the RAS' T-1 connection. T-1 Wink Start operation which is one of the most common, was used for our example.
20. Click on the Dialed radio button for the Default Timing Set. Click OK.

Note: Ensure "Dialed" is chosen for the Default Timing Set on both templates. This is necessary to ensure proper operation during call progress.

21. Click the Edit Channels button on Control Set screen.
22. Assign the channels being used for the test, POTS and T-1. Click OK.
23. The configuring of the control set is complete. Click OK. This will take you back to the TSP Main Screen.
24. Click on the Control Set Enable button to turn on the simulation. The TSP is now ready to accept calls from the V.90 modems and route them to the RAS.

The V.90 modem(s) can place a call to any to the T-1 channels by dialing the number assigned to the T-1 channels. The figure below shows what the simulation will look like once completed and enabled.

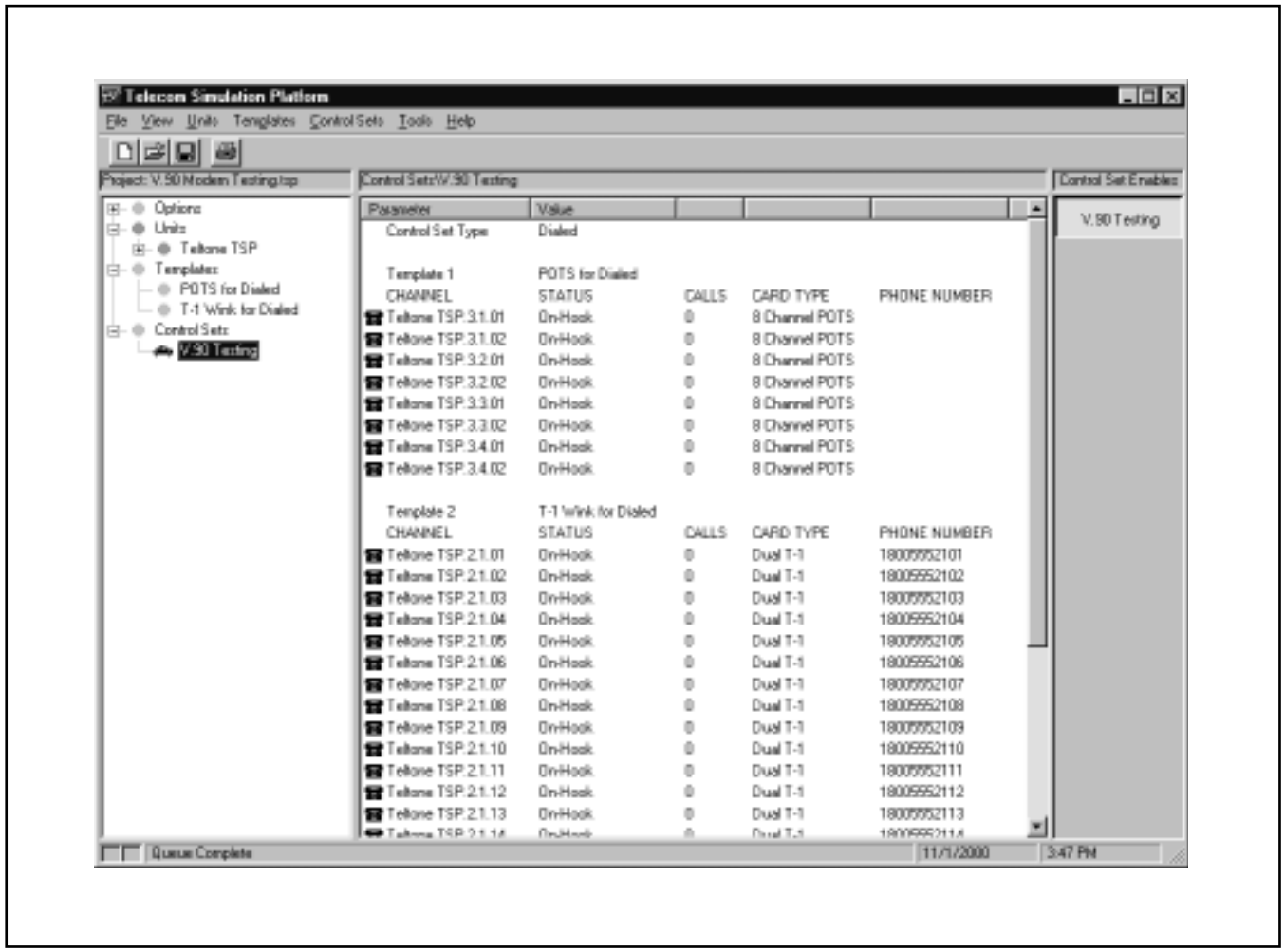

Figure 2 Example of Completed Simulation

Note by clicking on the Control Set name “V.90 testing” on the display tree, all the channels including their Phone Numbers are displayed. No numbers were assigned to the POTS channels since calls will only be made to the T-1 channels in this application.

Verifying V.90 Speeds are Achieved:

Use an FTP server because FTP reports elapsed transfer time . Although FTP also reports file size and transfer rate, it is recommended this information not be used because FTP reported file size neglects “overhead” bits used in file transfer, and the transfer rate calculation is based on the file size.

Connect using Dial-Up Networking because the actual amount of data transferred is reported in the Dial-Up Networking status box as a running total. By recording the Sent and Received values immediately before and after the FTP transfer, we can calculate the actual amount of data transferred in each direction.

Sent and Received are reported in Bytes, so they multiply them by 8 to convert to bits.

Ideally, the calculation should be: Received bits divided by time receiving data, but the elapsed time also includes time sending data and idle time. Idle time appears to be minimized by transferring files in the size range of 150k to 600k. Time sending data can be approximated by dividing Sent bits by 33,600bits/sec (the maximum sending rate).

Transfer rate can be approximated by dividing Received bits by the elapsed time minus time sending data.

$$\text{Transfer Rate (in bits/sec)} = \frac{\text{"Received" Bytes} \times 8 \ \frac{\text{bits}}{\text{Byte}}}{\text{Elapsed Time} - \underbrace{\frac{\text{"Sent" Bytes} \times 8 \ \frac{\text{bits}}{\text{Byte}}}{33{,}600 \ \frac{\text{bits}}{\text{second}}}}_{\text{Time Sending Data}}}$$

Figure 3 Transfer Rate