Chapter 4

Troubleshooting the SubSpace 2001

Your SubSpace 2001 Wireless Router is designed to operate unattended and without intervention for extended periods. Normally, no routine care is needed other than that normally given to antenna systems (for example, periodic inspections for damage to transmission lines, grounding systems, antenna elements or mounting/support structures) and indoor electronic items (cleanliness, temperature control, and ground and lightning arrestors).

Most failures result from the following types of changes:

- Network changes—Such as reconfigurations, repairs, or damage to part of the wired network
- Environment changes—Such as heavy snow or ice deposits on the antenna or support structures, vandalism, unusual rain, humidity, or lightning damage

Often, small changes to the network or to the hardware will not cause problems immediately, but will cause problems when something else in the network changes. Lightning and static damage can also have a cumulative effect, and might not be immediately apparent during or after a storm. Failures can happen days or weeks after the equipment is subjected to such an event.

If you notice performance problems, try to determine the likely source of the problem. Is it with the local router subsystem, the local wireless subsystem, or the remote Wireless Router? Then perform the steps in the appropriate sections to determine and resolve the specific problem. The rest of this chapter describes these tasks in greater detail.

4.1 Determining the Source of the Problem

If your Wireless Router is not operating correctly, you must try to identify the source of the problem. Use the ping facility to test whether another host is reachable. Follow these steps:

1. Send a ping to the local router from your wire-based network. If you cannot ping the router, the local router might be the problem.
2. If you can ping the local router, send a ping from the local router across a wireless link to a remote router. If you cannot ping the remote router, the wireless subsystem or remote router might be the problem.

4.1.1 Send a Ping to the Local Router

Sending a ping to the local router from the wire-based network varies depending on the type of computer you use.

- If you use a UNIX or DOS system that is directly attached to your network, enter the following command at the top-level prompt:

  ping *hostid*

  Where *hostid* is the Domain Name System (DNS) name or Internet Protocol (IP) address of the local router.

- If you use a Macintosh system, you must use a special ping facility (for example, MacTCP Ping or MacTCP Watcher) or connect to a UNIX system.

4.1.2 Send a Ping to the Remote Router

Issue repeated pings to the remote router to test whether you can connect to that router and to test response time. Use the following command to issue repeated pings:

ping *hostid length interval*

Where:

- *hostid*—Is either the DNS name or IP address of the remote router.
- *length*—Specifies the size of the data packets in bytes. We recommend you start with 50 bytes.
- *interval*—Indicates the pause in milliseconds between transmissions. We recommend that you start with 300 milliseconds.

Do not be surprised if the initial ping takes longer than subsequent pings. This is usually because the initial ping is trying to resolve DNS name and IP address, or if the destination's physical address is not in the Address Resolution Protocol (ARP) cache.

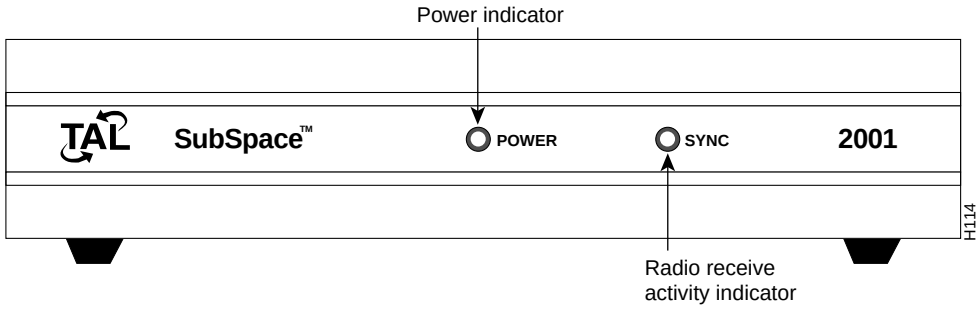
End the series of pings by entering the **reset** command at the console command prompt. You might need to enter **Ctrl-w** to switch sessions.

4.2 Troubleshooting the Wireless Subsystem

Perform the following steps to make sure the wireless subsystem is operating properly:

1. With a multimeter, ensure that power is within specified limits (109- to 122-Vac or 210- to 250-Vac) and is not fluctuating. If the power is not within specified limits or is fluctuating, change the power source.
2. Verify that the POWER indicator on the front panel of the radio is illuminated. See Figure 4-1. If the POWER indicator is not illuminated, check the power supply.

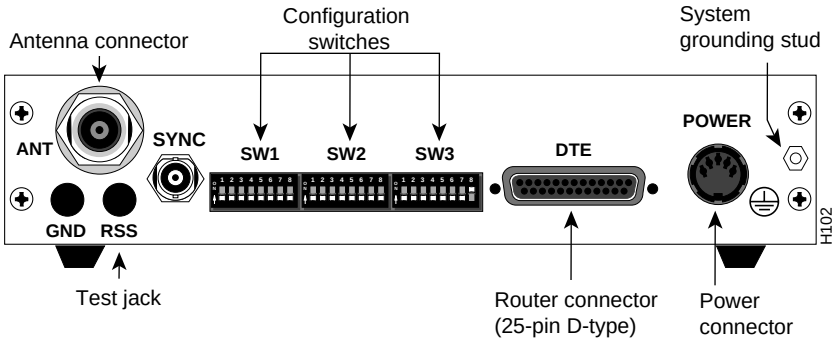
Figure 4-1 Radio LEDs



3 Verify that the EIA-530 and the modular patch cables are connected properly and are undamaged at the radio, the router, and your local area network (LAN). See Chapter 3.

4 Verify that the switches on the rear panel of the radio are in software configuration mode (SW3-8 should be ON). See Figure 4-2.

Figure 4-2 Radio Rear Panel



5 Verify that nothing is attached to the port marked SYNC on the rear panel of the radio. See Figure 4-2.

6 Verify that the connection between the RF cable and the radio is not physically damaged and is secure.

7 Verify that the power supply is operating correctly by measuring the voltages with a voltmeter or substituting the power supply with a power supply you know functions properly.

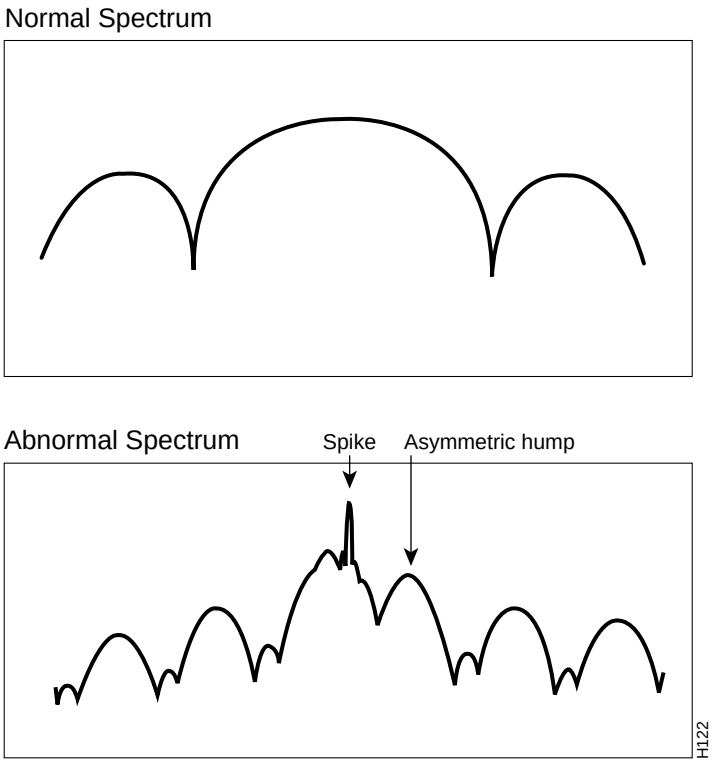
8 If the radio network is otherwise operational, note if the SYNC light flickers or illuminates when nearby stations are transmitting. See Figure 4-1. A flickering or illuminated SYNC light indicates that a radio in the vicinity is transmitting with the same PN code and in the same or adjacent frequency. You must identify the direction, polarity, and strength of the interfering signal. If the signal is not from a radio in your network, do one of the following:

- Change your operating frequency.
- Reduce the signal amplitude by changing the antenna location, polarity, or direction.

- Select a different PN code. Changing the PN code might extinguish the SYNC light because the radio will not receive data with a different PN code; however, the unwanted signal still exists.

9 Ensure that the reflected power from the antenna is less than 10 to 15 percent. Attach a directional wattmeter between the radio and the antenna and place the radio in continuous transmit mode (see Section 3.2.3 for switch settings). If you have a spectrum analyzer, ensure that the spectrum is normal; that is, a large hump in the display, approximately 5 MHz wide and centered on the channel selected, is accompanied by a smaller hump on either side of the main lobe. You should not see any narrow spikes in the middle of or near this pattern. See Figure 4-3.

Figure 4-3 Normal and Abnormal Spectrum



10 If the reflected power is excessive, check the following areas:

- Cable connector at the radio—Is it loose, or is the body rotating freely? This might indicate damage within the connector; replace the connector if necessary.
- RF filter—If an RF filter is installed, check the standing wave ratio (SWR) at the input and output of the filter or bypass the filter using a female-to-female Type-N adapter. Replace the filter if the SWR is high at the input of the filter but not at the output or if bypassing the filter resolves the problem.

- Lightning arrestor—Replace the lightning arrestor with another unit, or bypass the arrestor using a female-to-female Type-N adapter. In some cases, there is sufficient energy to cause the lightning arrestor to “short” or “open” and act much like a fuse. You can usually identify direct lightning hits by partially melted antenna cable and visible damage to your antenna system.
- All outdoor connections—Check for damage or inadequate weatherproofing.
- Outdoor coaxial cable—Ensure that the cable is not cut, bent in severe angles, or damaged in any way, allowing water to penetrate the cable.
- Antenna—Ensure that the antenna is oriented correctly, and that it is not physically damaged or heavily corroded.

If the reflected power problem is not solved by this time, you might have a break or short in the antenna cable. Place a 50-ohm “termination load” on the end of the cable where it attaches to the antenna, and see if the problem disappears. If not, then replace the cable. If you are using hardline/semirigid cable, you might want to rent a Time Domain Reflectometer (TDR). This will allow you to test the cable to identify the location of the problem.

Note TDRs are expensive, so only perform this test as a last resort.

If you cannot initiate continuous transmit mode in the radio, or if you cannot identify any other problems, substitute the radio with a unit you know is functioning. Make sure the switches on the rear of the replacement radio are set to software configuration mode (SW3-8 is ON).

4.3 Troubleshooting the Router Subsystem

Perform the following steps to ensure that the router subsystem is operating correctly:

1. With the multimeter, ensure that power is within specified limits (109- to 122-Vac or 210- to 250-Vac) and is not fluctuating. If the power is not within specified limits or is fluctuating, change the power source.
2. Verify that the POWER indicator on the front panel of the router is illuminated. See Figure 4-4. If the POWER indicator is not illuminated, check the power supply.
3. If data is being transmitted across an attached Ethernet LAN, verify that the Ethernet receive activity indicator is illuminated. See Figure 4-4.
4. Note if the RADIO DATA light flickers or illuminates when nearby stations are transmitting. See Figure 4-4. The RADIO DATA light mimics the SYNC light on the radio. If the SYNC light is flickering but the RADIO DATA light is not, check the connections between the radio and router.
5. From the attached Ethernet LAN, ping the router. If you cannot ping the router, turn off the power to the router, turn it on after 30 seconds, and try again.
6. Verify that the power supply is operating correctly by measuring the voltages with a voltmeter or substituting the power supply with a unit you know functions properly.

If you still cannot determine the source of your problem, contact your customer support personnel.

Figure 4-4 Router LEDs