

The first step in troubleshooting any wireless network is to separate and test the wireless network apart from the communications network. Once the wireless "backbone" has been verified, only then can your communications network be accurately tested and analyzed. Please find the below outline for the recommended testing and items to be addressed. This information is critical in providing ESTeem with the information to further support your troubleshooting efforts to identify and make any necessary changes to ensure the most reliable wireless network possible.

- 1) Please provide a drawing or map detailing the current installation. Please identify node locations with latitude and longitude coordinates, Serial numbers, IP address, the "enabled" wireless communication paths between the various sites and current signal levels between nodes.
- 2) Please provide current signal strength levels and compare with those recorded during the site survey.
- 3) Please provide photographs of the installation/individual nodes to verify correct installation.
- 4) Screen shots from the Horizon's "Wireless Status" page of each location. This may help identify any potential interference.
- 5) Please provide the **System Details** file from the problem locations. This file is accessed from the top of the "Log" page. Once the System Details button is pushed, the encrypted file is generated and downloaded to the connected PC to email ESTeem.
- 6) Verify an Unobstructed Line of Sight (LOS) between nodes. This includes any trees, foliage, buildings, etc. If the antennas can't clearly "see" each other, expect diminished wireless performance to the point of failure. This is due to the propagation characteristics in the high frequency bands above 900MHz, regardless of brand. Identify locations for possible relocation for current nodes or for additional "Repeaters" if LOS blockages cannot be eliminated.
- 7) Identify and note any potential sources of interference. This should include such things as neighborhoods, airports, RV parks, cell phone towers, etc. near the base of a site and/or other radio systems installed on the same tower as the ESTeem equipment.
- 8) If available, use a spectrum analyzer to test and observe the frequency in the wireless environment to determine the best and most efficient frequency or channel for the ESTeem wireless network. Based upon current wireless activity in the environment, the most appropriate channel will need to be used to minimize potential interference related issues and packet collisions. Reconfigure the ESTeem units to a new channel and/or bandwidth if necessary.
- 9) A series of ping tests must be run across all wireless paths to verify network reliability. You should also monitor the ESTeem Horizon's system log in parallel with the ping tests to determine and identify simple missed packets vs. a loss of connection.

Once the wireless Backbone network has been tested and all appropriate changes have been made, the specific communication protocols and programs can be tested for use.

The ESTeem Horizon's powerful Packet Monitor function enables you to see what's happening on your wireless network at a network protocol level. Used in combination with the Wireshark network protocol analyzer software, specific Ethernet traffic being transmitted can also be interrogated.