



TOP TIPS

# Troubleshooting Performance in Healthcare Environments

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SMART BUILDINGS TECHNOLOGY

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## Introduction

Healthcare IT is unique compared to other enterprise verticals for a few key reasons. The heavy reliance of wired copper and fiber optic connections combined with clinical, patient and guest Wi-Fi needs means that IT operations (ITOps) staff must be ready to quickly troubleshoot and resolve network access and performance issues at a moment's notice. As a result, troubleshooting a healthcare network requires an extra bit of effort and the right troubleshooting and analysis tools. This Top Tips brief will examine six unique cable/Wi-Fi troubleshooting scenarios that are common in healthcare settings.

## Guest WiFi

These days, when patients and guests visit a healthcare facility, easy access to guest Wi-Fi services is expected. In areas of a healthcare IT campus where patients and visitors are frequent, the reliance of guest Wi-Fi is much higher compared to most typical enterprise offices. Healthcare ITOps staff must be prepared to field larger numbers of trouble tickets where patients/visitors are having problems connecting to or receiving sufficient latency/bandwidth from the guest Wi-Fi network.

Due to the fluid nature of wireless propagation and the high likelihood of external interference causing wireless performance problems in the 2.4, 5 and 6GHz unlicensed spectrum ranges, these IT administrators need access to a portable tool to connect to the guest Wi-Fi network in problematic locations. Depending on the reported guest Wi-Fi issue, ITOps staff may be required to:

- Connect to the guest Wi-Fi network to verify signal strength using calculated dBm values;
- Run ping/traceroute tests;
- Ensure that roaming between Wi-Fi access points is functioning as intended;
- Verify that DHCP/DNS services are working properly; and
- Perform throughput stress tests to verify that sufficient bandwidth is available



## Multi-gig Wired Ethernet Connectivity at The Access Layer

Healthcare IT equipment such as medical imaging devices and the use of electronic health records (EHR) can necessitate the use of multi-gigabit Ethernet at the access layer of the network. Because of this, ITOps teams should have access to test tools that can run validation and diagnostic tests for twisted pair Ethernet. These tests are used to ensure that these types of multi-gigabit devices will be able to connect at the correct TX/RX speeds.

Alternatively, some medical equipment may come with fiber optic connectors as opposed to copper. This means that ITOps administrators in the field may need access to test tools that have fiber test capabilities.



## Uptick in High-Definition Video and Voice Us

As a result of the COVID-19 pandemic, the use of telemedicine in the United States has exploded. This often includes the use of high-definition video and voice over IP. Medical staff working on campus are consuming far more LAN and internet bandwidth than ever before while also requiring low network latency for real-time data communications. Due to this change in network behavior, ITOps will likely be troubleshooting more complaints of slow network connectivity.

A portable test tool can be used in these situations to verify cabling from the medical staff's PC to the network switch passes strict cable validation tests. Additionally, further tests can be run over time to ensure that network latency and data transport speeds are within an application's recommended requirements.

## Broken Cables/Terminations Inside Patient Care Areas

The amount of networked equipment inside healthcare inpatient/outpatient and examination rooms these days is staggering. Added to this is the fact that much of this equipment is on carts/wheels for portability purposes. In many cases, this equipment is often plugged into an Ethernet jack and accidentally moved without being unplugged. This leads to a situation where the Ethernet jacks, patch cables or horizontal cabling inside the wall becomes stretched or broken.

These types of physical cabling issues require a tool that can run simple wiremaps from one end of the connection to the other. These tests can identify wire breaks along the cable, pinpointing the distance to the fault. Because patient areas are almost always in use, these types of tests and test tools can significantly reduce the amount of time spent identifying and resolving a physical cable connectivity problem.

## Medical Equipment Electromagnetic Interference

Certain medical equipment can cause electromagnetic interference, disrupting the transport of data across twisted-pair cabling. Some test tools offer the ability to identify this type of interference. Examples include:

- End-to-end signal to noise ratio (SNR) tests which provide an assessment of link performance under network load;
- Alien crosstalk (AXT) to identify external electromagnetic interference and transverse conversion loss (TCL); and
- Equal level transverse conversion transfer loss (ELTCL) to verify that the electrical signal is properly balanced

## Power Over Ethernet Troubleshooting

The healthcare market has steadily increased their use of power over Ethernet (PoE) at the access layer of the network for several reasons including the use of IP-based surveillance cameras, door controllers, smart heating/lighting and medical-use IoT sensors. While some of these devices can operate on older CAT5e or CAT6 twisted pair cabling, others require higher Wattage output and thus more modern cable standards such as CAT6A. When deploying and troubleshooting PoE devices, a test tool that can validate the maximum wattage capability of a cable and show real power draw from the power source becomes necessary for keeping PoE devices running reliably around the clock.



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