

Portable Analysis Tools Help Solve Networking Problems

Jerry Zion and Eric Anderson

As recently as a few years ago, an article about biomedical equipment technicians (BMETs) solving networking problems wouldn't have made much sense. Back then, BMETs dealt only with patient-care instruments, such as monitors, infusion pumps, and ventilators. IT professionals—leery of dealing with anything that connected to patients—handled “the network:” servers, routers, cabling, and other network equipment, plus applications such as payroll, billing, and word processing. With the two departments having totally separate functions, it seemed, at the time, that “never the twain shall meet.”

But times change, and now territorial boundaries between the two departments are beginning to disappear. Factors such as the move toward delivering more patient care at the bedside and greater use of networked medical electronic monitoring and charting equipment are creating an increasing overlap between the functions of the two departments, resulting in a growing convergence.

Today, the biomedical department staff at some hospitals now includes an IT professional. In other cases, the biomedical and IT departments both report to the same executive; and in still others, the two departments have actually been merged into one. Some biomedical departments have even set up their own dedicated network to handle Picture Archiving and Communications System

(PACS) transmissions—a network that they maintain on their own, without involving the IT department.

Why Should BMETs Care About Networking?

As networked components become more common at the bedside, BMETs are becoming increasingly interested in learning to troubleshoot and fix simple problems.

For one thing, there's the urgency factor. Waiting for IT to solve a problem about slow e-mail is one thing; it's entirely different when the nurse at the

nurse's station can no longer see data from the monitor of a critically ill patient.

Even when the problem is more complex and the IT staff needs to get involved, it's helpful for the BMET to be able to do enough troubleshooting to narrow the problem down to a specific area—for example, to a server or application. That way, when the BMET calls on the IT staff for help, there's no finger pointing—no way for the IT professional to claim that the problem is a malfunctioning monitor, for example.

With IT professionals typically being paid more than BMETs, IT has even come to be a growth path for BMETs looking to advance beyond their current position.

Hospital Networking Challenges

Hospital networks are more complex than networks found in most businesses, for several reasons:

Frequent relocation. In response to both hospital growth and the move toward more bedside patient care, hospital networks are constantly being expanded and relocated. It's not uncommon for entire subnets to be moved to a new location.

Equipment mix. The constant flux in the location of network segments is made more complex by the mix of

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Jerry Zion is marketing manager for Fluke Biomedical. Eric Anderson is marketing manager for Fluke Networks EtherScope™ Network Assistant. Fluke Biomedical and Fluke Networks are sister companies. For more information about the tools described in the article, visit <http://www.flukenetworks.com/us/Solutions/Handheld+Network+Testers/Overview.htm> and <http://www.flukebiomedical.com/>. Select Network Testers from the Product Categories section in the middle of the webpage.

legacy and modern networking equipment, which can make it challenging to get all the parts functioning properly after a move.

Equipment Portability. Patient care equipment often follows patients from room to room. That means disconnecting cables, coiling up patch cords, and reconnecting at some other location. All this adds to wear the wear and tear of the cords and connectors.

Large volume of traffic. Now that hospital networks are dealing with patient information as well as with traditional functions, such as billing, they are carrying much more traffic than before. For example, monitors, ventilators, and other devices connected to patients are transmitting data breath-by-breath, and beat-by-beat. Diagnostic image files, such as Computed Tomography scans, are huge even after compression. And some particularly critical equipment may be monitored and

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upgraded over the network, further adding to traffic loads. For example, some types of equipment have a “phone home” capability in which they run their own diagnostics and alert the manufacturer’s service department (and possibly a BMET as well) when they detect a potential problem.

Security issues. Under the Health Insurance Portability and Accountability Act (HIPAA), security is a greater concern than ever before. Today’s hospitals must take every precaution to prevent unauthorized disclosure of patient information.

Wireless networks. More and more hospitals are turning to wireless networks. These are easier and less expensive to install than traditional wired networks—but they come with their own security issues. And they still connect at some point to the wired portion of the network.

Two Key Issues: Connectivity and Configuration

Two issues that are at the heart of dealing with many of these challenges are connectivity and configuration. Connectivity issues can stem from a variety of sources. There could be a problem with the physical infrastructure, such as a damaged patch cable or a wall outlet jack. The local switch or networked device could be improperly configured or contain a failing port.

One reason there are so many connectivity problems is that equipment is moved frequently—as patients come and go; as patients get better and need fewer devices; even when the janitorial staff comes in to clean the room. During a move, it’s easy for a component such as a patch cord or wall plate to be inadvertently damaged.

Frequent moves of equipment can also cause configuration problems. For example, a monitor’s statically-assigned IP address may work in one subnet but may conflict with that of another device in another subnet. Assigning IP addresses has become more complex since

Best Bets for BMET Network Troubleshooting

- A portable inline network tester. Connect between two network devices, listen to the traffic between them, and detect common connectivity problems. Automatically ping key devices. Verify connection to routers, servers, and printers. Spot available network resources; see MAC and IP addresses, subnet and services offered by active servers, routers and printers. Identify PC’s network; review list of services configured to a PC.
- A portable network troubleshooting tool. Solves network problems fast on 10/100/Gigabit Ethernet and 802.11a/b/g wireless network. Analyze network traffic; discover devices, networks, virtual local area networks, access points, mobile clients. Measure internetwork performance and document your wired and wireless network.
- Cable certification testers are for cable installers. This type of tool is intended for certifying newly installed cable. It has capabilities that a BMET does not need for troubleshooting and it lacks capabilities that are needed.



An inline network test tool is easy-to-use, affordable, and goes in-room with the BMET to the point of the problem.

the enactment of HIPAA, which requires controls to prevent an unauthorized device from connecting to the network and gaining access to patient data—and the increased complexity can lead to conflicts.

Configuration issues also arise in connecting legacy proprietary systems to the hospital network. Specialized software, data translation components, or both may be required to extract information from the proprietary system and express it in a form that the rest of the network can understand.

Portable Test and Troubleshooting Tools to the Rescue

Both connectivity and configuration are areas where BMEs can get involved, with the assistance of easy-to-use, portable network test and troubleshooting tools. These tools enable BMEs to solve a number of connectivity and configuration issues without needing to call the IT department. Even for the more complex problems that do require IT help, BMEs can speed the process by isolating the problem to a specific area before calling on the IT department.

Two key types of tools appropriate for this level of troubleshooting are portable inline network testers and portable network troubleshooting tools.

Using passive testing, it can identify connectivity

problems, such as whether the right wires are touching. For example, if there's a faulty patch cord, it can diagnose the problem and enable the BMET to fix it on the spot. In addition, when placed inline between a device and the network, network testers can perform active testing, monitoring actual traffic on a powered network. In this way, it can detect such interface problems as mismatched duplex settings, an incorrect subnet mask, and duplicate IP addresses, as well as situations where excessive data collisions are interfering with communication.

Portable network troubleshooting tools offer several times the diagnostic capability of portable inline network testers. In addition to performing all the basic connectivity and active network tests that the inline tester does, it can go much deeper and provide more detailed results. With this tool, you can analyze network traffic, discover devices and networks, and rapidly solve Ethernet problems.

Even when the problem is too complex for the BMET to fix—for example, if a router channel goes down, or a server or application error occurs—these tools will enable the BMET to quickly identify the source of the problem before calling the IT department. That way, there will be no finger-pointing: the BMET will be able to prove that the problem is not in the patient device, but in another network component.

Portable network test and troubleshooting tools are a cost-effective choice: an inline tester costs about a fourth of the price of a cable certification tester, for example. They are also a more appropriate choice than a cable certification tester for solving network problems. A cable certification tester can test the cable (patch cord, wall jack, and long run of wire), but not the device connected to the cable—nor can it solve such interface issues as protocol mismatches, incorrect duplex settings, or bad IP addresses.

A final benefit of portable network test and troubleshooting tools is that they are easy to use. Many of them use on-screen prompts to walk the user through the necessary steps, telling the user at each point what needs to happen next. They often display test results in visual form rather than presenting an arcane collection of network data. The combination of simple interfaces and expert diagnostics that tell the user the next steps reduces the amount of training required. ■