Rapidly and Reliably Deploy an Enterprise Network

Proactively testing networks during deployment, upgrades, and changes saves time and money and prevents equipment damage, minimizes network degradations and downtime, and reduces time spent on reactive troubleshooting.

Use these industry best practices when deploying an enterprise network:

- test fiber media
- test copper media
- test connectivity
- test and monitor performance.

Deploying fiber everywhere

In modern networks, connecting various network elements involves making several fiber connections. Fiber has been used for many years in typical enterprise networks for lower-speed links, which were more forgiving to fiber connection impairments. While industry-standard practices, such as tier I and tier II fiber certification, are recommended when installing high-speed networks (for example, 10 G Ethernet [10 GE]), inspecting and cleaning fibers prior to connecting them is also essential. A common best practice known as *Inspect Before You Connect* (IBYC) can ensure proper fiber connectvity.

When applied proactively, IBYC provides these benefits:

- reduces network downtime
- reduces reactive troubleshooting
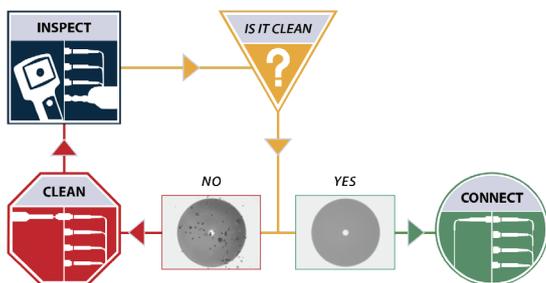- optimizes signal performance
- prevents network damage.

Figure 1. IBYC process flow

Using copper in backbone links

Often, copper can be used in high-speed links (for example, 10 GE) between core routers and access switches or between access and distribution switches. Guaranteeing long-term reliability of 10 GE links (typically CAT 6A) requires certifying each link to TIA/ISO limits with a cable certifier. Doing this guarantees that the cables are built and terminated properly to support the appropriate frequencies for high-bandwidth connections.

Ensuring connectivity at the drop

Most offices require installing and certifying horizontal cabling between access switching and desktop drops according to TIA/ISO-structured cabling standards. Depending on the speeds these networks must carry, the cabling used is typically CAT 5e, CAT 6, or CAT 6A.

While cabling installation and certification is a good first step and essential during the initial build out, it is not the only step required, especially during a move, addition, or change. The following steps can ensure that every drop has acceptable network connectivity.

1. Trace the drop back to the patch panel.
2. Cross connect to the switch.
3. Ensure port connectivity of the switch.
4. Verify dynamic host configuration protocol (DHCP).
5. Ping devices inside and outside of the local area network (LAN).

Enterprise Services Application Module (ESAM) for the T-BERD/MTS-4000

There are many ways to trace a drop back to a patch panel. Using a cable tester with remote identifiers to identify the cable and test for wiremap, technicians can trace the drop and verify proper termination in one step. In order to quickly identify drops, users can connect the remote identifiers to each connection at the patch panel and then connect a tester to the drop to be identified. The test result shows the remote identifier's unique number and wiremap results.

Once the switch is up and running, you can perform the other steps. If following steps 4 and 5, you can skip step 3 and use it as troubleshooting step to verify switch port configuration.

With most testers, DHCP and ping (steps 4 and 5) are two tests that are typically performed together with results that point to specific issues. If the tester cannot obtain an IP configuration with DHCP there is a communication failure between the drop and the DHCP server or, perhaps, an issue with the DHCP server itself. Obtaining an IP configuration lets users test various devices by pinging each one to ensure each has basic IP connectivity. The default gateway and the DNS server are two devices that users should be able to ping. Users can check connectivity by pinging a known address such as Google.

Performance testing and monitoring

Guaranteeing performance from individual Ethernet drops through the network requires performing several tests. First, test the wide area network (WAN) links to the data centers at full GE speeds using various frame sizes to ensure the links have no issues. Technicians should use different frame sizes because smaller frame sizes stress the network's ability to process (read addresses and verify FCS), while large frame sizes stress the network's ability to buffer (switch queues).

Tier 1 fiber certification

Next users can verify the performance of the on-site network. Consistently following the best practices for testing the fiber and copper media prior to turning up active networking equipment can isolate network performance problems to the cause rather than the physical media. Line rate throughput testing and iPERF are both used to effectively test network performance.

Line rate testing is performed by placing test hardware in strategic locations within the network, such as at core switches or data centers. Users can verify data rates by connecting another test device at a key location, such as the distribution or access switch, and running tests at various frame rates.

Line rate throughput is required to verify link rates; however, it does not reflect the actual performance of applications running on a network, which requires using an application-layer (Layer 4) test like iPERF. While iPERF is a common software application that runs on PCs and servers, it is best to use a hardware-based iPERF server to confirm that the computer is not the bandwidth bottleneck. As with line rate testing, it is also best to perform iPERF tests at strategic or critical points in the network.

Copper certification

Conclusion

Today's networks are installed using various processes and best practices. Proactive test methodologies described here can help you achieve worry-free, long-term network performance and ultimately improve customer satisfaction.