

DATA CENTER CABLING BEST PRACTICES & TIPS YOU NEED TO KNOW

Why Data Center Cabling Matters

It's easy to underestimate and downplay the importance of the cabling in a data center. After all, industry standards such as Uptime Institute's Tier Standard and TIA-942 place a heavy emphasis on the power and cooling systems—and for good reason, as these systems are vital. But the cabling within a data center can play an equally important role in the functionality and overall efficiency of data center operations.

To help you optimize your data center for better functionality, efficiency, and scalability, here are a few data center cabling best practices to keep in mind:



1. Keep Cable Management in Mind when Choosing Your Racks and/or Cabinets

The level of demand on your data center is sure to increase as your organization grows and technology evolves towards the "Internet of Everything." This naturally means having to plan for future growth—though simply allocating more floor space to your data center can be costly and inefficient at best. Therefore,

it is important to use the available space within racks and/or cabinets efficiently. This requires some additional thought be placed on the type and quantity of racks/cabinets that should be installed based on the current as well as the future needs of your organization.

It is vitally important to incorporate into your initial data center design the type of racks/cabinets that are not only capable of supporting active equipment but equally capable of managing the cables that interconnect equipment within the same rack/cabinet or to equipment installed in other cabinets throughout the data center. Not placing proper emphasis on cable management often results in a tangled mess of disorganized cables, which can make ongoing maintenance and future equipment upgrades unnecessarily difficult, time consuming, and costly.



The level of demand on your data center is sure to increase as your organization grows and technology evolves towards the “Internet of Everything.”..... it is important to use the available space within racks and/or cabinets efficiently.

2. Properly Design Overhead Pathways

The larger your data center, the more important it is to have cable pathways that are properly designed. Although raised floor environments are still being used as a means of routing cables and distributing power, overhead pathways using wire mesh and/or ladder type cable trays are the most prevalent.

Since overhead pathways are visible from below, it is important to ensure that the cable trays are designed in such as way as to allow proper routing and separation of cables installed between cabinets. This will help to maintain a neat, organized appearance while allowing for future growth.



3. Consider the Quality of Your Cable and Connecting Hardware

Due to the influx of “off-shore” products into the market, there are products available that appear to be less expensive—at least up front. However, many of these products have been found to be non-compliant with established performance and durability standards and some manufacturers have been completely fraudulent in marking cables with a UL® Listing without having actually gone through the UL® testing process.

Many of the issues associated with these substandard products may not be immediately identifiable and end-users sometimes do not experience trouble for several months. This makes it harder to identify problem cabling until it is too late.

Low-quality cabling is quite often the cause of poor network performance and can sometimes be the source of unplanned or intermittent outages. This can end up costing you more in the long run, especially when paired with substandard installation practices.

Be sure to hire a cabling contractor that only installs cable and connecting hardware from a reputable manufacturer who stands by their products with extended warranties and is able to provide initial design support.

4. Know Your Data Center Cabling Topologies

Because your active equipment will be distributed throughout your data center, often in multiple rows of cabinets, it is important to carefully consider how everything will be connected.



The more common topologies for the distribution of cables and connecting equipment are Top-of Rack (ToR), Middle-of-Row (MoR), and End-of-Row (EoR). These topologies can be used exclusively or together depending on the size, complexity, and specific requirements of the data center. However, they all have a significant impact on how and where cables should be installed as well as the size and type of cable management required in each cabinet and/or each row of cabinets.

5. Consider the Need to Accommodate Future Technologies

As networking speeds and bandwidth requirements continue to increase, it is likely that you will need to upgrade your equipment at some point. This is especially true in the data center environment where 40 and 100 Gigabit speeds are already being deployed to meet the demands created by high-speed, high-demand applications and technologies.

While copper cabling is still prevalent in many data centers, hybrid systems consisting of both copper and fiber cabling have been the norm for many years. However, it's important to note that the 40 and 100 Gigabit Ethernet standard uses parallel optics, which transmits signals over multiple fiber stands simultaneously and requires the fiber optic cable to be terminated with Multi-Fiber Push On (MPO)



It's important to note that the 40 and 100 Gigabit Ethernet standard uses parallel optics, which transmits signals over multiple fiber stands simultaneously and requires the fiber optic cable to be terminated with Multi-Fiber Push On (MPO) connectors.

connectors. These MPO connectors incorporate 12 individual fiber strands within a footprint relatively the same size as a standard RJ45 plug.

If, during the initial design of the cabling infrastructure, proper consideration is not given to the fiber optic cable and the corresponding terminations, then migrating to the 40 and 100 Gigabit speeds will require new fiber cables to be installed and terminated with the correct connectors, which significantly increases the cost of the migration effort.

6. Pay Close Attention to Organization and Documentation

As your data center grows, the cabling infrastructure will need to grow along with it. One way to mitigate the effects of change is to implement and strictly adhere to a comprehensive labeling scheme as well as a change management process for equipment upgrades, connections, and additions. The more organized and structured things are, the less likely things will get out of control and become dysfunctional as new equipment is added.



7. Use Color-Coding Effectively

As a corollary to organizing and labeling your cabling, it can be helpful to use color-coding techniques to differentiate applications, server connections, etc. These techniques can involve using different colored cable, labels, Velcro wraps, patch cables, etc. to make it easier to identify cabling, power connections, etc. and make troubleshooting easier and less time consuming.

When deciding what and how much should be color-coded, it is important to document what the different colors represent and to remain consistent whenever upgrades or other changes are made. If not properly controlled and maintained, the color coding can quickly become confusing and essentially useless.

8. Exercise Due Diligence when Considering Pre-Terminated Solutions

A data center with multiple cabinets can be an ideal situation for pre-terminated cabling solutions and almost essential when designing the infrastructure for the 40 and 100 Gigabit networks previously mentioned in #5 above. Because the cables are pre-terminated by the manufacturer, there is a higher cost associated with the materials but the installation labor is significantly lower than traditional systems that require time-consuming terminations at each end.

However, it is critical to double-check the cable routes and all length measurements prior to purchasing the cable assemblies. Assemblies that are too short are an obvious problem—but having assemblies that are too long can present an issue that is tricky to overcome.

Since the cable assemblies are already terminated at both ends, the cable cannot simply be cut to length as this would require re-termination resulting in additional costs for materials and labor. Instead, the excess cable would need to be stored somewhere, which impacts the cable management capacity within the cabinets and/or on the overhead cable trays mentioned in tips #1 and #2 above.



Photo taken from www.leviton.com

Next Steps

Need more tips for optimizing your data center cabling management? Get in touch with the experts at Blue Wave Communications!

[Get in Touch](#)



Office Hours:

Monday-Friday from 8:00 am to 5:00 pm
Eastern Standard Time (EST)

Contact Us By:

Phone: (954) 436-8886 or (305) 436-8886

Fax: (305) 594-4243

Mail: 10330 USA Today Way, Miramar, FL 33025

Follow Us:

 Facebook

 LinkedIn

 Instagram