The Three Pillars of Effective Cable Management

Presented by:

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Agenda

- Overview on the benefits of good cable management
- Foundation, Standards
- First Pillar, Planning
- Second Pillar, Infrastructure
- Third Pillar, Discipline
- Summary

Overview

Benefits of Good Cable Management

Benefits of Cable Management

Some may perceive a full-featured cable management solution as overkill. However, consider the following question…

"Are my cable management solutions and practices an asset or a liability?"

Benefits of Cable Management

Proper cable management is integral to the performance and effectiveness of your network. Managing and maintaining cables and cords provides the critical support, reliability, and flexibility needed to sustain and grow your network capabilities.

Question…

What elements of a network are impacted by cable management?
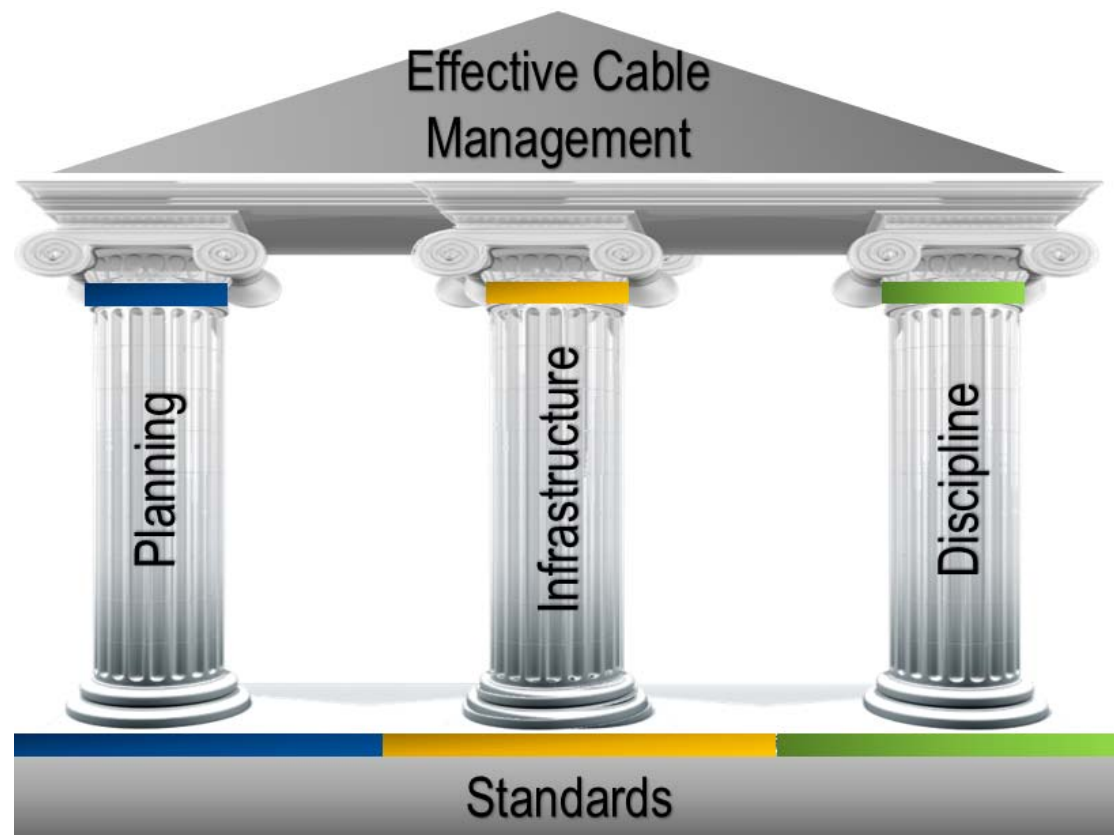
Good vs. Bad Cable Management

Good Cable Management	VS	Bad Cable Management
Save time when moving or replacing cables, and during maintenance and troubleshooting	Time	Waste time trying to find and identify cables during maintenance and troubleshooting
Efficient operation – airflow is not impeded by congested or poorly placed cables	Efficiency	Cable congestion causes restricted airflow putting unnecessary increase in cooling costs
Reduced workplace hazards and liabilities – Safety first!	Safety	Cables blocking fire suppression; tripping hazards in the workplace
Optimal circuit and signal performance	Signal	EMI interference, crosstalk; inefficient and slow network
Save money by extending the life of your cables; greatly reduce potential for outages; respond quickly when something goes wrong	Money	Can be costly and inflexible if not maintained; intermittent failures; difficult to troubleshoot; time = $$$

Three Pillars of
Effective Cable Management

Three Pillars of Effective Cable Management

Standards

(Foundation)

Standards – the Foundation

Industry standards provide guidelines that define which cables and connectors are appropriate to support each type of network and suggest methods for maintaining high levels of cable performance, which include, among many things, recommended room layouts and the importance of cable management.

Cabling standards are reviewed and changed every five to ten years, which allows them to keep pace with technology advancements and future requirements. Get involved! Know and trust the standards, and apply common sense when designing, implementing, testing and maintaining your network.
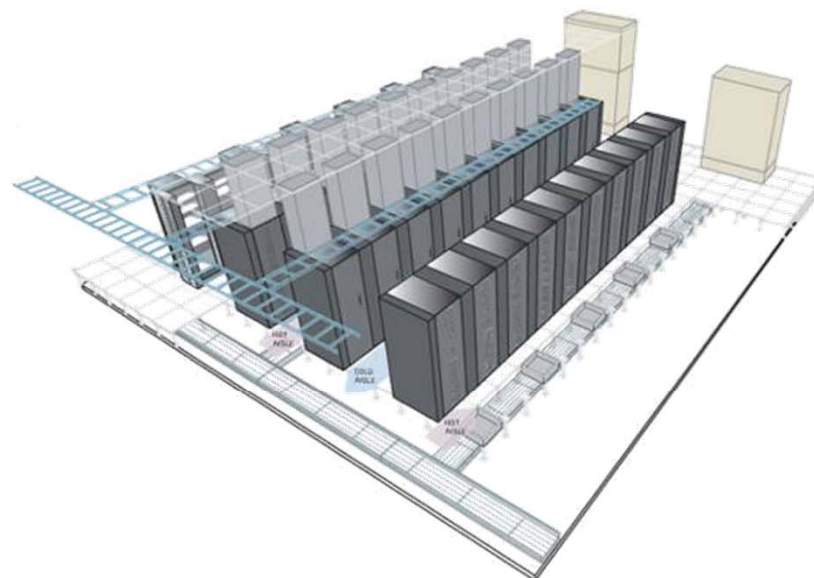
Planning

(First Pillar)

Planning – First Pillar

Proper planning has many facets. Scheduling, documentation, layouts, labeling, training, and developing repeatable and scalable methodologies are all important. One aspect that oftentimes doesn't get the attention it deserves is the physical capacity planning of cable pathways.

Planning-for and reserving capacity for future growth is critical to the long-term effectiveness of your cabling infrastructure.

"Organizing is what you do before you do something, so that when you do it, it is not all mixed up." –A. A. Milne

Planning Tool - Cable Capacity

Not considering future cable capacity inherently leads to less than ideal conditions where cables are forced into tight areas where there simply isn't any room for proper organization and management. Most cable pathway and management product manufacturers offer a cable fill table to help specify the right sized products for your cable management needs.

An app-based or Excel format calculator provides and easy-to-use method to quickly estimate cable fill based on product-specific or user-defined cable diameters and/or aperture sizes.

Estimated Cable Fill Capacities
for CPI Cable Management and Pathway Products

Part Number	Description	Cable Manager Specs.			Recommended Cable Fill				Maximum Cable Fill		
		Interior Width (in.)	Interior Depth (in.)	Usable Area (sq. in.)	Cable OD (in.)	Cat 5e 0.200 50%	Cat 6 0.250 50%	Cat 6a 0.300 50%	Cat 5e 0.200 100%	Cat 6 0.250 100%	Cat 6a 0.300 100%
	Vertical Cable Managers for Racks										
11374-XXX	SS Wide Vertical Cable Sect, 6"W	5.6	6.0	33.6		267	171	119	535	342	238
11378-X02	Extension, SS Nar Vert Cable Sect, 2'H x 3.65"W	3.5	6.0	21.0		167	107	74	334	214	149

Planning Tool - Cable Capacity

What does "cable fill ratio" mean?

Fill Ratio is the percentage of Usable Area within a product that is populated with cable including the required gaps between cables.

Cable Fill considers cable diameter and is an estimate of the number of cables that will fit in a area based on desired Fill Ratio.

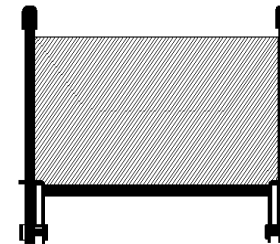**Calculation for 50% Fill:**

((USABLE AREA/AREA OF CABLE) x 50%) x 50%

50% is the fill ratio = 25% of the available area is populated with cable and 25% is the required space between cables

Usable Area = **INTERIOR WIDTH x INTERIOR DEPTH**

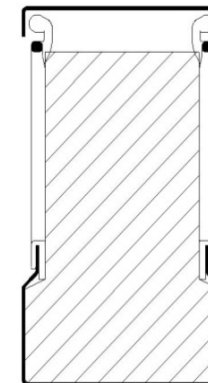Area of Cable = **(CABLE DIAMETER^2 x π) / 4**

It is in this planning stage that you need to consider future needs. You may only use 10% day 1 but, easily increase to 50%+ only a few years from now.

Consider cable pathway, rack and/or cabinet level cable capacity, and underfloor pathways if you plan on using a raised floor for cable delivery.

Cable Runway with optional retaining posts
Usable area is runway width multiplied by maximum height of *6"

*TIA-569B maximum height limit

*Vertical Cable Manager

Usable area is narrowest point in width and distance between back of manager and back of "T" on management finger

*Recommended – not defined in TIA-569D

Infrastructure

(Second Pillar)

Infrastructure – Second Pillar

In regards to cabinet and/or rack manufacturer selection, features like quality, load-ratings, service, pricing and on-time delivery are all important factors to consider. But, don't discount the importance of the cable management solutions that accompany these products. **Hold cable management solutions to the same high standards when selecting a cabinet or rack provider!** Doing so will provide you with the proper tools for an effective cable management strategy.

"A place for everything and everything in its place."
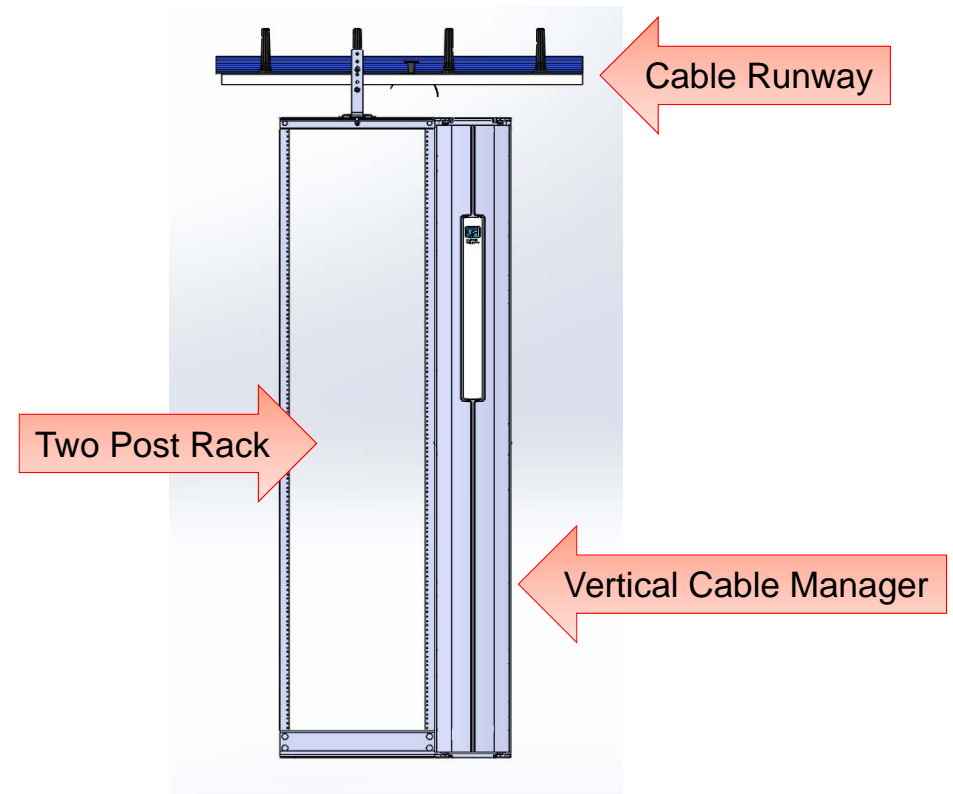*– Benjamin Franklin*

Importance of Product Selection
A Typical Scenario

A section of cable runway supporting a run of cables over a row of racks and cable managers…

- Applies to two- or four-post open racks or fully enclosed cabinets
- Need to drop cables at specific locations along the row while maintaining minimum bend radius requirements
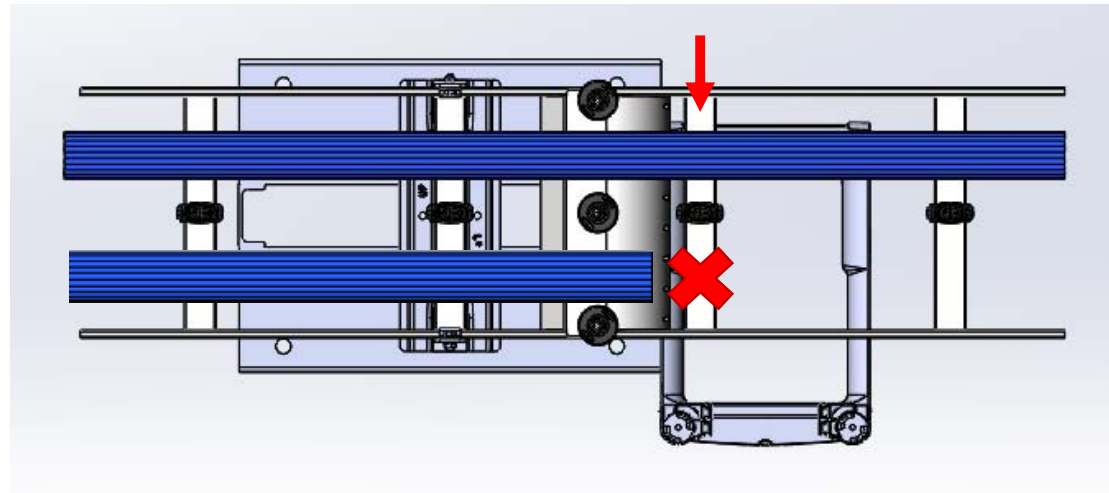

Cable Runway

Two Post Rack

Vertical Cable Manager

Importance of Product Selection
A Typical Scenario

A cable drop is required into the cable manager below. However, the cross-member (rung) is blocking direct access. Consider the time required to do the following:

**Disassemble
Cut & Grind
Paint
Reassemble
Electrically Bond
Repeat for Every Instance**
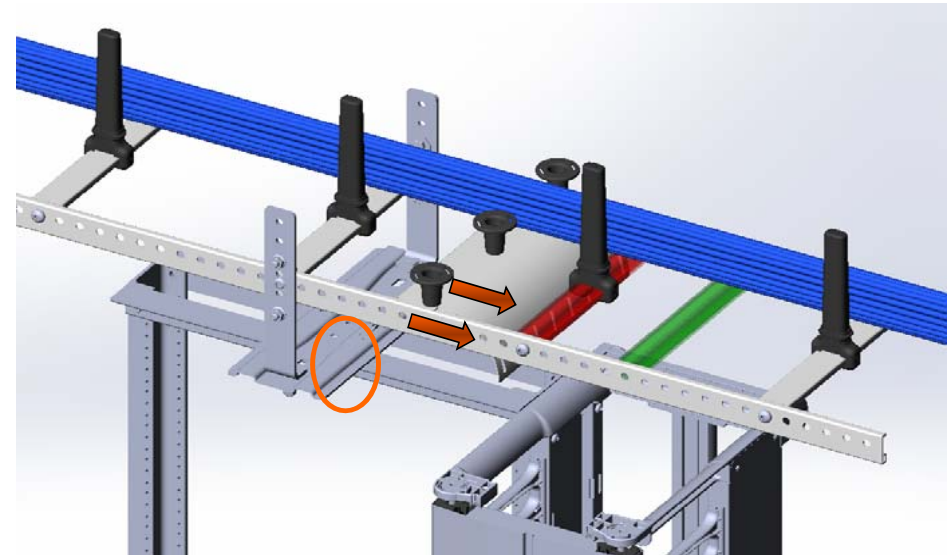
Importance of Product Selection
A Typical Scenario

Here's how the right product selection for a given application can greatly improve the time it takes to install and ultimately manage your cables.

The product example at right provides a means to quickly remove (or move) a cross-member by the removal of a couple of screws.

Through thoughtful product selection, your installation now adheres to cable bend radii requirements with proper weight distribution throughout the pathway.

This aspect of your network is now flexible and adaptable for future needs.

Discipline

(Third Pillar)

Discipline – Third Pillar

By far, the biggest variable in the quality of any cabling installation is the human element. Standards, thorough planning, and the best products can never be fully appreciated unless you are committed and disciplined to maintaining your installation for the long haul. If you don't do it now, you'll certainly pay for it at some point in the future.

As your network expands, how will your cabling infrastructure look 1, 3, 5+ years from now?

- Requires commitment and discipline
- Continual training for new and experienced technicians/installers
- Stay up-to-date on standards
- Update as needs, technologies, and standards evolve

"The triumph of anything is a matter of organization."
–Kurt Vonnegut

SUFFER
THE PAIN OF
DISCIPLINE
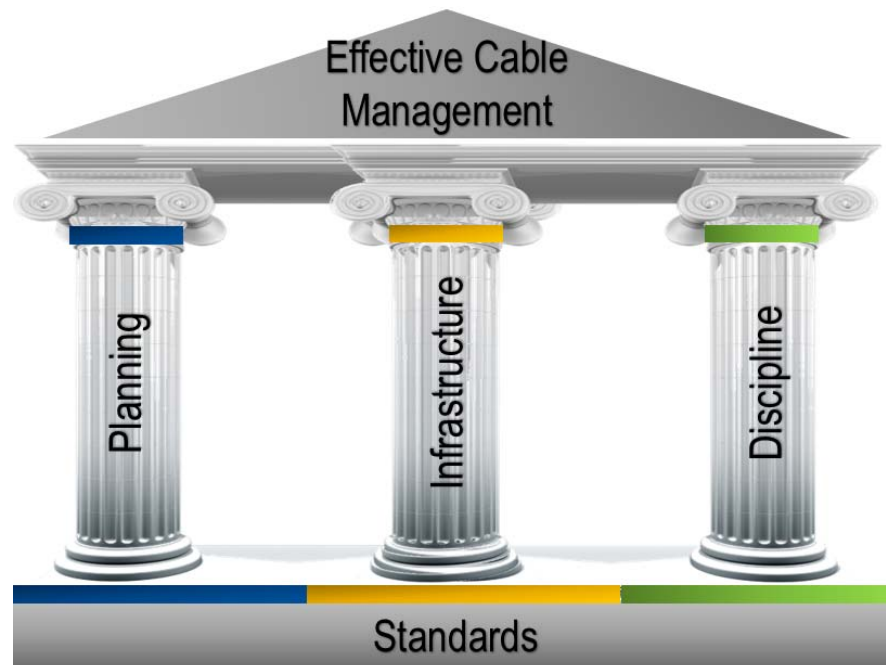OR
SUFFER
THE PAIN OF
REGRET

Summary

Perspective...

Although cabling represents less than 10% of the overall data center network investment, expect it to outlive most other network investments and components, and expect it to be the most difficult and potentially costly component to replace.

Regardless of cable management or pathway strategy, proper capacity planning is critical to the long-term usefulness and effectiveness of your infrastructure. Adding cable capacity can be very disruptive! When in doubt, go a size or two bigger.

Three Pillars of Effective Cable Management

A solid knowledge base on industry standards, due-diligence in planning and product selection, along with ongoing discipline, will provide you with an efficient and effective cable management strategy now and in the future.

Thank you!

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