a CommScope company

SYSTIMAX®
SOLUTIONS

Data Center Fiber Cabling Topologies and Lengths

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Purpose and background

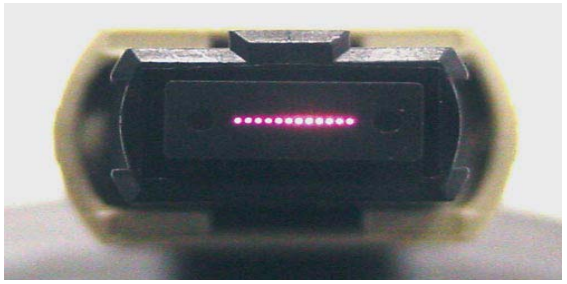
- Provide channel length distributions within Data Centers as guide for setting distance objectives
- Focus on Data Center cabling in support of view that >10G applications will initially be largely DC centric
- Data gathered from CommScope corporate sales data base of pre-terminated cabling and patch cords

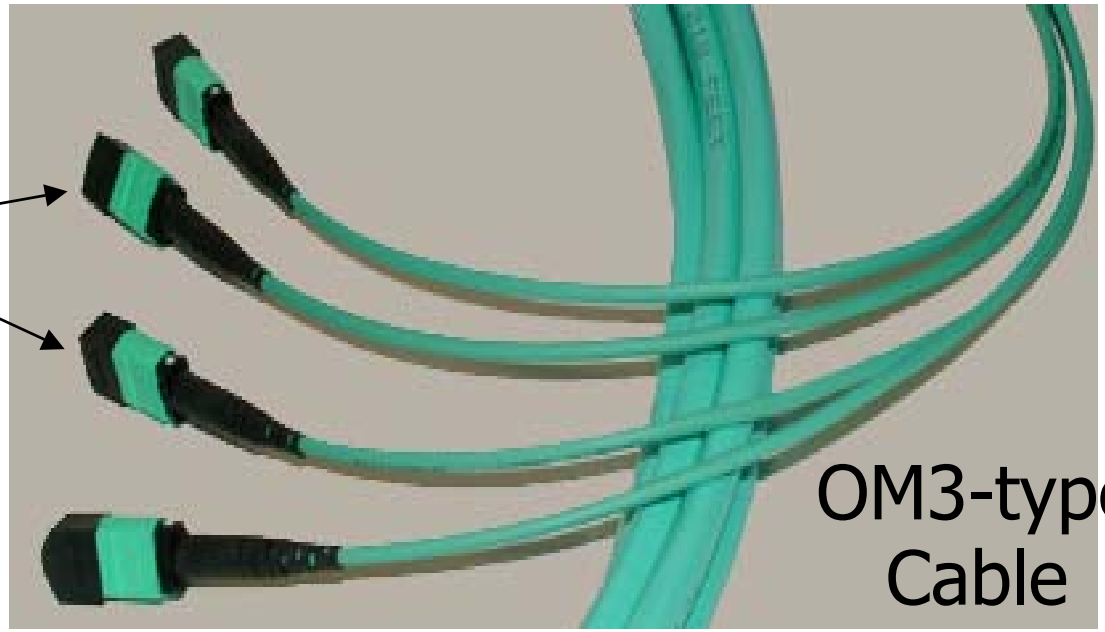
Primer on Data Center Cabling

What is pre-terminated cabling?

- **Custom-length cabling delivered with factory-installed connectors on both ends**
- **Cable is plugged into the back of patch panels**

MPO Plugs (12-fiber array connectors)

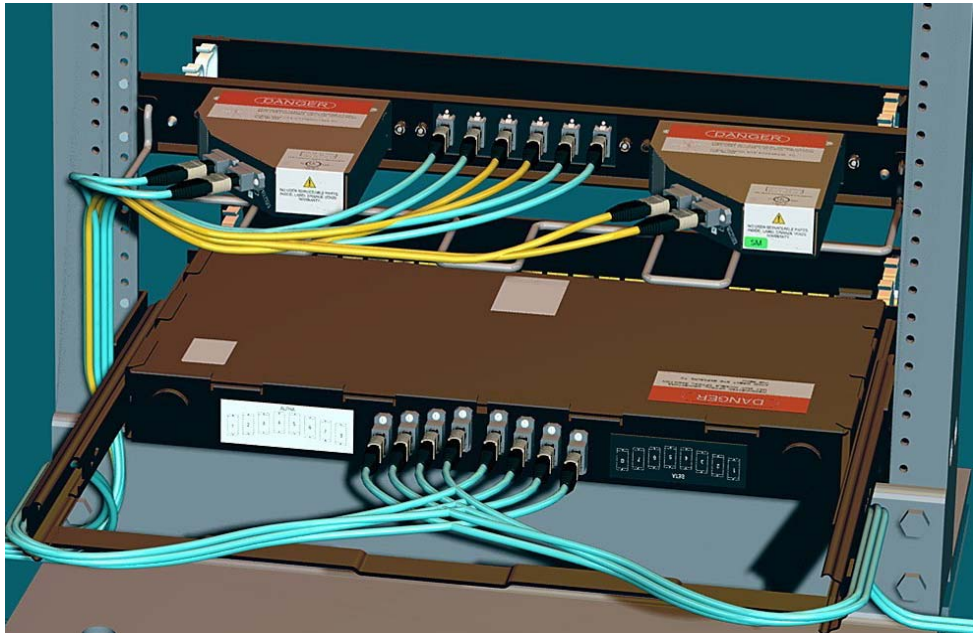




OM3-type Cable (aqua color)

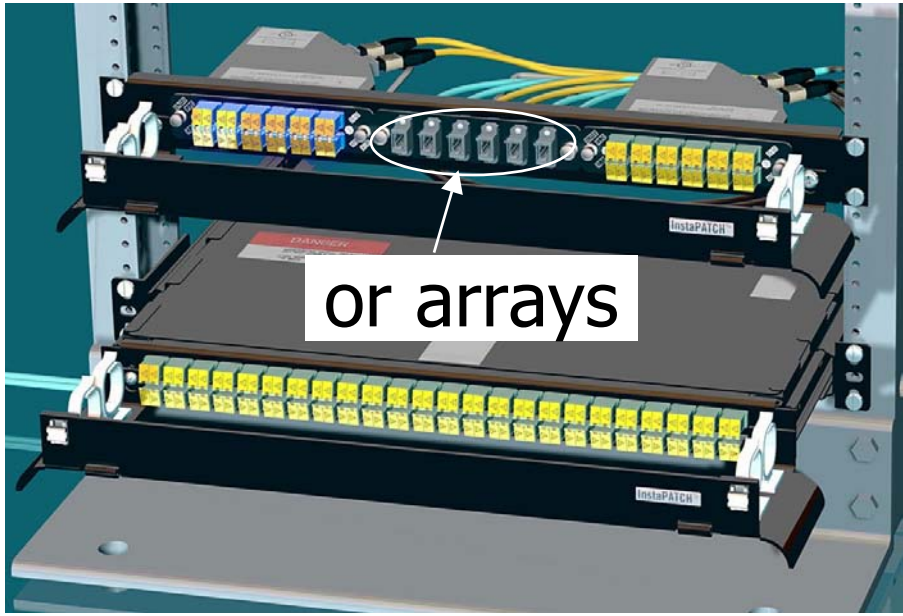
What is pre-terminated cabling?

- **Arrays are typically fanned out to present multiple duplex ports at front of panel**



Array cables plug into back of fanouts

Front side of panels present duplex ports



Why is pre-terminated cabling relevant?

- **Speeds installation and turn up**
  - **Eliminates field termination process**
  - **All assemblies factory tested**
- **Highly advantageous for Data Center builds**
  - **Primary Data Center cabling choice for SYSTIMAX Solutions customers**

- ***Length distribution directly applicable to Data Center channels***
- ***Array cabling supports parallel transmission***

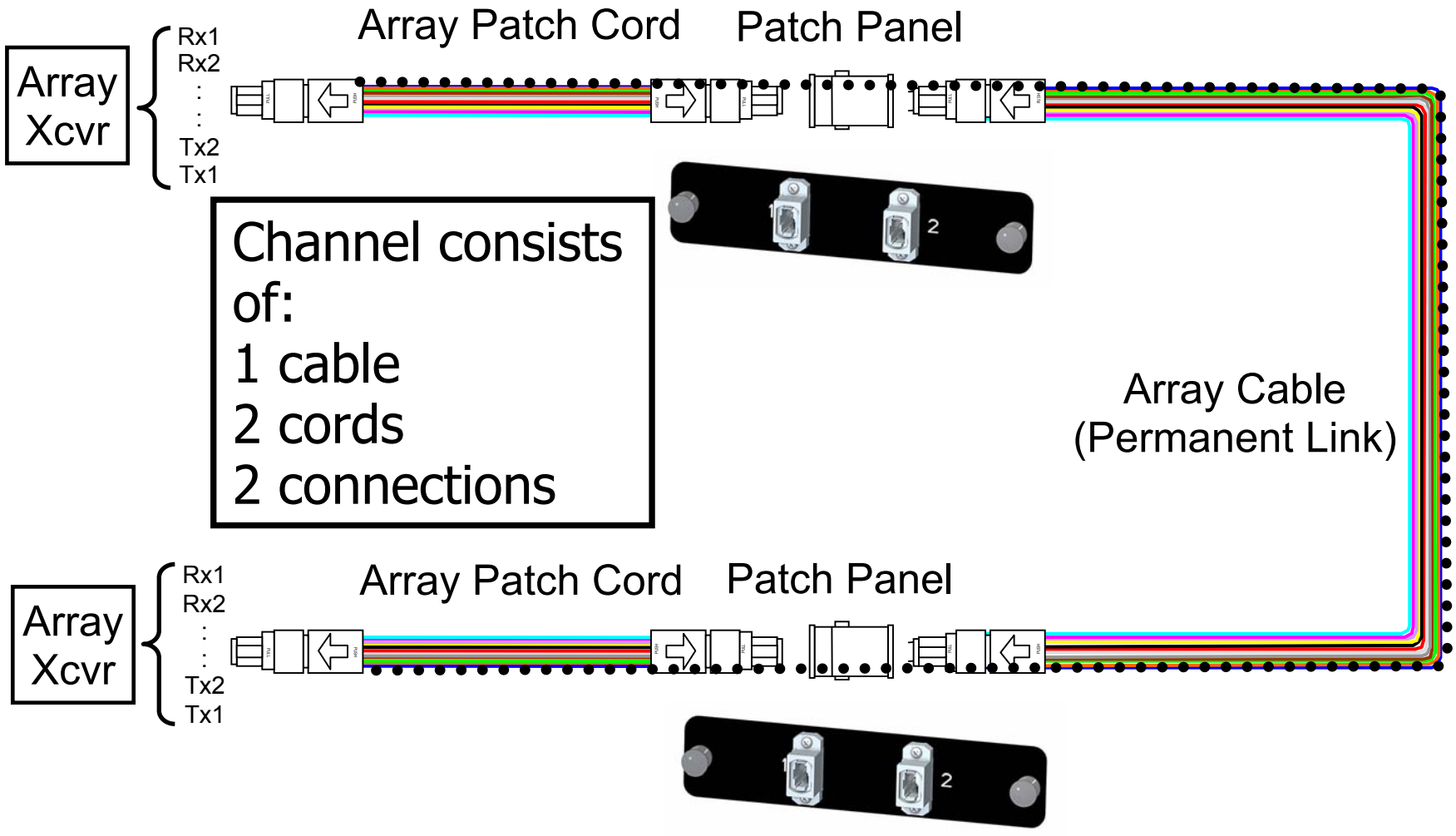
TIA TR42 standardized array cabling for parallel applications

ANSI/TIA-568-B.1-7
"Guidelines for Maintaining Polarity Using Array Connectors"
Approved: January 13, 2006

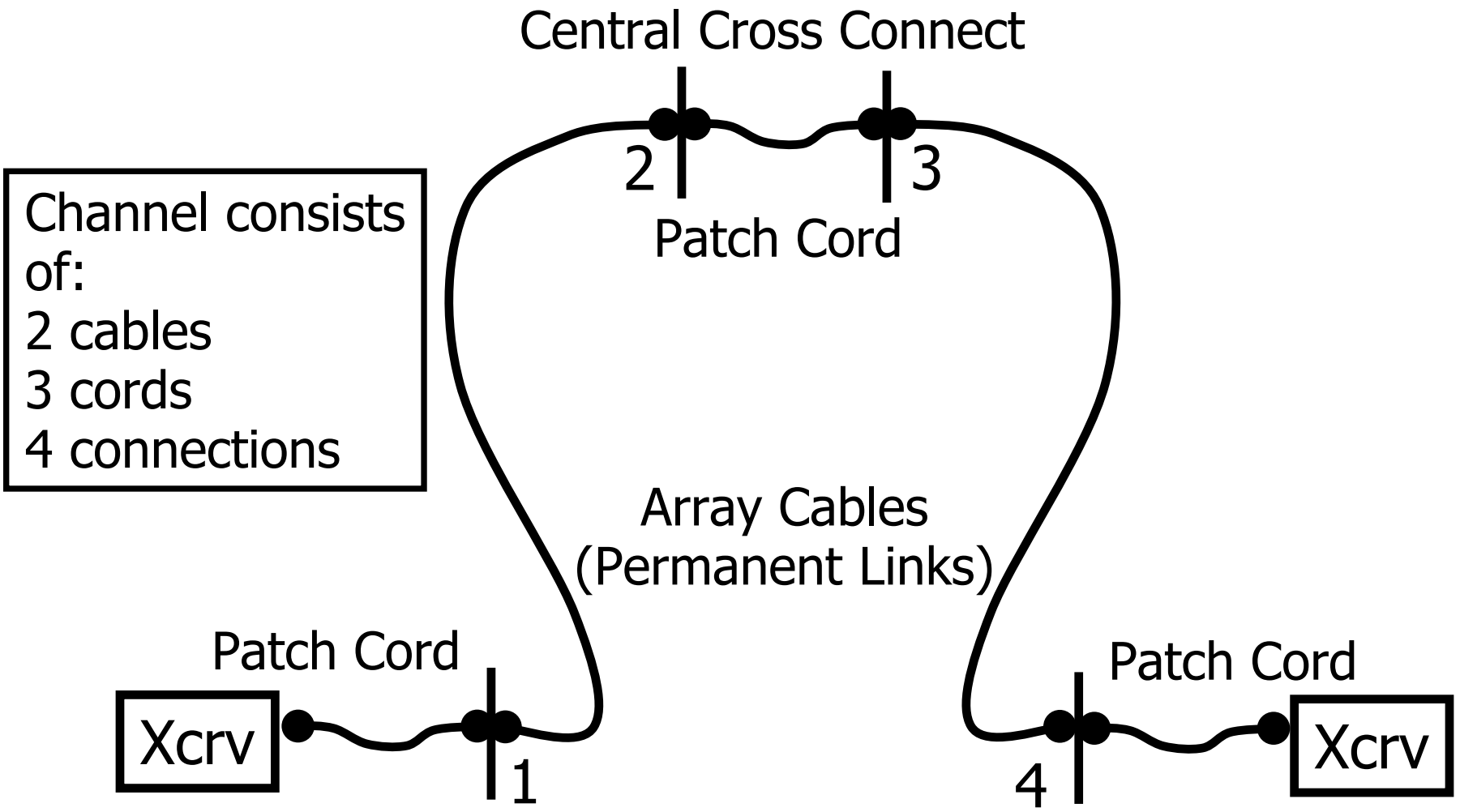
Addendum to TIA 568-B.1 structured cabling standard

Structured cabling now
extends beyond duplex

Basic p2p parallel channel topology

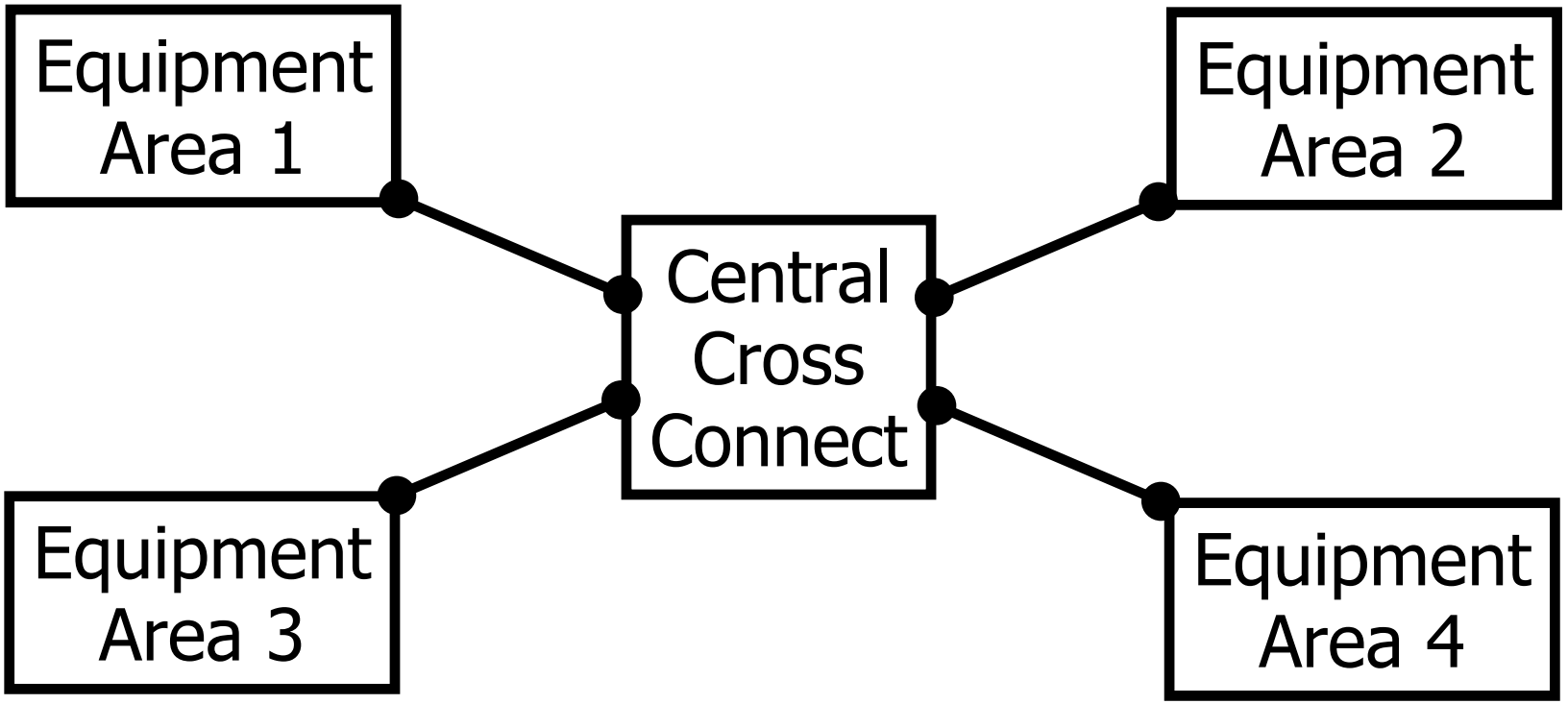


Central cross connect topology



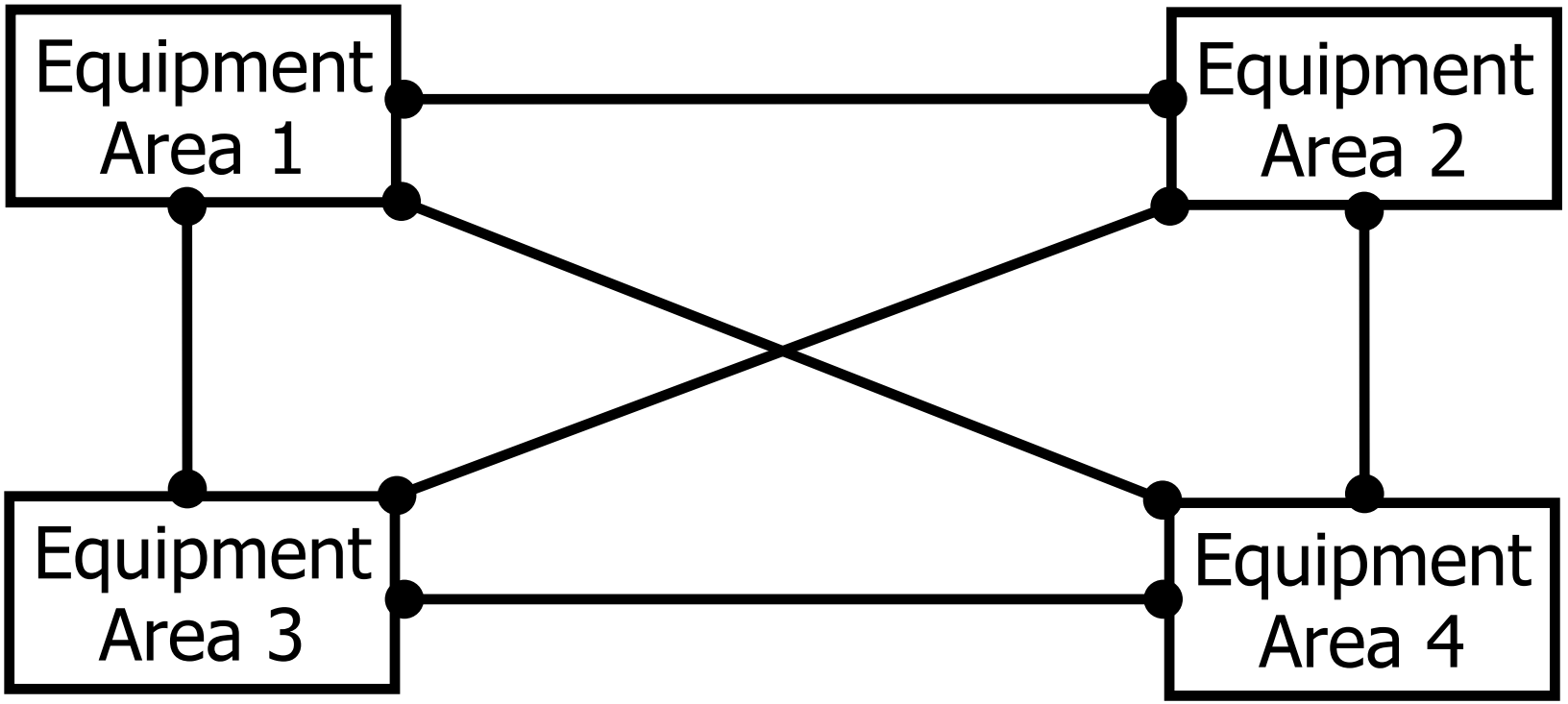
Why use a central cross connect?

- **Allows changeable connectivity between any equipment area**
  - **The hub of star-wired architecture**
  - **Greater flexibility with less cabling than p2p**



P2P requires more cabling

- **For similar connectivity capability relative to central cross connect for star wiring**



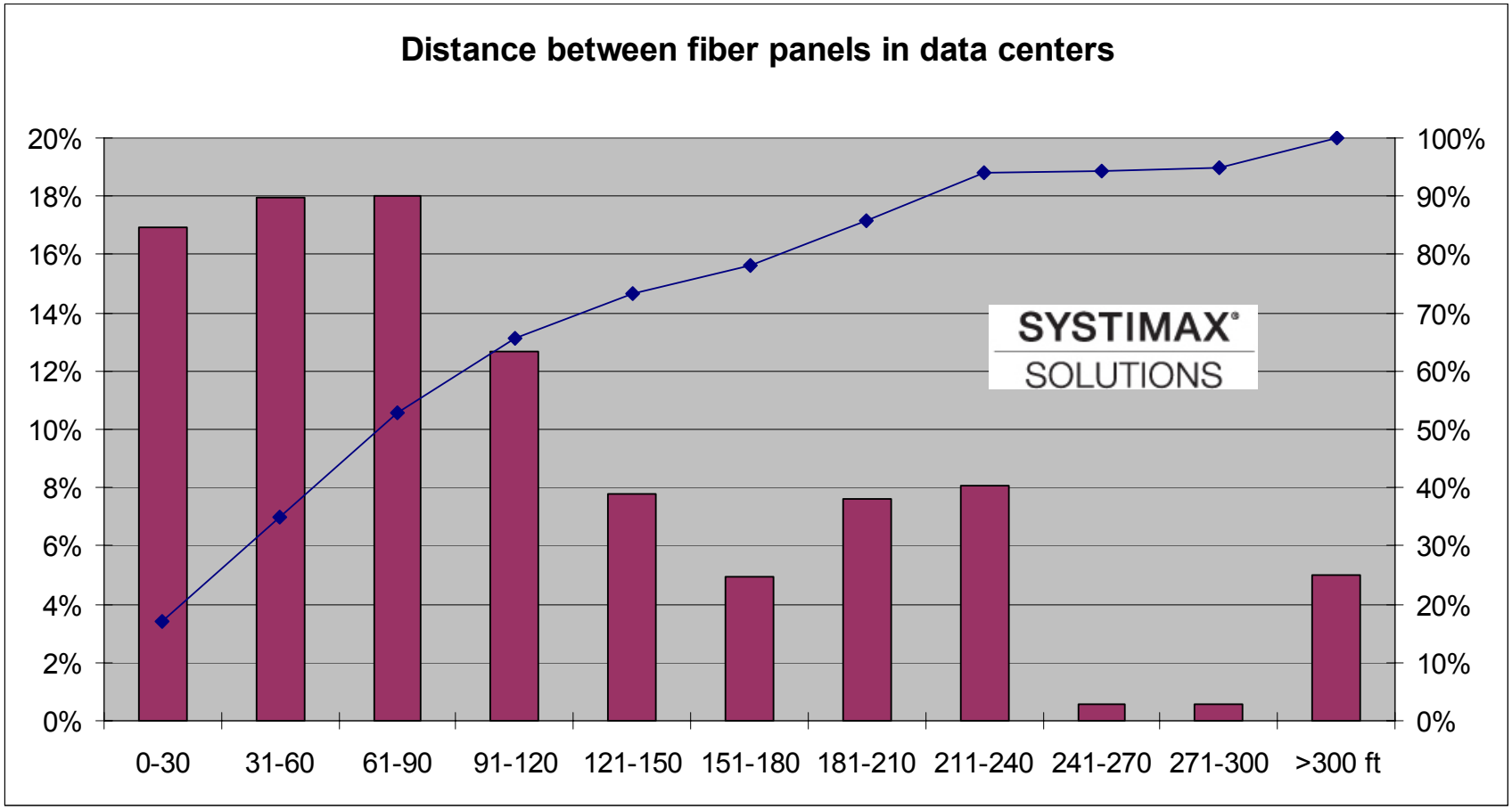
Why are central cross connects relevant?

- Important and popular for managing connectivity, especially in larger data centers
- In the following analysis the data on array cable lengths and patch cord lengths must be combined to form the length of complete channels
- To derive channel length distributions, one must account for some mixture of central cross connect topologies and basic p2p topologies, but the precise mix is unknown

Data Center Cabling Length Data

Array cable length distribution

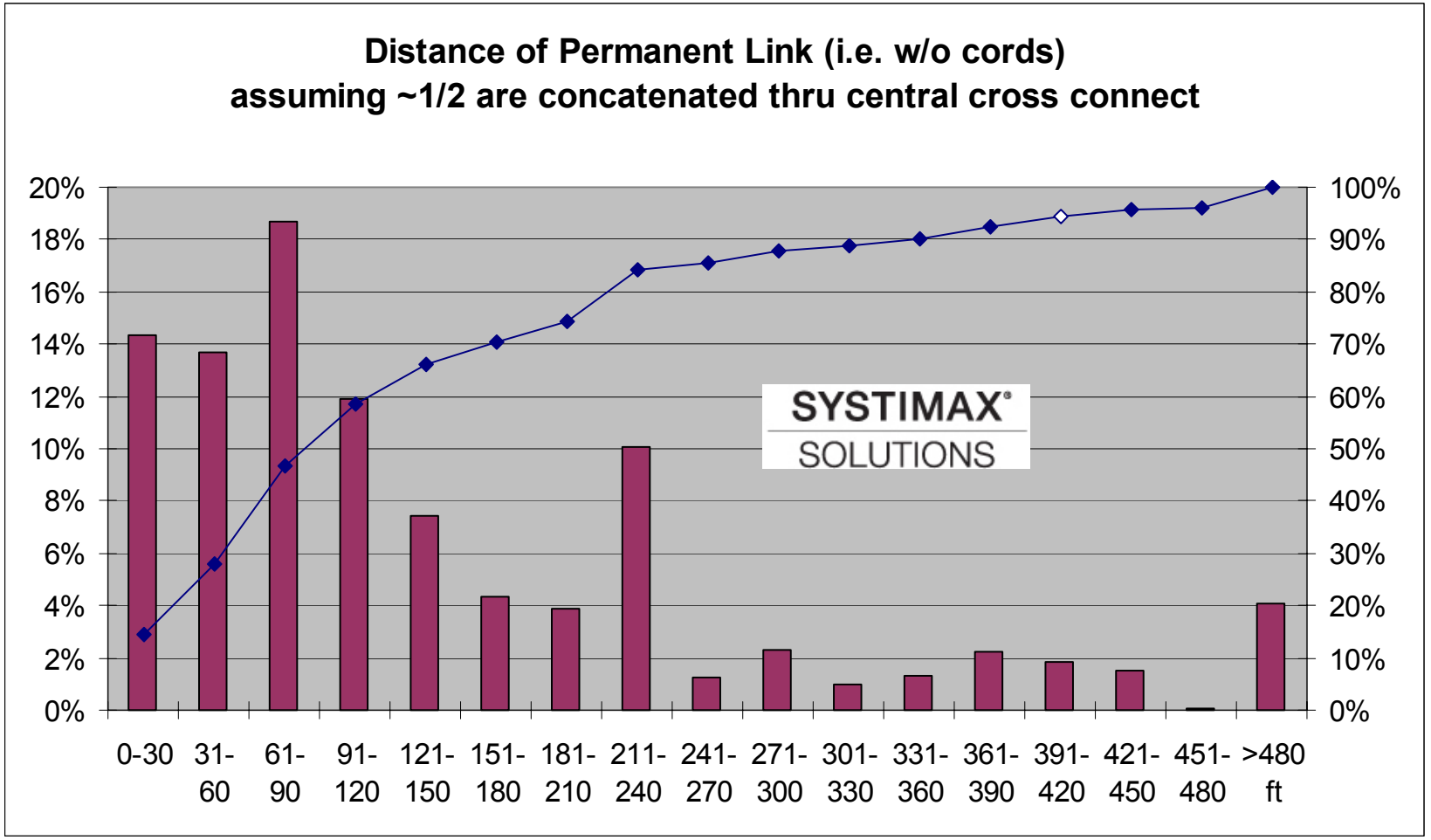
- **Many thousands of 12-fiber units**



73 m

Permanent link length distribution

- **Longer tail emerges**



Patch cord length data

- **Distilled from data on tens of thousands of cords**
- **Mean Length = ~11 ft Standard Deviation = ~12 ft**
- **Two Standard Deviations covers ~94% within this distribution**

statistical length of cords in channel						
number of cords		1	2	3	4	
# std dev	**2**	34	55	74	91	ft
		11	17	22	28	m

3 cords covers central cross connect topology

Putting it all together

- **Recommend aiming to cover 90 to 95% of Data Center channel lengths**
  - **Precedent: 300 m covers similar percentage of in-building LAN backbones**
- **Using a simple summation of constituent lengths near this coverage level gives:**

Distance Requirements at ~95% Coverage		
	ft	m
Permanent Link Allocation	420	128
3 Patch Cord Allocation	74	22
Total Channel Allocation	494	150

Recommend setting short reach length objective = 150 m

Backup Material

Analytical approach using statistics

- **Using means and standard deviations for all component lengths**