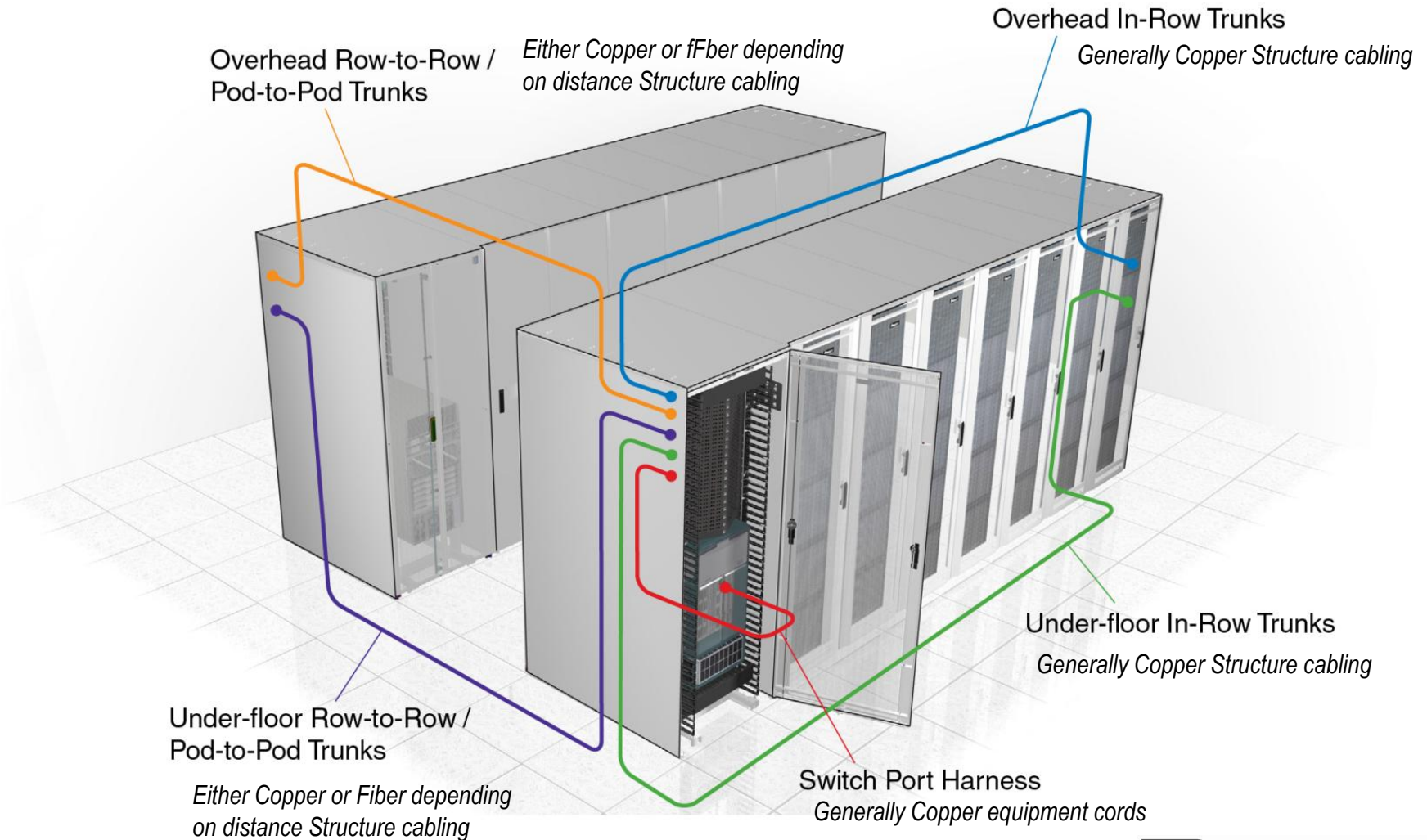


Data Center Copper Channel Length Usage

Bob Wagner - Panduit Corporation
Ron Nordin – Panduit Corporation
Steve Skiest – Panduit Corporation
Frank Straka – Panduit Corporation

Data Center Deployments



Structured Cabling Benefits

- Pre-install overhead or under floor facilitates future deployments
- Simplifies moves, adds, changes
- Flexibility and upgradability
- Allows any deployment topology
- Easier support of multi-vendor equipment: no proprietary cables

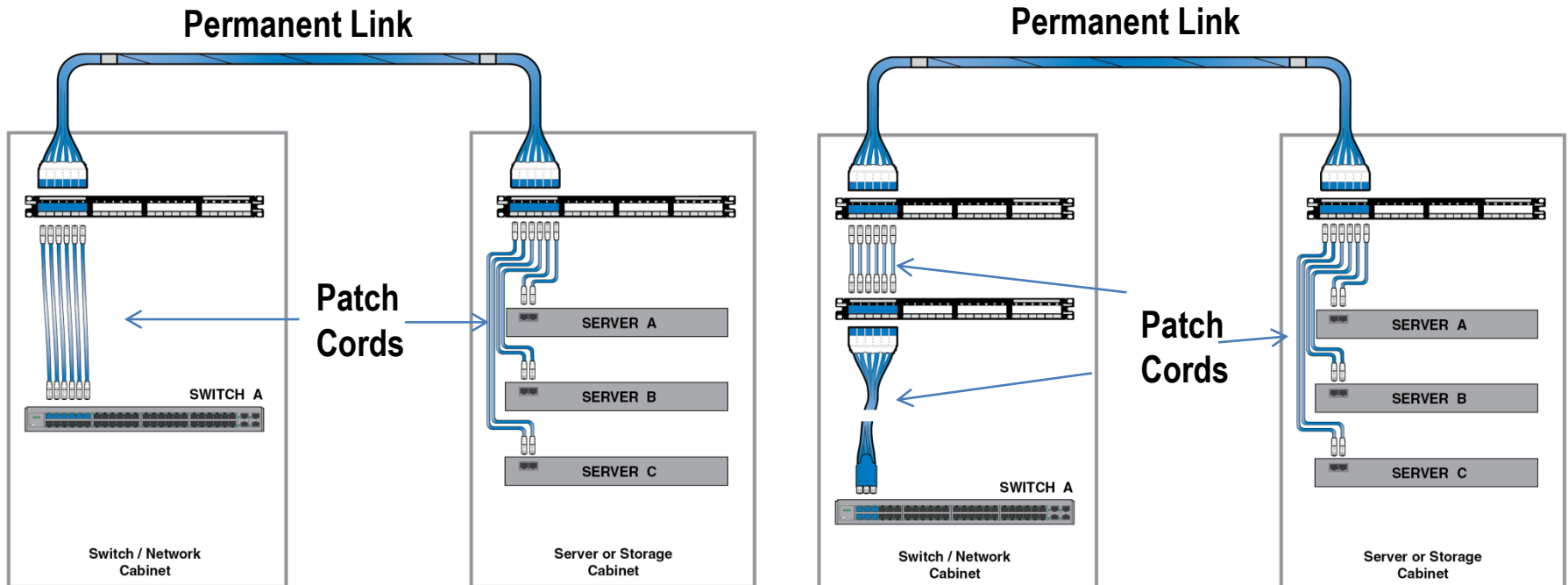


Structured Cabling Channel Construction

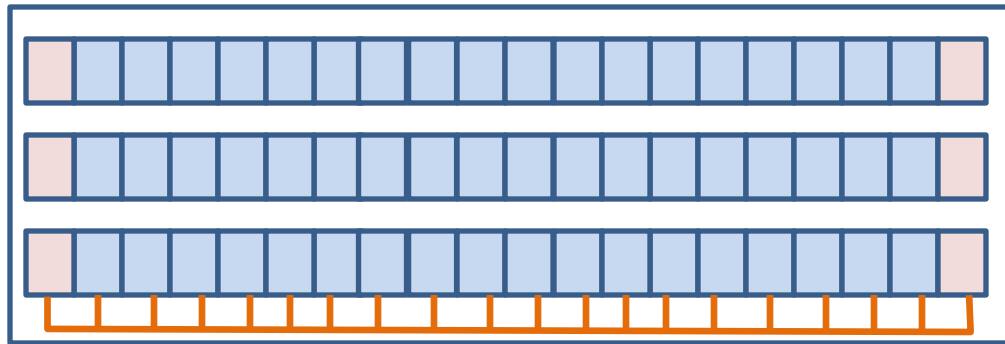
Typical **2-connector** deployment.
Structured cabling within a row or across rows. Common for End of Row or Middle of Row switching topology in Data Centers

Typical **3-connector** deployment.
Using a cross-connect at the switch end is sometime preferred to eliminate need to disconnect from switch port to make changes.

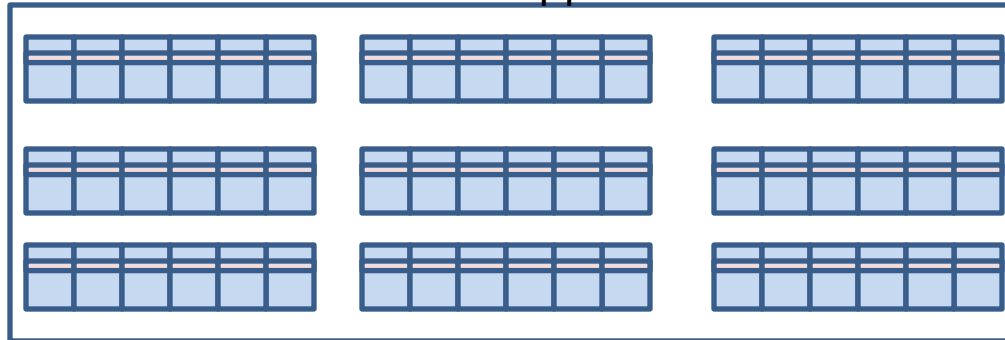
Patch panels are most often in the same rack as equipment, but can be in an adjacent rack or above the rack on the pathway



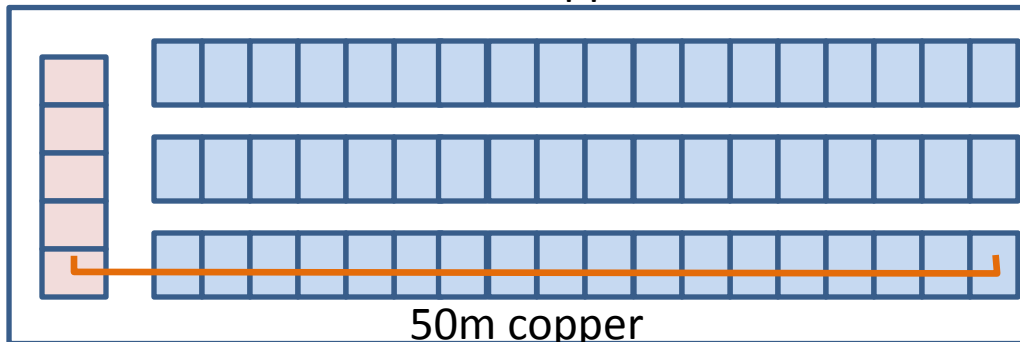
Deployment Topologies



30m copper



1-10m copper



50m copper



Switch cabinet



Server cabinet



Top of rack switch cabinet

End of Row (or Middle of Row)

- Switch at end of row
- Structured cabling along row, 30m max. channel
- Some use cross-connect on switch end
- Switching at each end for redundancy
- Fiber typically for inter-switch uplink, although copper can be used

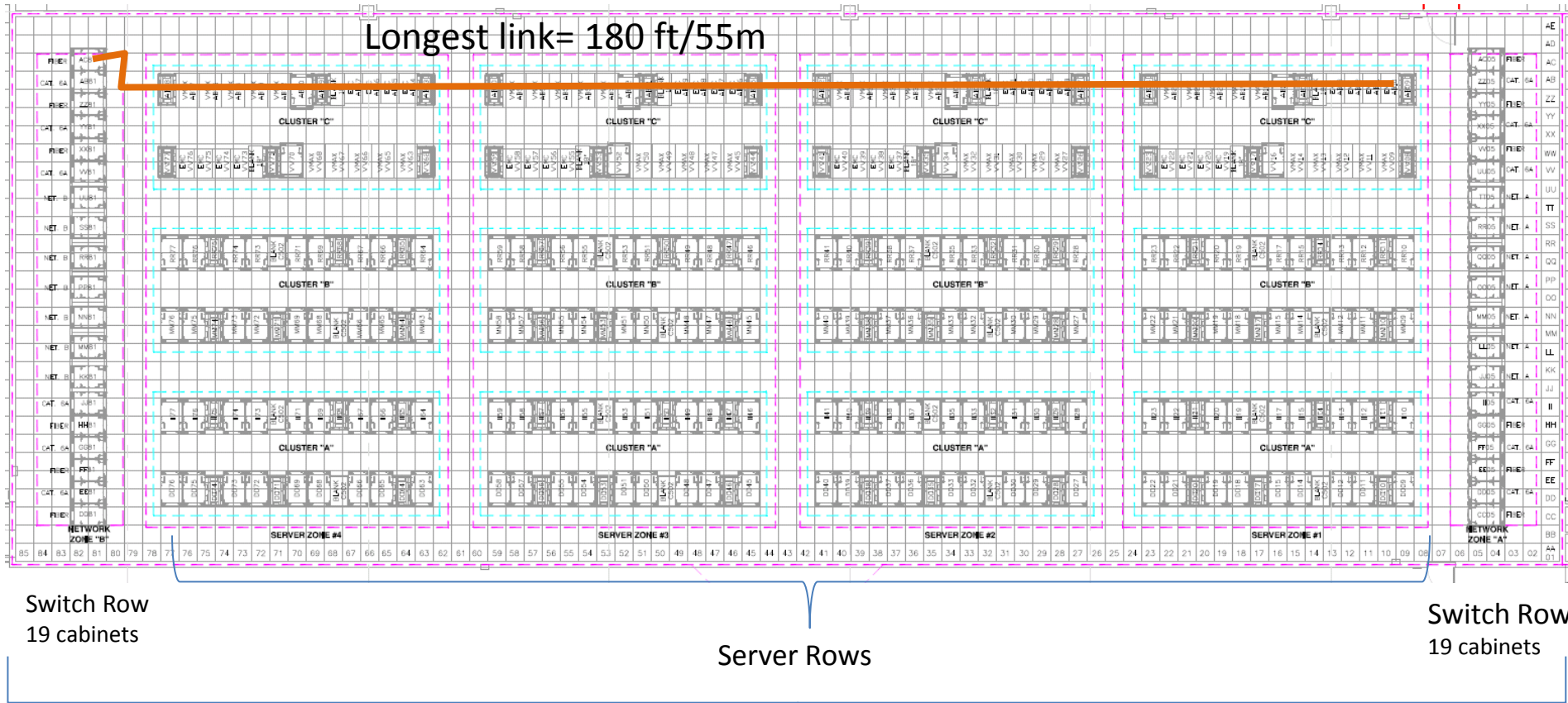
Top of Rack

- Switch in each or adjacent cabinet
- Most scalable
- Patching or very short structured cabling used for access
- Less cabling, more switching
- Potential for oversubscription if traffic goes between cabinets/rows
- Less copper, more (expensive) fiber cabling

Dedicated Network Row

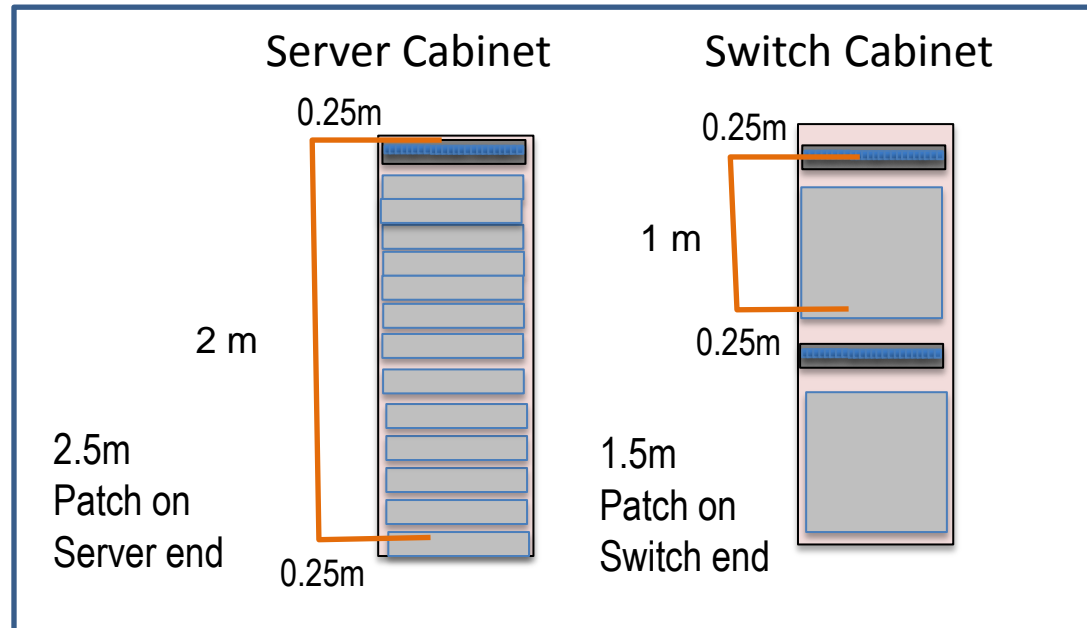
- Most flexibility
- Facilitates switch management
- Longest access links up to 90m, typical rooms need 30-50m max.
- Most common legacy topology

Example New 10G Data Center Deployment Large Industrial Company New Data Center Using Dedicated Network Row Topology

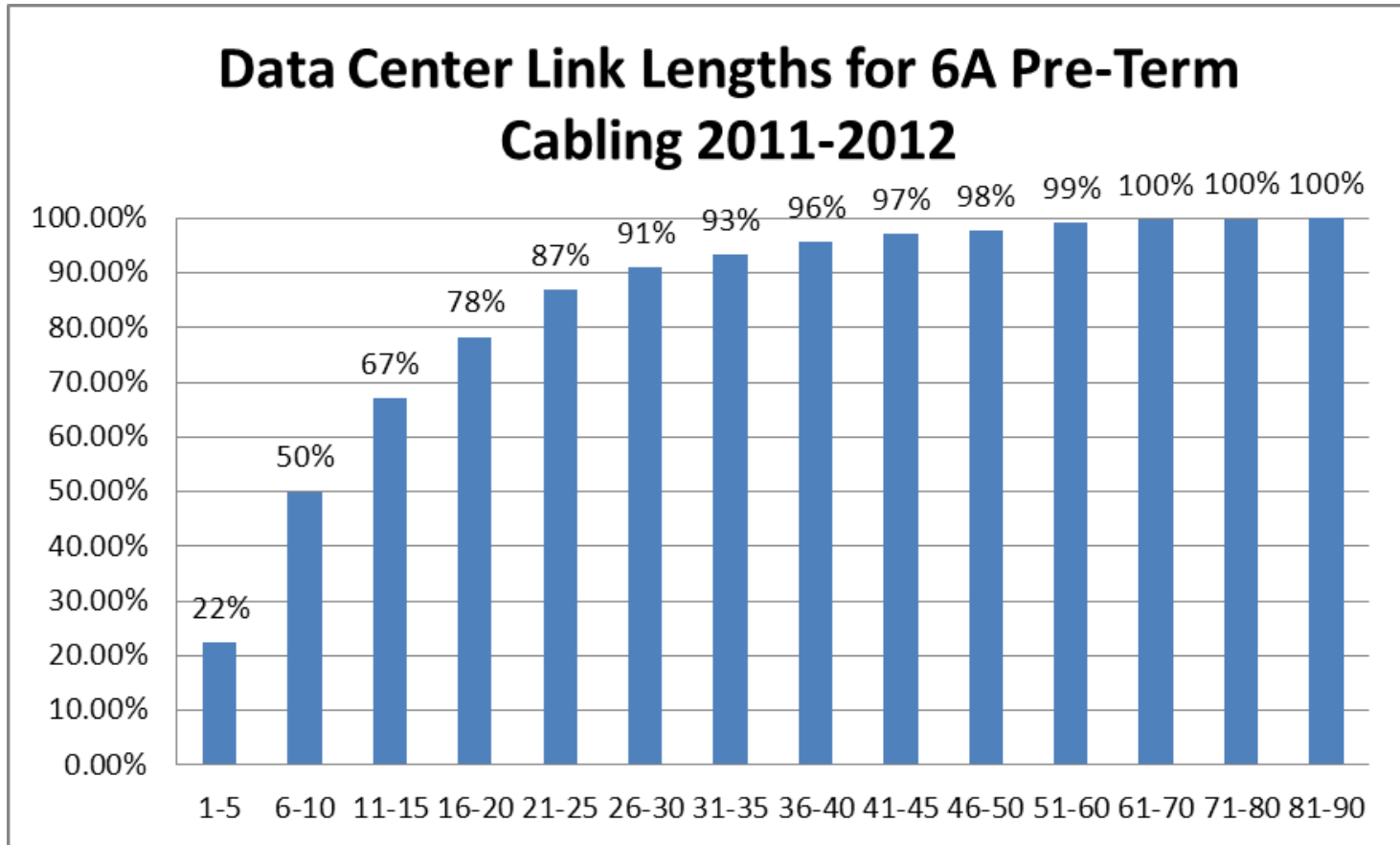


Panduit Cabling Reach Study

- Based on Cat6A Pre-terminated Data Center deployments: 2011-2102 (100K+ cables)
- Compiled link lengths
- Add in estimates for average patching length: 4m
 - 2.5 m on server end
 - 1.5 m on switch end

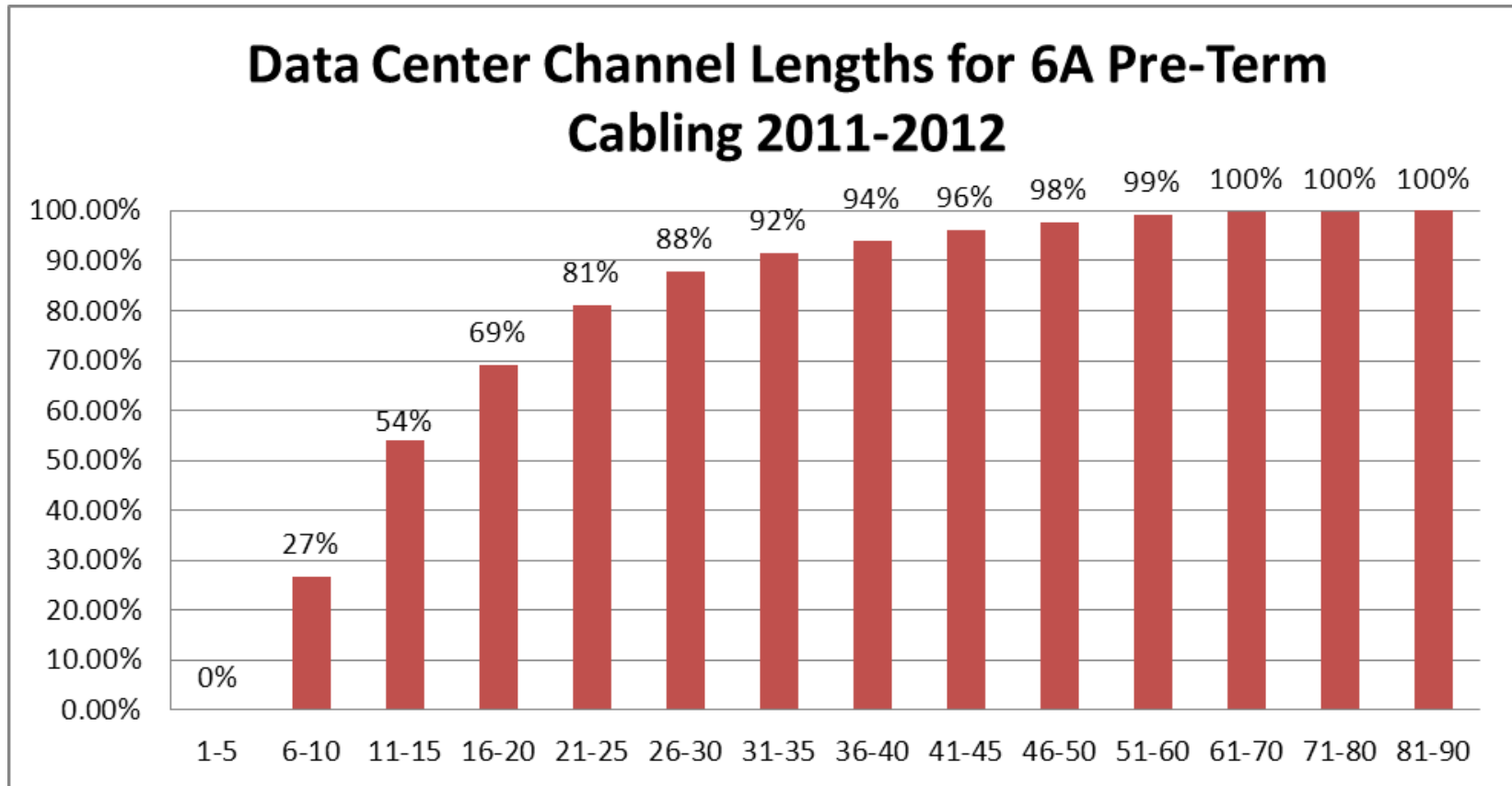


Permanent Link Lengths Trunk Cables only



Channel Lengths with patch cords

Assumes 4m patch cords added in channel



Summary of Channel Length Data

Assuming users will wish to deploy 40G similar to 10G:

- 0% channels < 5m (twinax space)
- 15m channel will cover 54% of applications
- 30m channel will cover 88% of applications
- 40m channel will cover 94% of applications
- 50m channel will cover 98% of application

Summary of Channel Length Data

Market wants:

- 30 meter cable length meets the market's needs
 - Covers 88% of today's 10G applications and is expected to meet most future 40G Data Center application usage
 - Covers EoR and modified Dedicated Network row topologies
- Structured Cabling
 - Allows simplification and flexibility
 - Never have to touch active equipment
 - Allows any deployment topology