Cabling Challenges and Opportunities

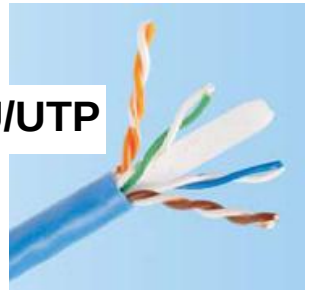
Ron Nordin
Robert Wagner

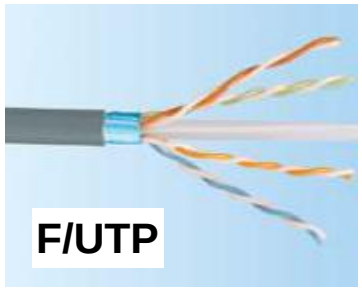
Panduit

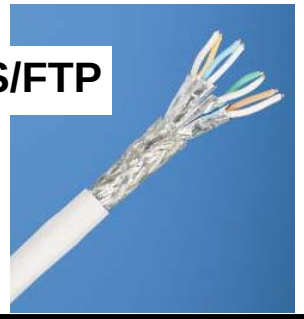
Existing Connector Standards

Type of connector	IEC 60603-7-41 and -51 (RJ45)	IEC 60603-7-71 (GG45)	IEC 61076-3-104 (TERA®)
Recognized in standards	Category 6A / Class EA	Category 7A / Class FA	Category 7A / Class FA
Current Maximum Frequency	500 MHz	1000 MHz	1000 MHz
Supported cable Types	U/UTP, F/UTP, S/FTP	S/FTP	S/FTP
Backwards compatible	Y	Y	Y (but requires a hybrid patch cord)

Possible 40G Base-T Cabling Solution Space

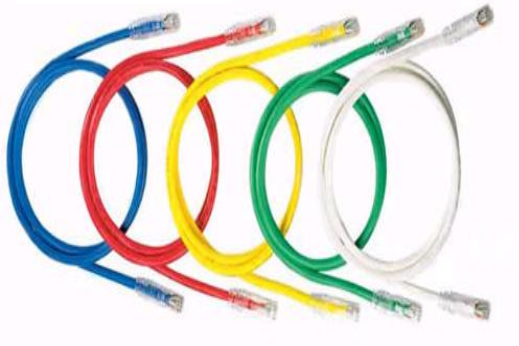


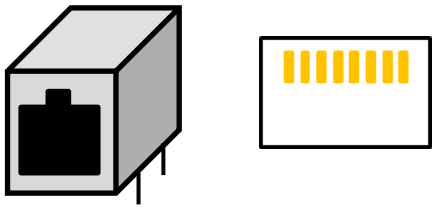




Traditional RJ45 (enhanced)

Patch Cord



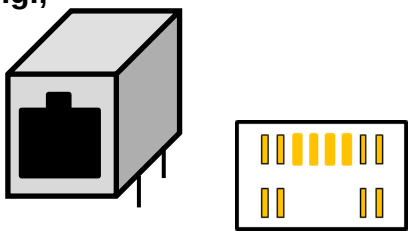


Switched RJ45 (enhanced GG45)

Patch Cord

Plug face

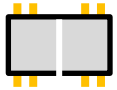
Jack is compatible to both Cat6a RJ45 and enhanced patch cords (e.g., GG45 style)

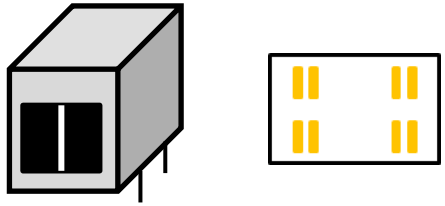


TERA Connector (enhanced)

Patch Cord

Plug face





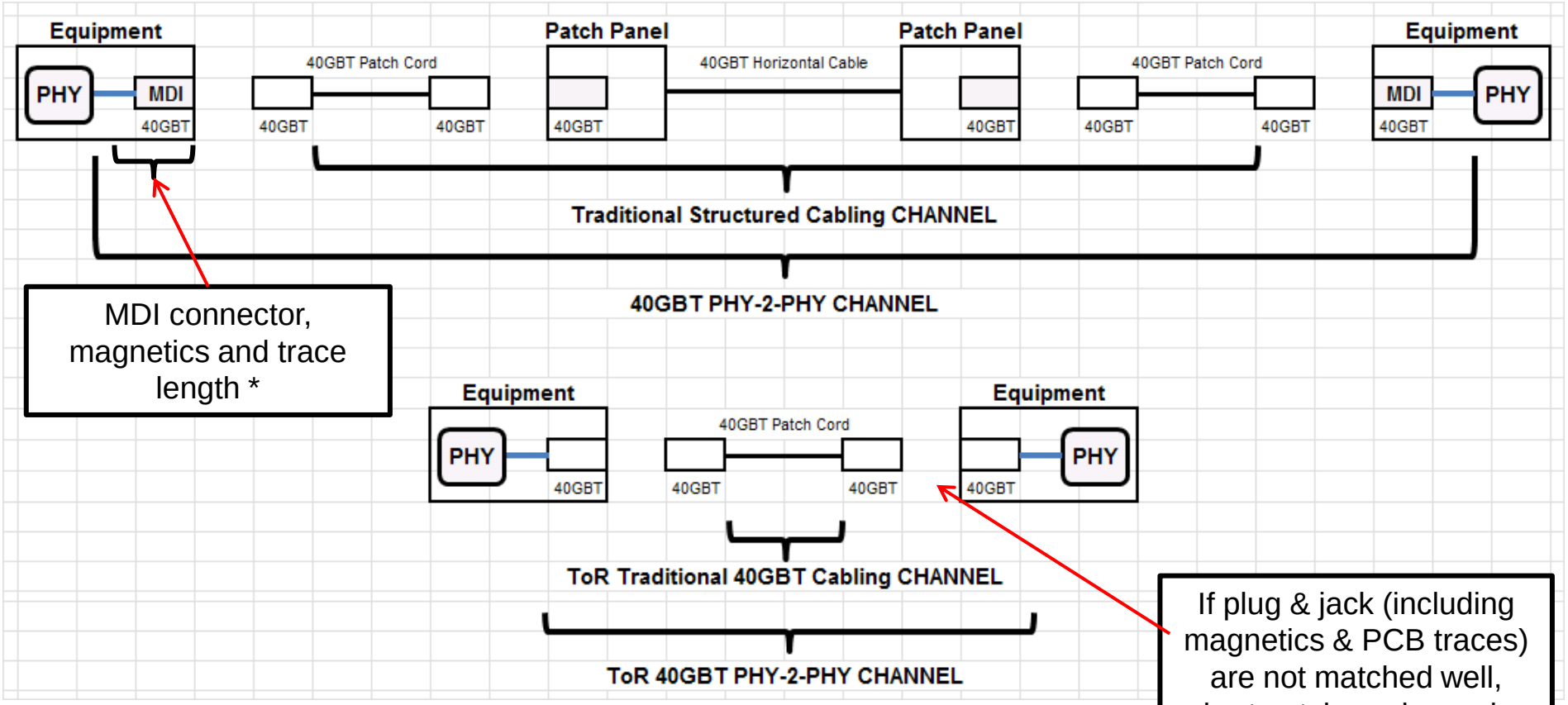
PANDUIT LABORATORIES

Channel Characteristics:

Bandwidth
Insertion loss
Insertion loss deviation
Return loss
Alien Crosstalk
NEXT
FEXT
Balance
Common mode (e.g., EMI) susceptibility
Skew

PANDUIT LABORATORIES

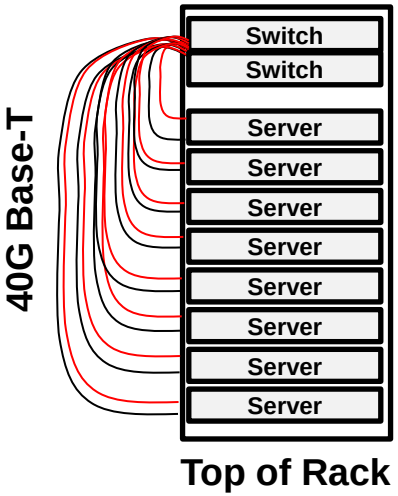
40GBT Modeling
- Traditional Structured Cabling
- Should we use PHY to PHY model?



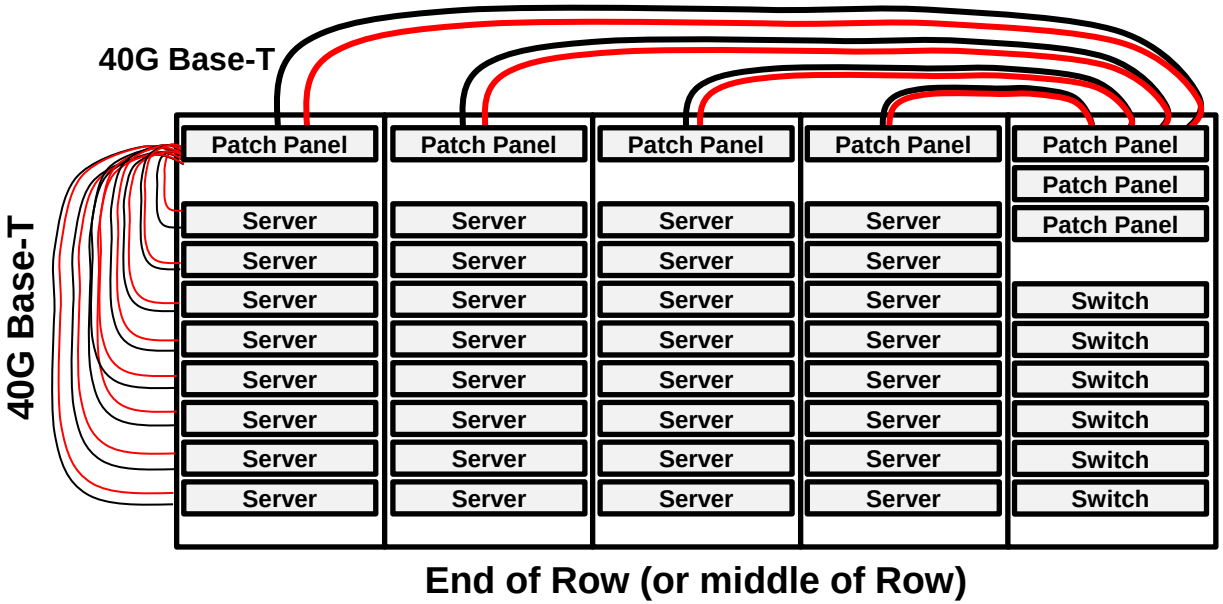
*Assume PHY through MDI connector continues to be the responsibility of the equipment providers

Network Architecture Implementations

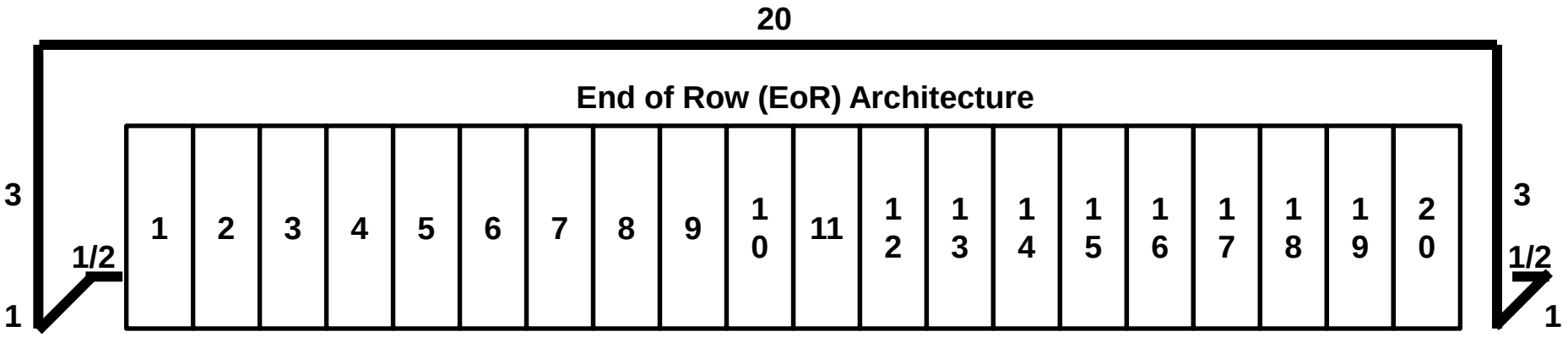
ToR
Point-to-Point



EoR
Structured Cabling



40G Base-T Cabling: Channel Length Considerations

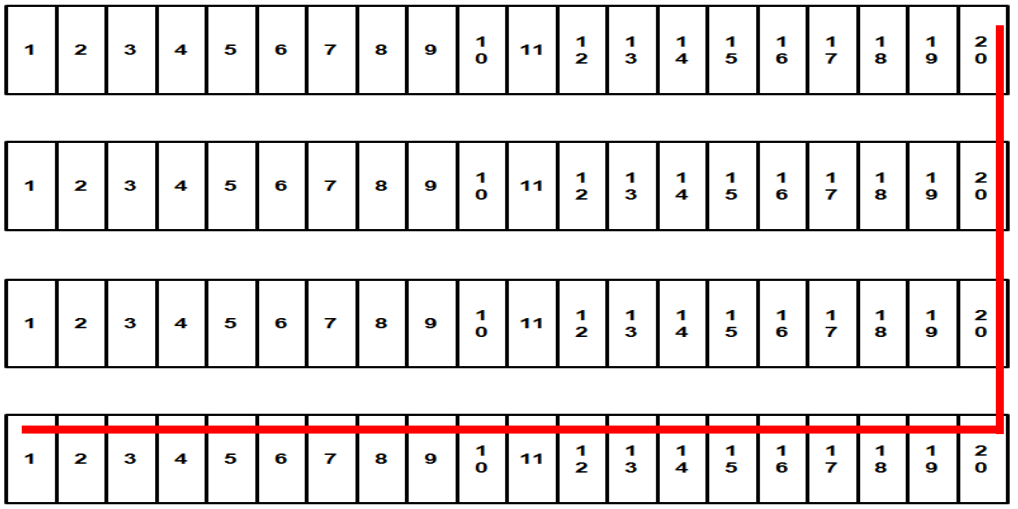


Summary

- at least 30m of cable length is important, longer is better

- Longer will increase potential applications such as Enterprise

ToR Fabric Based Network Architecture



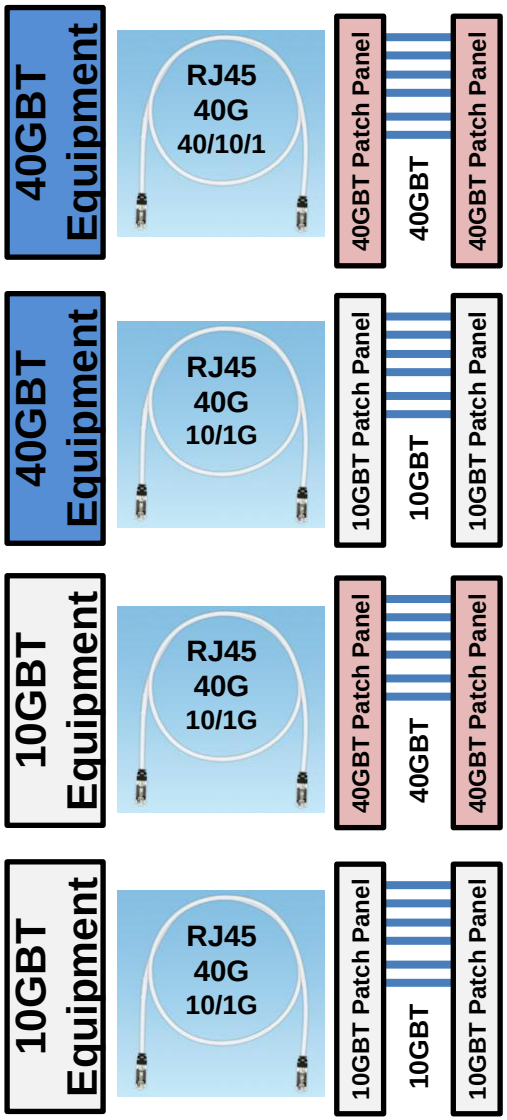
40G Base-T Cabling
Top of Rack Backward Compatibility

Traditional RJ45			Switched RJ45			TERA Connector		
40GBT Equipment		40GBT Equipment	40GBT Equipment		40GBT Equipment	40GBT Equipment		40GBT Equipment
40GBT Equipment		10GBT Equipment	40GBT Equipment		10GBT Equipment	40GBT Equipment		10GBT Equipment
10GBT Equipment		10GBT Equipment	10GBT Equipment		10GBT Equipment	10GBT Equipment		10GBT Equipment

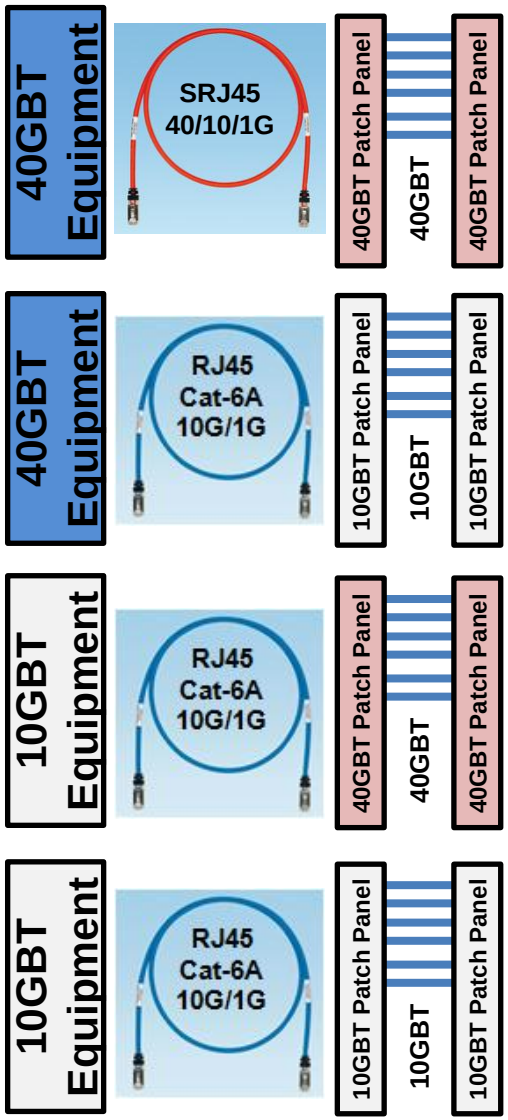
40G Base-T Cabling
EoR Structured Cabling Backward Compatibility

PANDUIT LABORATORIES

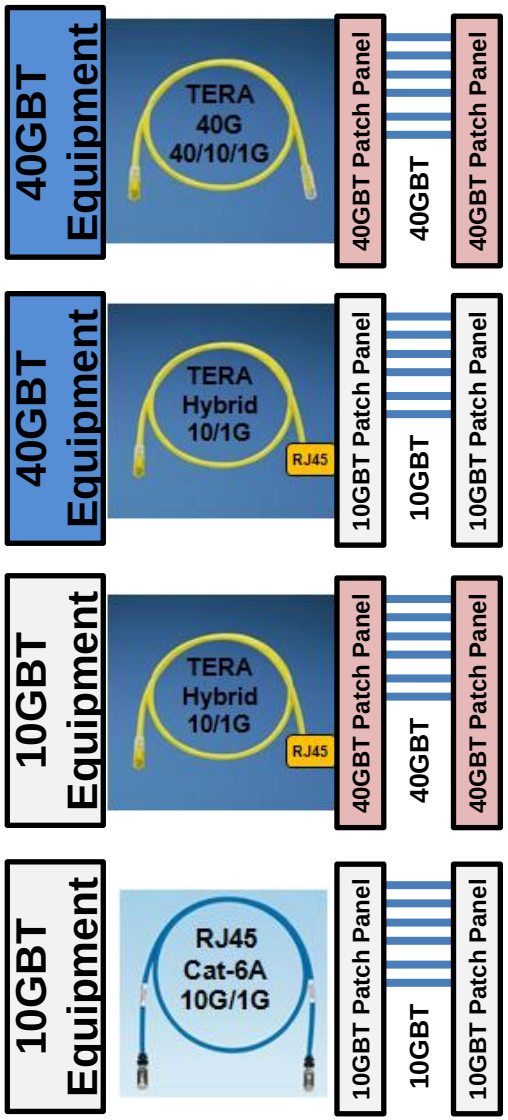
Traditional RJ45



Switched RJ45



TERA Connector



Summary

- There can be trade-offs between performance and backward-compatibility
- Should the Channel model be modified
- Support for a channel length of at least 30m is important for EoR & Fabric Based Network applications
- Should a cabling sub-group be formed to address:
  - Channel models
  - Compatibility models