

RJ45 Cat.8: a topic for LAN?

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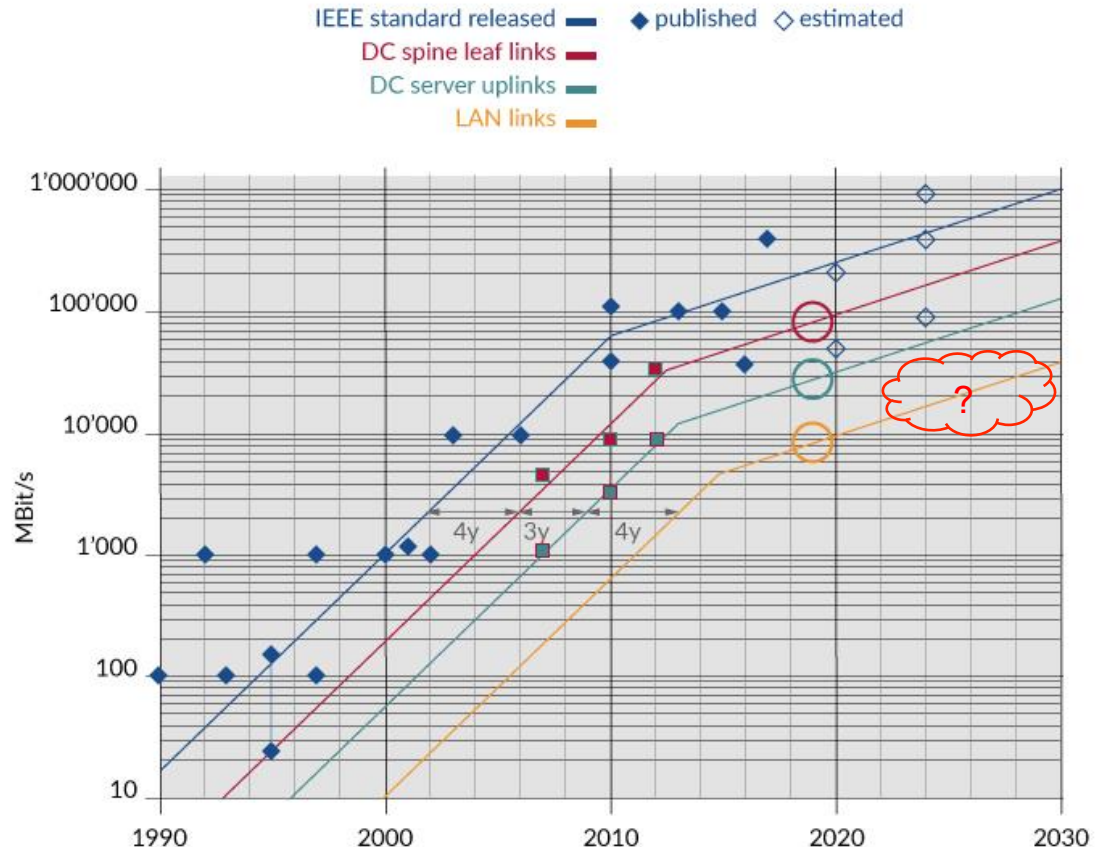
Development of data rates

Data rates follow trend curve:

- Moor's law until 2010
- Slower increase since

Experience shows for 2020:

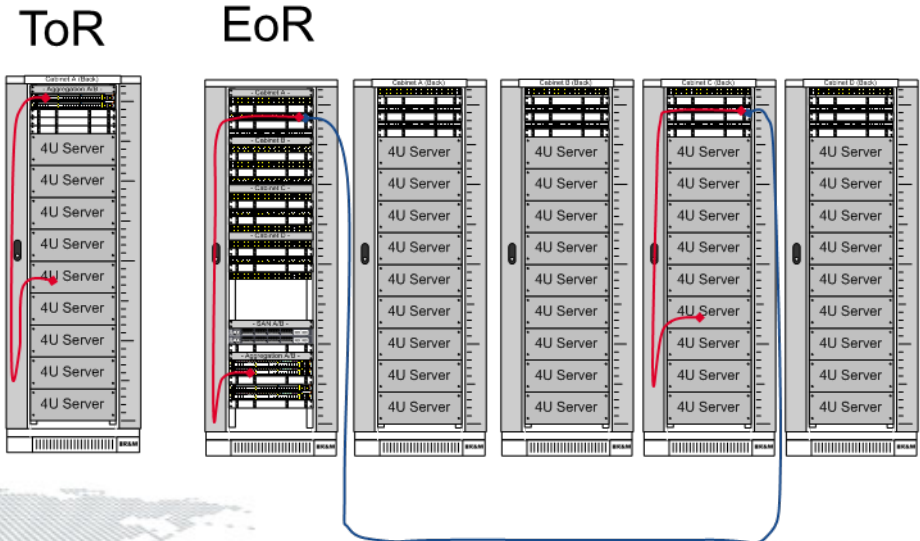
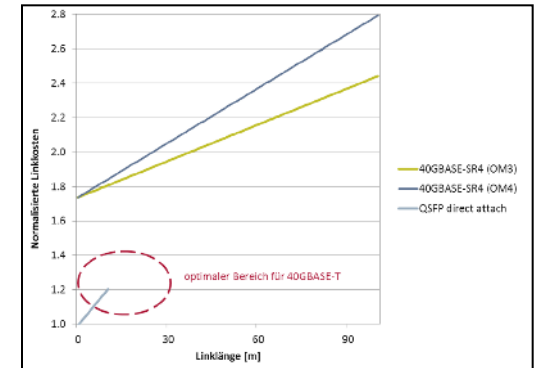
- 100GBase-X will be state of the art between switches
- 40GBase-X will be state of the art for server access
- 10GBase-T will become the preferred media in LAN



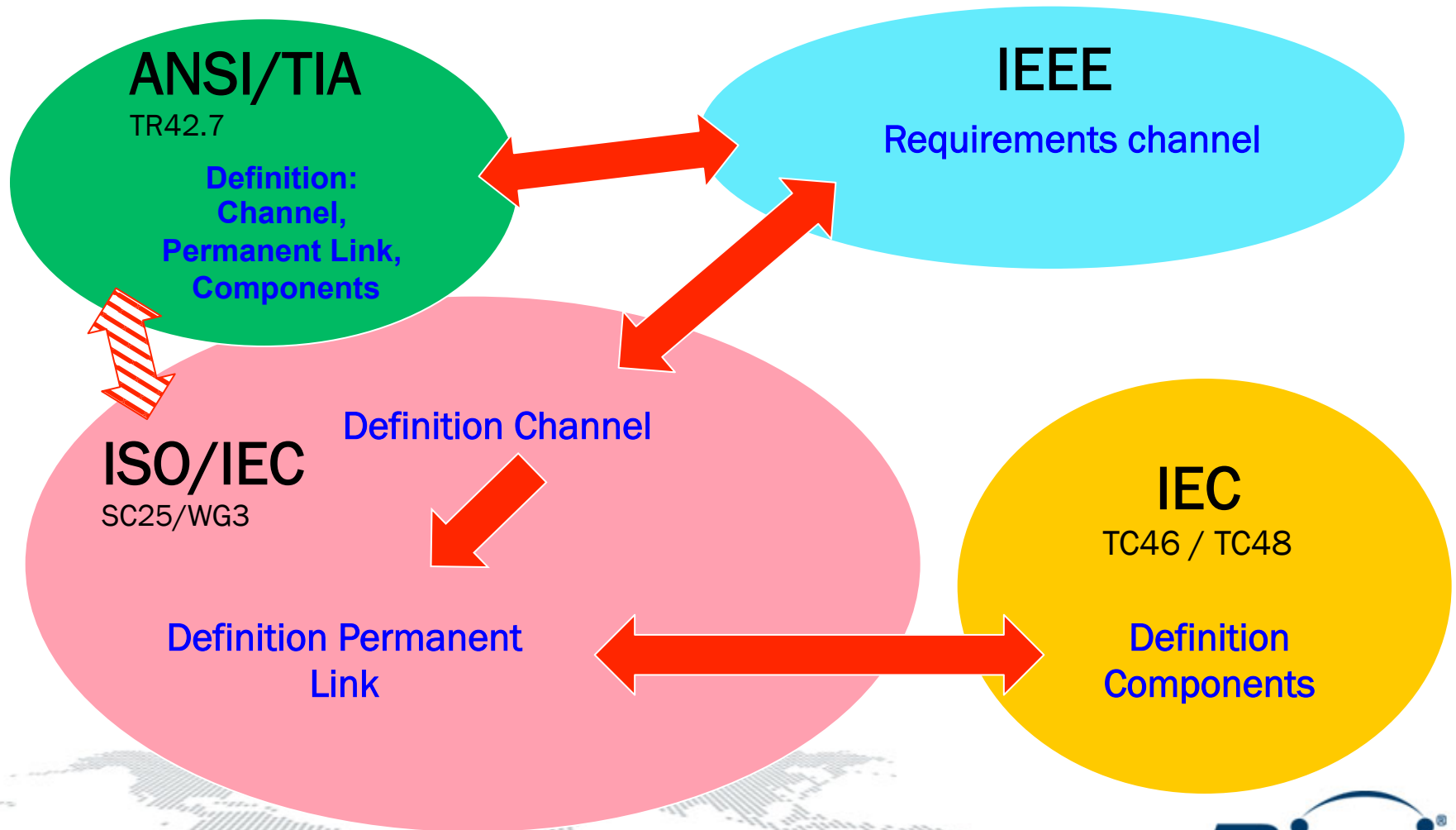
IEEE 40GBase-T business case

- Saving potential for TP ports vs. FO ports
- Saving potential for TP ports vs. QSFP DAC ports
- Easy migration from 10G to 40G on same media

- Top of the Rack (TOR)
 - Point to Point connection
 - Only few meters
 - Patch cords only
- End of Row (EOR)
 - 2 connector Channels
 - 30m channel length is enough
 - Generic cabling system between cabinets



committees

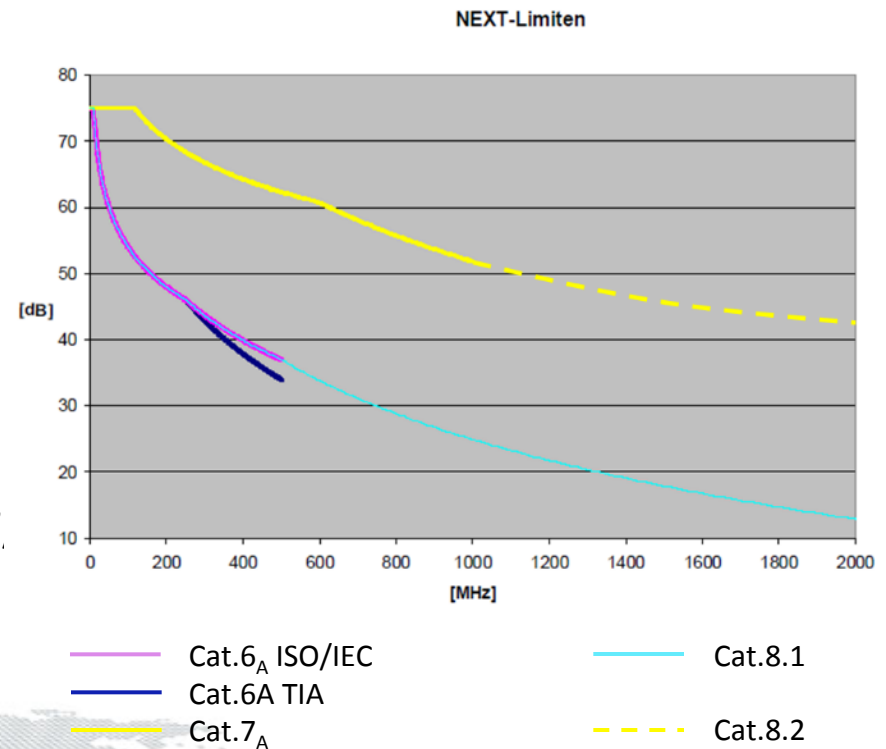


40GBase-T cabling standardization

- IEEE 802.3bq (09/2016)
MDI definition and channel requirements

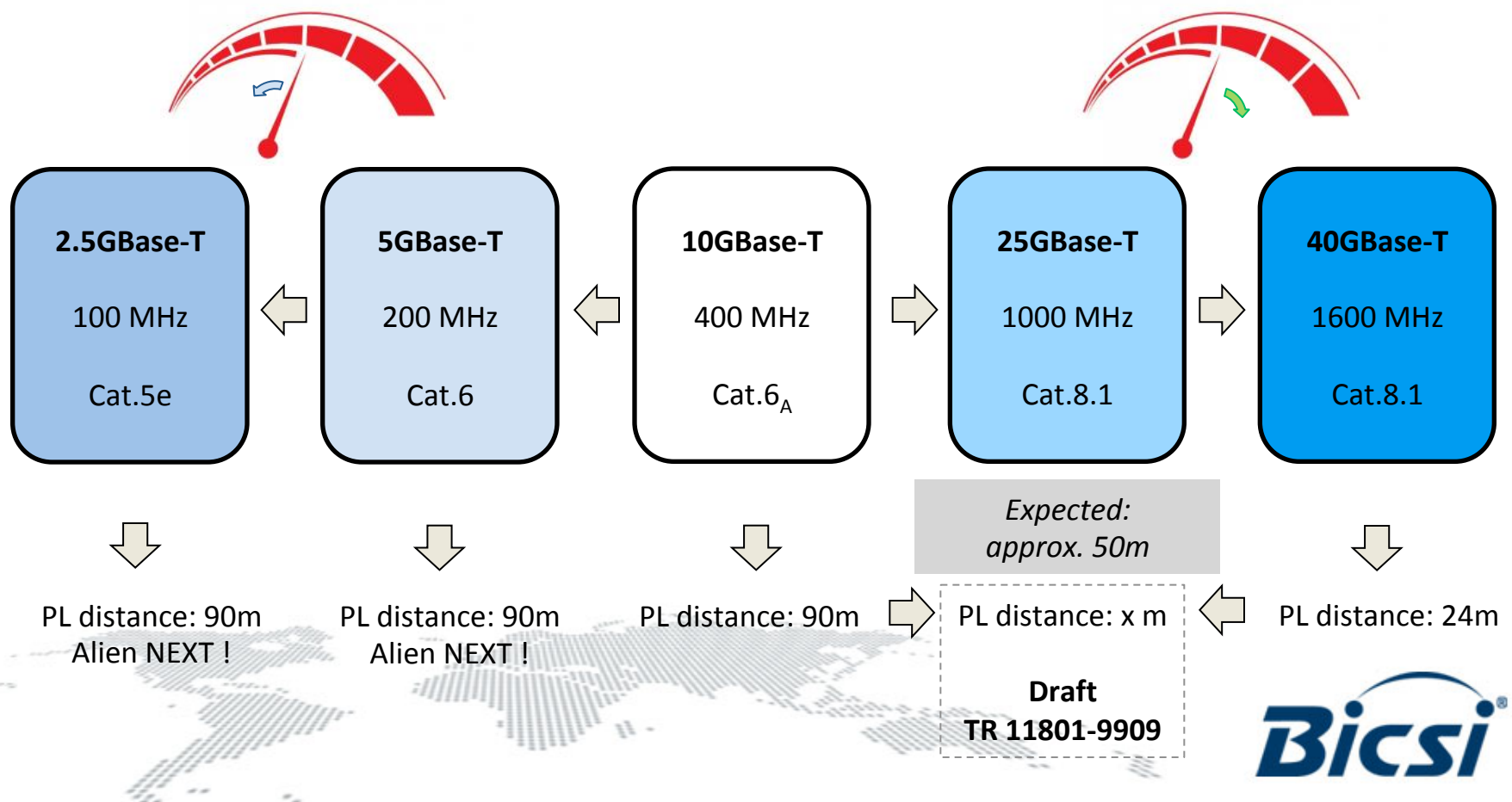
- ISO/IEC 11801 3rd ed. (10/2017)
30m Channel, Bandwidth 2000MHz
 - Class I (Cat.8.1)
Based on interpolated Cat.6A
 - Class II (Cat.8.2)
Based on interpolated Cat.7A

- ANSI/TIA 568-C.2-1 (07/2017)
30m Channel, Bandwidth 2000MHz
 - Cat.8
Based on interpolated ISO/IEC Cat.6A
Comparable to Cat. 8.1



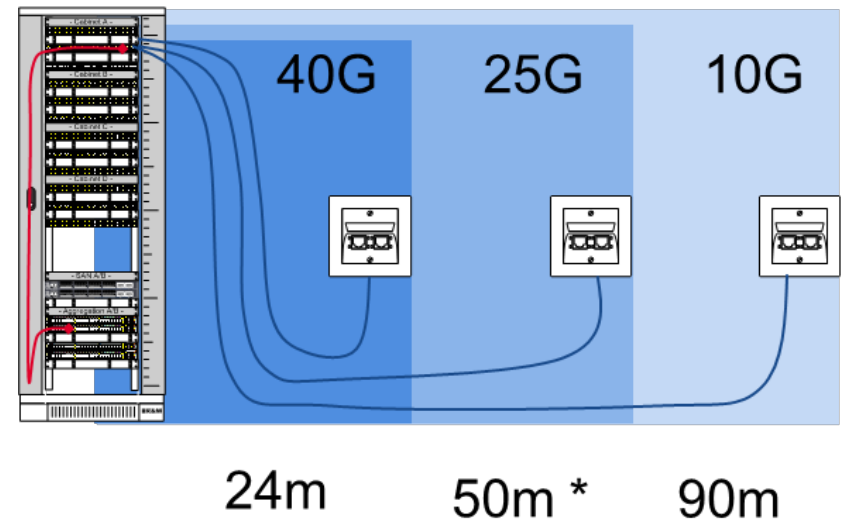
Key technology: 10GBase-T

The coding technology of 10GBase-T (IEEE802.3an) is also used for other protocols:



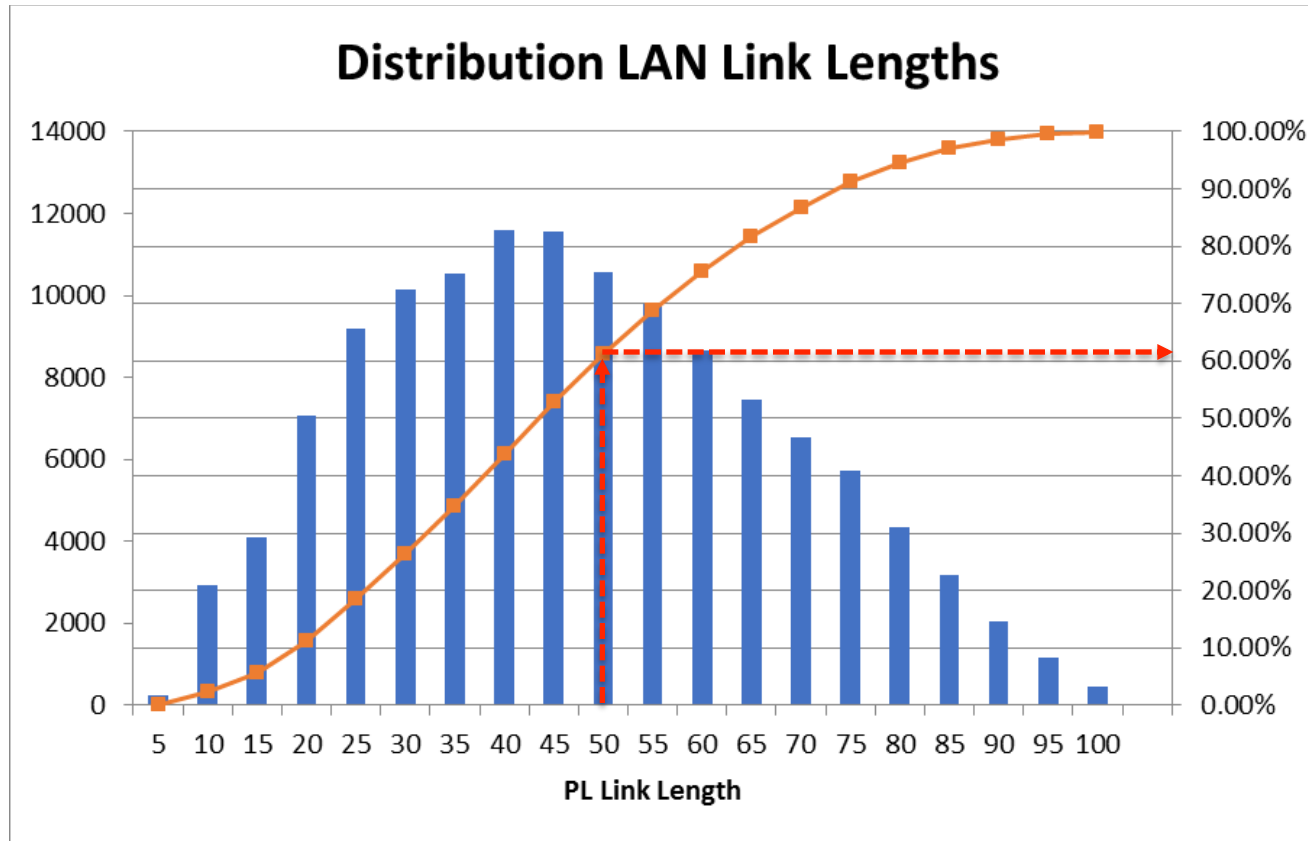
Scenario for 25/40GBase-T in LAN

- Backward compatible RJ45 cabling with built in migration capabilities from 1G - 10G - 25G - 40G
- Future proofing for wireless base stations of the next generation(s) (WLAN/WiFi6, DAS, 5G picocells)
- Distance depending data rate zones
- A significant number of LAN links could benefit from at least a doubling of the data rate
- 25G support according to report ISO/IEC DTR 11801-9909



* Expected distance for 25G support: 50m

Link length distribution in LAN

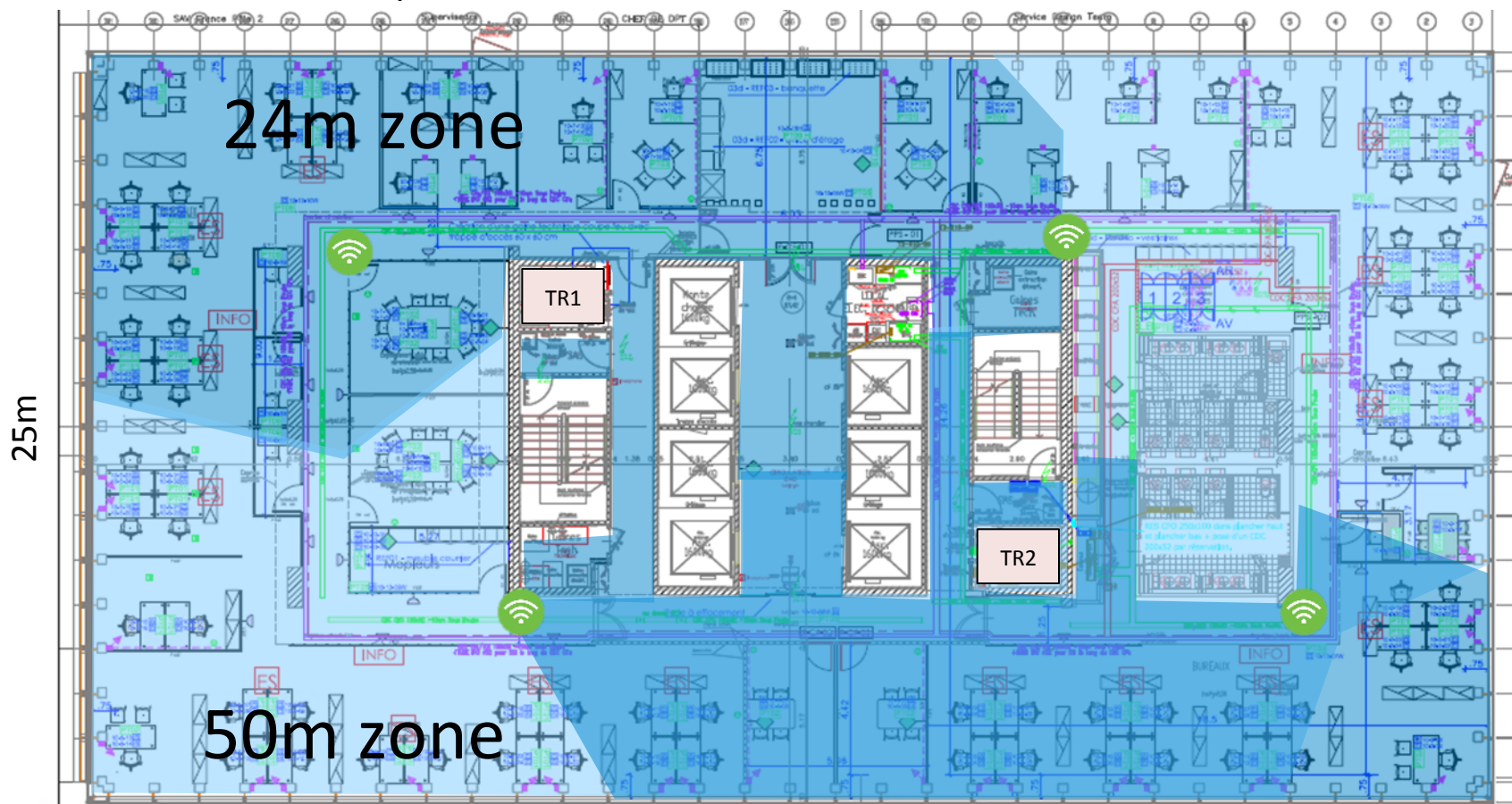


- Permanent Link distribution based on 120k Cat.6A links
- 50m Link-length would cover 62% of the installed base

Exexample installation 1

Planned 100 work spaces / floor

50m



TR1:

- 24m (40G/8.1): 30% WS; 75% WAP
- 50m (25G/8.1): 95% WS; 100% WAP

TR1 & TR2:

- 24m (40G/8.1): 58% WS; 100% WAP
- 50m (25G/8.1): 100% WS

Example installation 2

R&M Kubus (2011):
(120 – 180 work spaces)

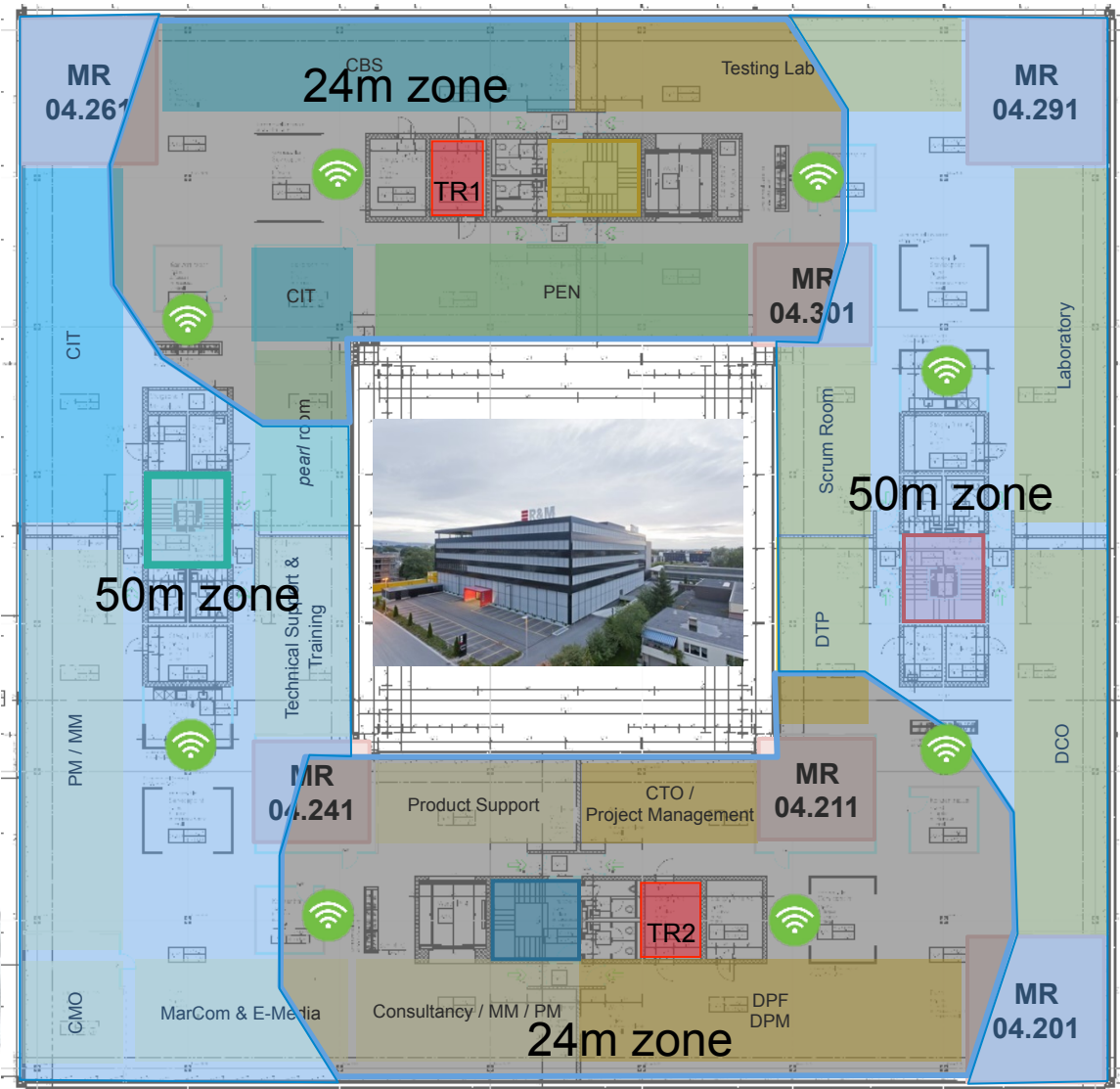
24m zone
(40G/Cat.8.1)

- 45% work space
- 75% WAP

50m zone
(25G/Cat.8.1)

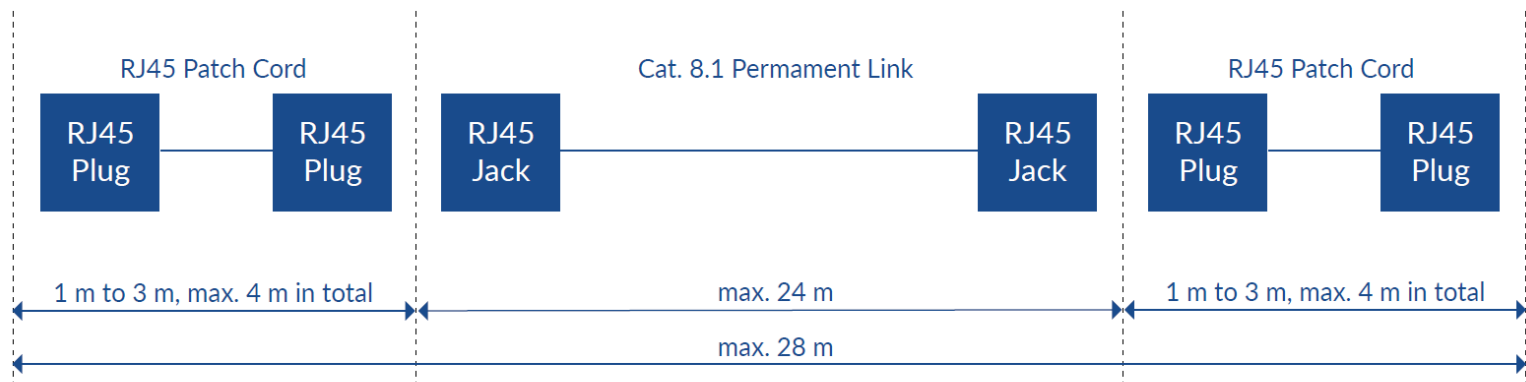
- 100% work space
- 100% WAP

90m zone: not needed



Cat.8.1 / Class I: Permanent Link

- 2 connector model only; shielded cabling solutions only
- Different link length models in TIA and ISO/IEC

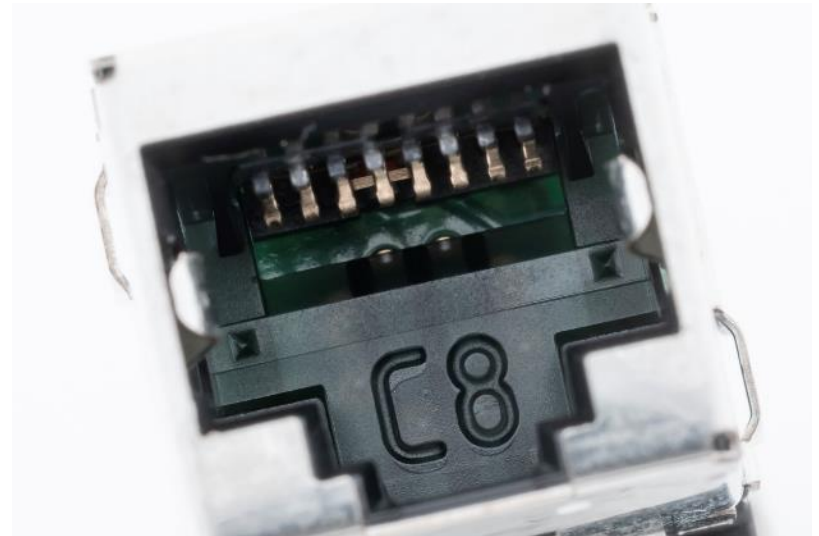


	ISO / IEC	TIA	Recommendation
Permanent Link length	5m – 26m *	Max. 24m	5m – 24m
Patch cord length	2m – 4m	Max. 8m *	2m – 4m
El. Length for attenuation budget	Max. 32m	Max. 32m	Max. 32m
Mechanical channel length	Max. 30m	Max. 30m	Max. 28m

* Max. length dependent on selected patch cord diameter (factor: AWG22/23: 1; AWG24: 1.25; AWG26: 2)

Why to use Cat.8.1 in LAN?

- Cat.8.1 is future proof and covers the cabling needs for the next 10 – 15 years
- First applications are foreseeable (WAP/WiFi6, DAS, 5G Picocells)
- Cat.8.1 is the current high-end RJ45 technology
- Cat.8.1 is fully compatible to existing installations and equipment. Existing patch cords can be used
- Cat.8.1 is available and can be used immediately
- Cat.8.1 allows remote powering (PoE)
- Cat.8.1's base technology is well known and is easily applicable



Summary / Insights

- In datacenters Cat.8.1 for 40GBase-T is in competition with existing, proven 40GBase-X technologies (FO and DAC)
- Cat.8.1 simplifies the migration from 1G to 10G to 40G (built-in compatibility)
- A link length of 26m limits the applicability of 40GBase-T in LAN
- The extended reach of 25GBase-T according DTR 11801-9909 (e.g. to 50m) will enhance the usability of Cat.8.1 in the LAN environment
- In many real world installation a significant number of work spaces would benefit from a bigger bandwidth
- RJ45 based Cat.8.1 have the advantage of built-in backward compatibility. Cat.8.2 components have no advantage regarding data speed , but need special adaptor patch cords
- Cat.8.1 components must be compatible to lower category components. I.e. with Cat.6A patch cords 10GBase-T compatibility must be reached

Thank you !



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