

Cabling Considerations for IEEE 802.3bq 25GBASE-T

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Outline

- 25GBASE-T Study Group objectives
- Single link segment advantages
- Market preferences
- Cabling Standards support
- Cabling Technology advances
- Recommendations

25GBASE-T objectives

- ...
- ...
- ❖ Support a data rate of 25 Gb/s at the MAC/PLS Service Interface
- Define a link segment based upon copper media specified by ISO/IEC JTC1/SC25/WG3 and TIA TR42.7 meeting the following characteristics:
 - 4-pair, balanced twisted-pair copper cabling
 - up to 2 connectors
 - up to at least 30 m
- Define a single 40 Gb/s PHY supporting operation on the link segment
- ❖ Define a single 25 Gb/s PHY supporting operation on the link segment

- ❖ Adopted by the 25GBASE-T Study Group, January 14, 2015

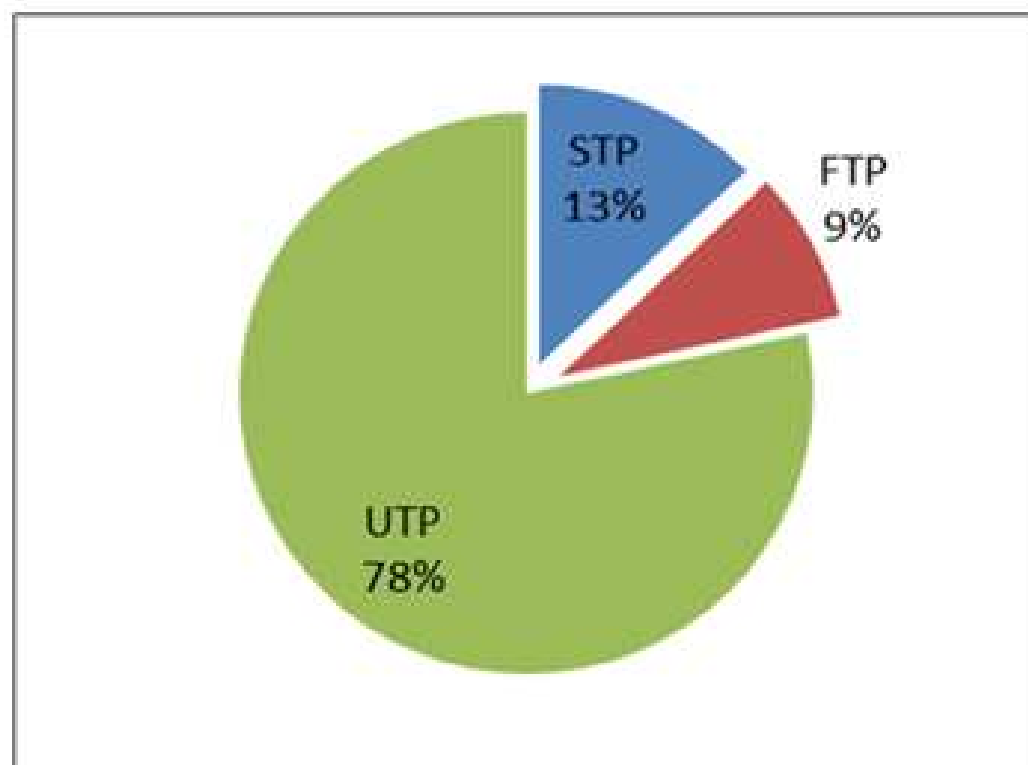
Source: http://www.ieee802.org/3/25GBASET/draft_P802.3bq_modified_objectives.pdf

Single link segment advantages

- 40GBASE-T defined a new topology of 30 m, two connection balanced cabling suitable for data center applications
- Link segment properties studied and vetted by both cabling and PHY vendors to select TIA Category 8 or ISO Class I&II
- Re-using the same link segment for 25GBASE-T facilitates an easy path to quick development
- A **single** link segment for 25, 40, and potentially 50 GBASE-T with a **single** backward compatible interface for auto-negotiation continues the popular “evolutionary growth” of BASE-T applications

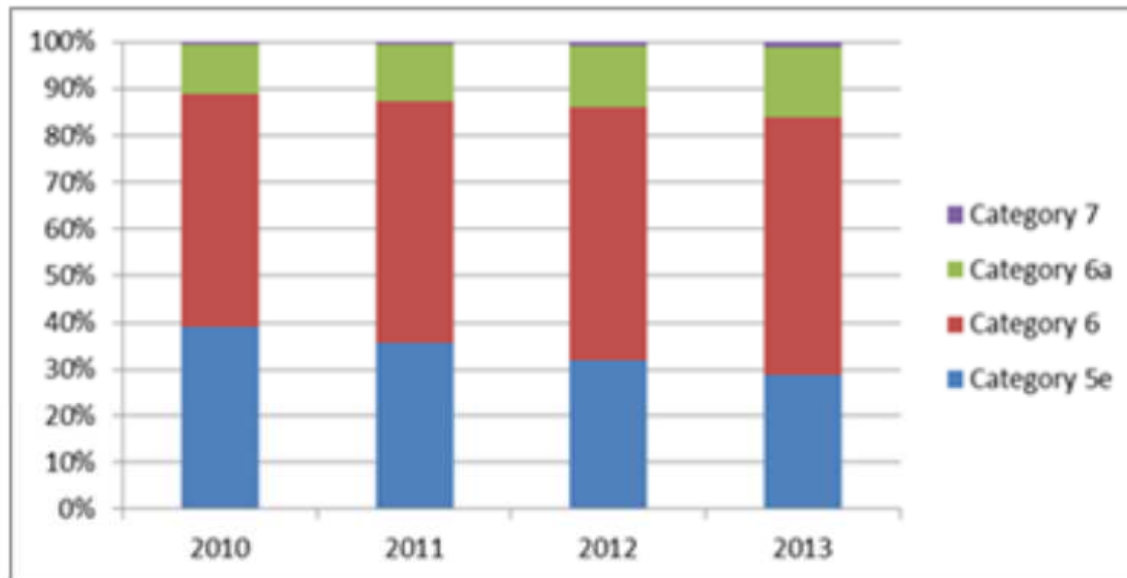
Worldwide Sales by type of cables, 2013

Worldwide Sales by type of cables, value, 2013



- Global sales are dominated by unshielded cables with a 78% share
- UTP accounts for 85% by volume
- Since 2008 shielded cable sales have been stable at 22%

Penetration by Category worldwide 2009 – 2013 and by region, 2013



- Worldwide (40 countries)
- Based on cabling end-to-end systems
- Sales of Volume (outlets/ cables)

2013	Cat 5e	Cat 6	Cat 6a	Cat 7/7A	Total
America	35%	58%	7%	0%	100%
Asia Pacific	33%	59%	7%	1%	100%
Europe	17%	44%	37%	3%	100%
ME/South Africa	10%	65%	24%	1%	100%
Worldwide	29%	55%	15.0%	1.1%	100%

Cable Category Shipments

	2011	2012	2013	2014
Category 5e	36%	33%	31%	28%
Category 6	51%	54%	54%	55%
Category 6A	12%	13%	14%	16%
Category 7	0.7%	0.7%	0.8%	0.8%
TOTAL Worldwide	100%	100%	100%	100%

Source: BSRIA March 2015 Worldwide Market Overview – Structured Cabling

Market preferences

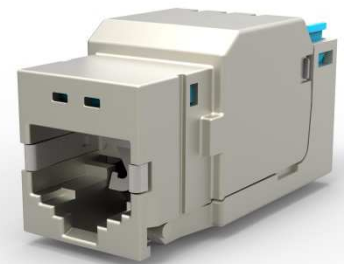
- Category 7A limited to a few countries and regions with a worldwide market size of less than 1 %
- Based on multiple sources and inference from the BSRIA data, 7A cables are mostly terminated on Category 6A RJ45 STP interface connectors making the channel Category 6A
- Installed base of complete Category 7A channels is therefore far below the 1 % worldwide cable shipments and does not represent a significant broad market potential
- Dominant cabling in the market is Category 6/6A cable shipping about 71% of worldwide market in 2014
- Category 8/Class I have compatible connectors with Category 6/6A connectors and are likely to be adopted easily and broadly

Cabling Standards Support

- TIA-568-C.2-1 Category 8 cabling specifications is now in ANSI industry ballot and will likely publish by end of 2015
- ISO 11801-1 Ed3 containing Class I and II specified up to 2000 MHz is in Committee Ballot and will likely publish in 2016
- Associated component and test specifications in IEC and TIA are under development up to 2000 MHz and will also likely publish in 2016
- Using simple frequency scaling 25GBASE-T is expected to need up to 1250 MHz of bandwidth
- There are no standards under development for a 1250 MHz cabling system specifying a 30 m channel with 2 connections.
- Category 7A is specified up to 1000 MHz and any claims of performance beyond 1000 MHz are non-standard instances
- No Category 7A 30 m two connection specifications under development corresponding to the IEEE 802.3 30 m link segment

Cabling Technology Advances

- Since the advent of IEEE 40GBASE-T, there has been significant interaction with cabling SDOs leading to the following advances in Category 8 and Class I/II cabling:
 - Alien Crosstalk has been improved dramatically
 - Balance parameters which reduce mode conversions are now required for Category 8 and Class I/II (not required for Category 7A)
 - RL specifications are significantly improved
 - Spikes in IL and RL responses reduced resulting in smooth and stable link segment performance



Recommendations

- Keep the link segment for 25GBASE-T the same as the consensus link segment agreed for 40GBASE-T allowing:
 - Quick integration of 25GBASE-T into the 40GBASE-T working draft
 - Common link segment between 25, 40 and potentially 50 GBASE-T applications with a single backward compatible RJ45 interface
 - Easy and broad acceptance in the market that has shown clear preference for Category 6/6A type of cabling, which is the basis for Category 8/Class I