NGEABT Study Group
Cabling Installed Base Update

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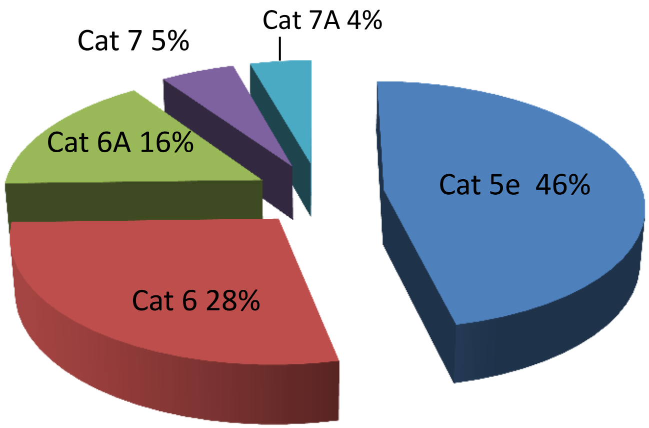
Background

- During the CFI leadup, four companies (Broadcom, Cisco, Dell and HP) commissioned BSRIA (Lone Hansen, www.bsria.co.uk) to provide current data on the installed base for copper structured cabling.
- This deck includes the data shown at CFI (as a refresher), and the more recently available data from BSRIA.
  - The CFI data (Cable Install&Maint Feb 14) was a survey asking “What do you have?”
- BSRIA Objective and method:
  - The aim is to provide an estimate of “what cabling is behind the wall” in 2014 worldwide.
  - To provide this information BSRIA will look at annual cabling sales by Category (5e, 6, 6A and 7/7A) per year and per region. Assumptions will be applied (per region) regarding replacement rates and average meters per drop.
  - “Outlet” means the same as “drop”, and number of outlets is computed based on volume of cable and average meters per drop.
- These are very different ways to measure installed base, and the results are not directly comparable.

Data Presented at the CFI.

- Enterprise access links (aka horizontal links) are dominated by 1000BASE-T over Cat 5e/Cat 6
  - Source: Cable Install&Maint Feb14
  - Survey participants were asked to identify all major cable types in their Horizontal Links
  - The chart shows the proportions of cable types for BASE-T links



Source: Cabling Installation & Maintenance Magazine, Cabling Market Outlook Consumption Trends and Analysis Enterprise and Data Center Organizations, February 2014

Type	Proportion
Cat 5e	46%
Cat 6	28%
Cat 6A	16%
Cat 7	5%
Cat 7A	4%

BSRIA REPORT SUMMARY

Methodology

Copper cable sales (million meters)	**Europe**	**Cat 5e**
Number of drops	**ME**	**Cat 6**
	North America	**Cat 6A**
	Mexico & Latin America	**Cat 7/7A**
	Asia Pac	

Metres per drop	**An average of 40 – 50 metres is the norm**
Replacement rate	**Overall and by Category. The replacement rate vary region**

The base will be annual sales of cables by Category and region.

The cable volume will be converted to number of drops/outlets per year by Category (5e, 6, 6A and 7/A) using the assumed average meters per drop.

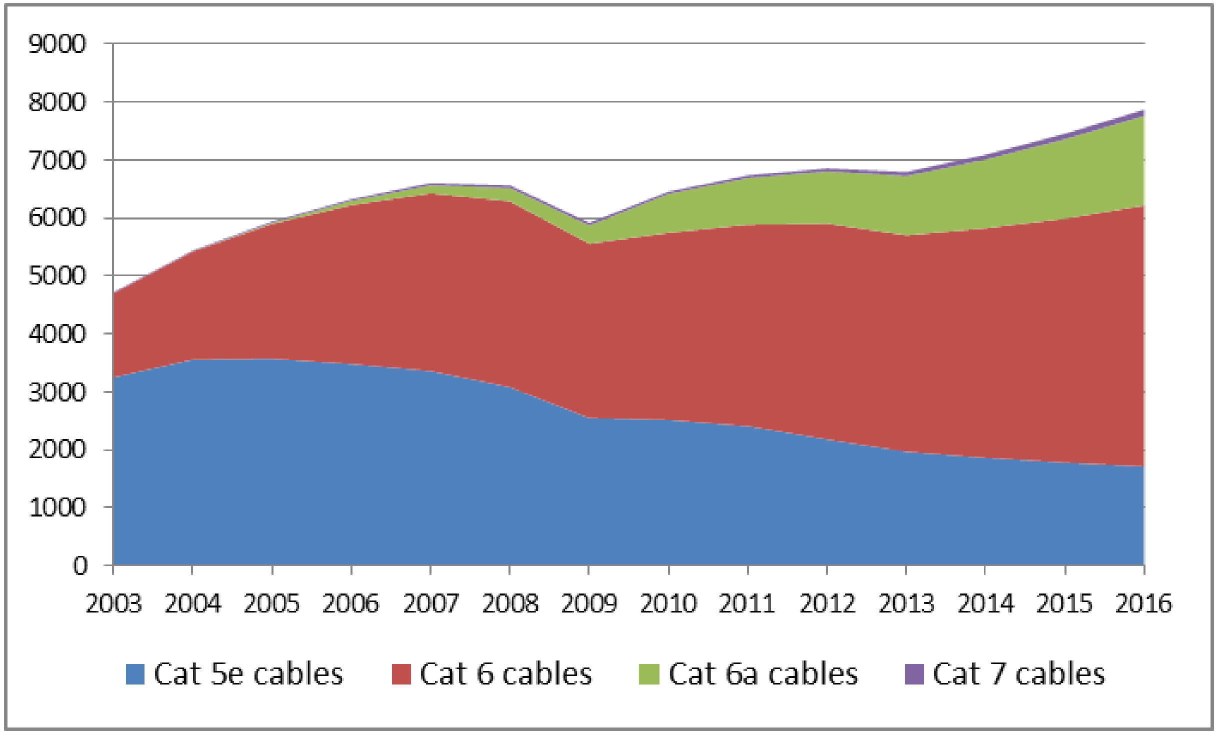
The amount of cabling being replaced will be estimated for 2003 – 2016 by region.

The replacement rates by type of category of cabling will be estimated based on assumptions.

Sales per year will be aggregated minus replacement of cabling to estimate the total installed base.

Total cable shipped has been used as copper cables in DCs only accounts for around 4% (6% by value) globally in 2013**.**

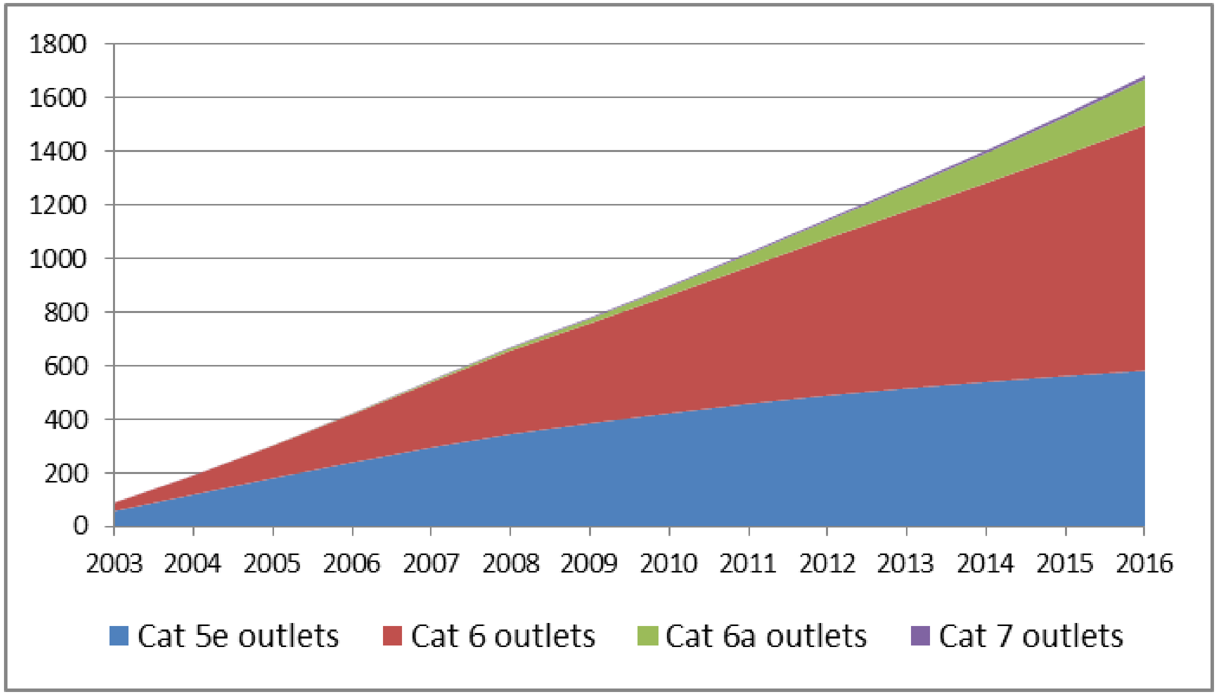
Global Cable Sales Volume



The global annual sales volume (million meters) per year by cable type.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cat 5e cables	3252	3557	3573	3483	3359	3081	2550	2515	2408	2182	1968	1866	1780	1715
Cat 6 cables	1455	1868	2326	2742	3069	3207	3008	3230	3476	3722	3735	3959	4211	4501
Cat 6a cables	0	1	21	74	137	230	316	673	806	904	1022	1186	1371	1549
Cat 7 cables	16	15	22	27.5	41	47	46	38	47	51	74	84	95	108
Total volume	4722	5441	5942	6326	6606	6566	5920	6457	6738	6859	6799	7094	7457	7873

Installed Base: Estimated Outlets (millions)

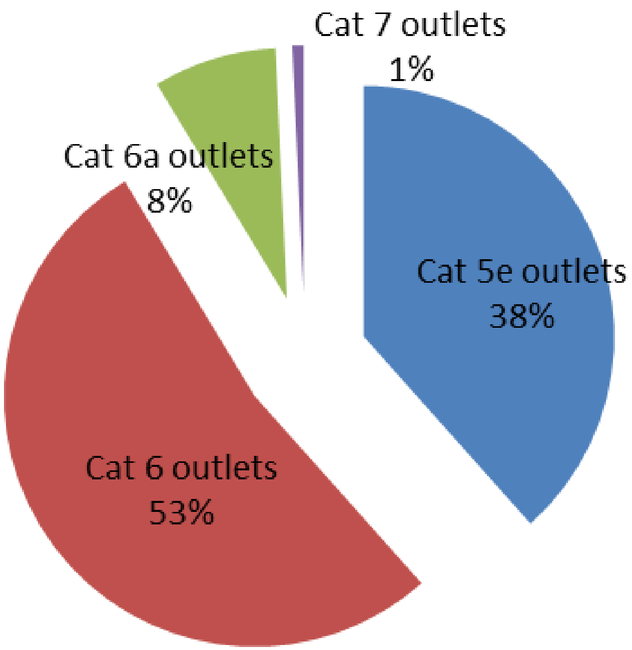


The global annual outlet sales (millions) per year minus the outlets replaced.

The calculation is based on the regional annual outlet sales (from cable volume and average drop distance) per year minus replacement.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cat 5e outlets	57	119	180	239	294	344	384	422	458	488	515	539	561	581
Cat 6 outlets	31	72	121	180	245	312	374	441	512	588	664	743	828	918
Cat 6a outlets	0	0	1	2	5	10	17	31	47	66	87	111	140	172
Cat 7 outlets	0	1	1	2	2	3	4	5	6	7	8	10	12	14
Total	89	191	303	422	547	670	780	899	1023	1149	1274	1405	1541	1685

Installed Base: Estimated Outlet Split 2014



Just over half the 2014 installed base outlets are Cat 6.

38% are Cat 5e, almost 9% Cat 6a outlets and 1% Cat 7/7A.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cat 5e outlets	64%	62%	59%	56%	54%	51%	49%	47%	45%	42%	40%	38%	36%	34%
Cat 6 outlets	35%	37%	40%	43%	45%	47%	48%	49%	50%	51%	52%	53%	54%	54%
Cat 6a outlets	0%	0%	0%	1%	1%	2%	2%	3%	5%	6%	7%	8%	9%	10%
Cat 7 outlets	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%

Notes, Observations & Conclusions

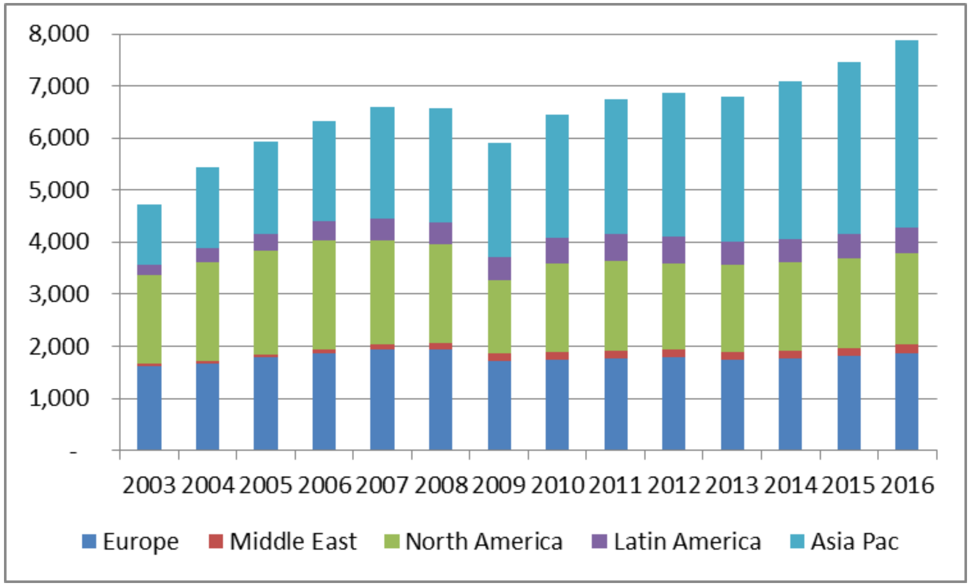
- Notes
  - There is additional data in the backup slides, please review.
  - The data collection methodology is very different (“what types of cable do you have” vs “how much cable of type xx was sold”). As a result, the results are not directly comparable.
- Observations
  - Relative to the CFI presentation, Cat 6 went from 28% to 53%, Cat 5e from 46% to 38%, and Cat 6a from 16% to 8%.
  - Proportion of Cat 5e is declining (~2% per year), but outlets are still growing (~20 million per year). Cat5e is not going away any time soon.
    - Note: the backup slides show large regional variations, NA, LA, AP still buying lots of Cat 5e.
- Conclusion
  - Both Cat 5e (539 million) and Cat 6 (743 million) are still growing, and together they represent ~1.3 billion ports today.

THANK YOU

BACKUP

Annual sales of cable by region, million meters, 2003 - 2016

Copper cables sales by region, million meters



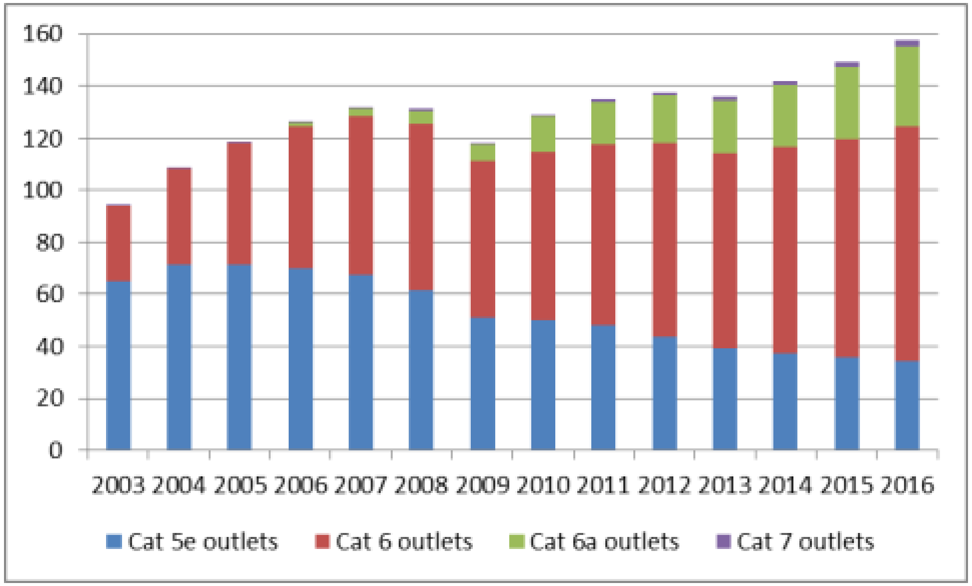
Copper cables sales by volume by region, % split , 2014

	2014
Europe	25%
Middle East	2%
North America	24%
Latin America	6%
Asia Pac	43%
Global	100%

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Europe	1,613	1,675	1,791	1,865	1,951	1,932	1,722	1,748	1,768	1,795	1,748	1,771	1,811	1,869
Middle East	42	46	58	76	80	121	139	148	151	148	146	149	152	157
North America	1,704	1,905	1,983	2,100	1,993	1,895	1,414	1,687	1,710	1,654	1,662	1,692	1,730	1,771
Latin America	201	270	331	366	437	423	430	497	525	501	443	457	471	489
Asia Pac	1,162	1,545	1,779	1,919	2,146	2,195	2,215	2,378	2,583	2,762	2,800	3,026	3,292	3,586
Global	4,722	5,441	5,942	6,326	6,606	6,566	5,920	6,457	6,738	6,859	6,799	7,094	7,457	7,873

Annual sales of outlets, 2003 - 2016

Global Annual sales by Category, million outlets



Total cable shipped has been used as copper cables in DCs only accounts for around 4% (6% by value) globally in 2013.

Copper cables sales in LAN vs DC, US million

2013	
2,403	94%
158	6%
2,560	100%

Annual sales by Category, % split by million outlets

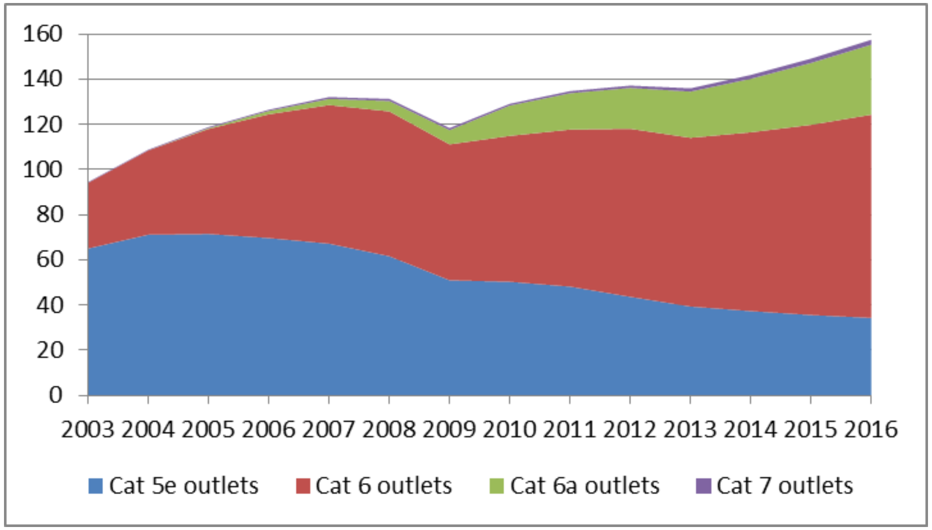
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cat 5e outlets	69%	65%	60%	55%	51%	47%	43%	39%	36%	32%	29%	26%	24%	22%
Cat 6 outlets	31%	34%	39%	43%	46%	49%	51%	50%	52%	54%	55%	56%	56%	57%
Cat 6a outlets	0%	0%	0%	1%	2%	4%	5%	10%	12%	13%	15%	17%	18%	20%
Cat 7 outlets	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

Sales of Categories in 2014 by region

Sales by Category by region, % split by volume, 2014

	Eu	ME	NA	LA	AsiaP	Global
Cat 5e outlets	15%	10%	29%	39%	30%	26%
Cat 6 outlets	43%	65%	63%	50%	60%	56%
Cat 6a outlets	39%	24%	8%	10%	9%	17%
Cat 7 outlets	3%	1%	0%	1%	1%	1%
Total outlets	100%	100%	100%	100%	100%	100%

Global Annual sales by Category, million outlets



- Cat 5e still accounts for 26% of the sales in 2014 due to relatively high sales in Asia and America
- The majority of sales today are Cat 6.
- Cat 6A accounts for 17%. The uptake in Europe is 39% dominated by sale in Germany and other shielded countries such as France and Switzerland.
- Cat 7/7A is very small and mainly sold in Germany and Switzerland. Other (UTP) countries have limited sales of Cat 7/7A.

Assumptions:
Replacement rates and meters per drop

Region	Refurbishment rates	Avg. meter per drop
Europe	40%	50 meters
Middle East	30%	48 meters
North America	40%	40 meters
Latin America	35%	50 meters
Asia Pac	30%	50 meters

The average length per drop is typically 40 – 50 metres.

40 meters are used in US and Canada.

Most of Europe use 50 meters with the exception of a few of the smaller markets. The Middle East use 50 meters with the exception of UAE, where 40 meters per drop is used.

Assumptions:
Replacement rates by Category and by region

Replacement (%)	40%	35%	30%
% replacement rates	**EU+NA**	**LA**	**AsiaP, ME**
Global Cat 5e % replacing Cat 5 or less	25%	10%	5%
Global Cat 5e % replacing Cat 5e	15%	25%	25%
Global Cat 6 % replacing Cat 5 or less	10%	1%	1%
Global Cat 6 % replacing Cat 5e	26%	32%	27%
Global Cat 6 % replacing Cat 6	4%	2%	2%
Global Cat 6a % replacing Cat 5 or less	1%	0%	0%
Global Cat 6a % replacing Cat 5e	20%	20%	16%
Global Cat 6a % replacing Cat 6	19%	15%	14%
Global Cat 7 % replacing Cat 5 or less	1%	0%	0%
Global Cat 7 % replacing Cat 5e	14%	10%	10%
Global Cat 7 % replacing Cat 6	25%	25%	20%

The sales per year is split by new build, moves & changes and retrofit.

The replacement is estimated for each Category adding up to the 30%, 35% and 40% replacement rate.

END