Bandwidth Explosion

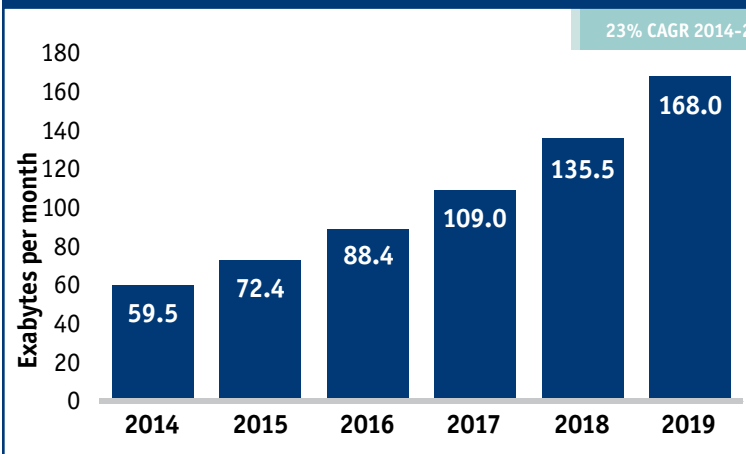
By 2019, global IP traffic will pass two (2) Zettabytes annually or 168 Exabytes per month **(Figure 1)**. To provide a point of reference, one (1) Zettabyte is equivalent to the amount of data that has traversed the internet since its creation.* The application that will drive the most bandwidth over the next five years is IP video. In fact, in 2019, if you were to sit down and watch one month worth of global IP video traffic, it would take you more than five (5) million years! Lastly, more and more of this IP traffic will be sent over wireless networks.

To prepare for this bandwidth explosion, a new IEEE initiative was started in 2014 to develop technology that boosts the bandwidth of existing Category 5e and Category 6 standards-based solutions. Specifically, the IEEE 802.3bz initiative is working to develop technology that allows 2.5G and 5G to work over existing Category 5e and Category 6 solutions. The thought is that by doing so, IT managers can use their existing network infrastructure to support the ramp-up of 802.11ac wireless technology.

However, there are pitfalls to this approach. First, both Category 5e and Category 6 were initially designed for only 1.0Gbps, and pushing these products to 2.5G and 5G will create alien crosstalk that they were not designed for. The consequence of this could be that bundle sizes may need to be reduced, and total channel lengths may be restricted to less than the standard 100 meters. Additionally, using the 802.11ac technology, the bandwidth required from the WAP to the IDF will ramp up to 6.9Gbps. At that point, 5.0G will not be enough. To avoid the need for costly changes down the road, we highly recommend only Category 6A be used to install WAPs.

For desktop applications, however, technology that allows Category 6 cable the ability to transmit up to 5.0G is an effective solution. Investing in a premium Category 6 product like LANmark™-2000 could certainly pay off down the road if the IEEE is successful and can transmit up to 5.0Gbps down premium Category 6 cabling. You could look at investing in a premium Category 6 solution like LANmark-2000 as a relatively inexpensive bandwidth insurance policy for the desktop.

FIGURE 1: FORECAST FOR MONTHLY IP TRAFFIC



(= 2 Zettabytes Annually)

*Source: Cisco VNI, 2015

Berk-Tek®
A NEXANS COMPANY

More Power Over Ethernet (PoE)

Power over Ethernet (PoE) was first adopted in 2003 with the original 802.3af standard, providing up to 15W of DC power with 12.95W minimum available to the powered device. The ability to power IP devices, primarily VoIP phones at that time, proved to be very cost effective for customers. As years went by and advanced VoIP phones began to require more power, the IEEE ratified 802.3at in 2009, allowing up to 30W of DC power with 25.5W of power available to the powered device. This accommodated VoIP phones with larger full-color displays, as well as some of the early IP security cameras and other IP devices.

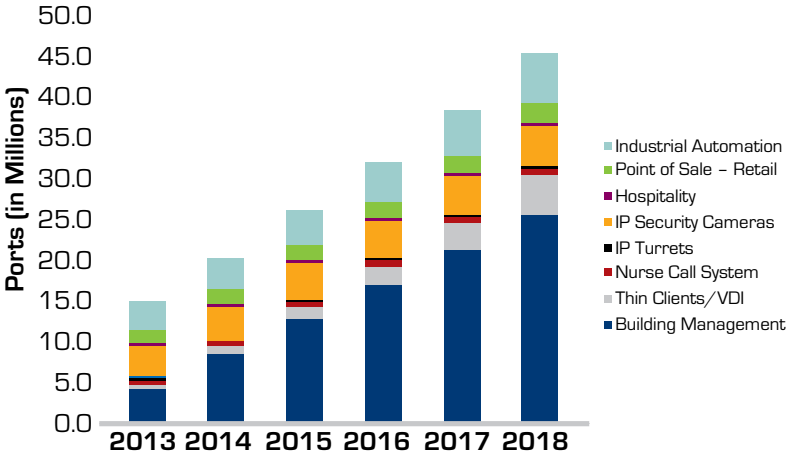
PoE remains very cost effective, and therefore a very popular technology. As such, the need for more power continues to grow, and the IEEE has begun work on a new standard – 802.3bt. The technology being developed for 802.3bt will likely introduce the following advancements over previous generations of PoE:

- Deliver power over all four pairs instead of only two
- Deliver power with 10Gbps throughput, not limited to 1Gbps
- Deliver power in two increments (depending on what is needed) – 60W / 100W

Figure 1 below shows the forecasted growth of next generation PoE technology, and examples of devices that will require more than the currently available 30W of power.

The challenge to future network infrastructures, especially cabling, is this: How can IP traffic be isolated and protected from the additional heat and noise that will be generated from more than 3X the power that is currently available? Berk-Tek's premium Category 6 products have advanced technology built in to do just this. Additionally, Berk-Tek's LANmark™-XTP product with its innovative discontinuous shield allows for superior isolation and minimum temperature rise, even under 100W of power through all cables in large bundles.

FIGURE 1: 4-PAIR HIGH POWER MARKET POTENTIAL



Sources: VDC Research
IMS Research – Jenalea Howell
http://seekingalpha.com/article/101408-the-global-lighting-market-by-the-numbers-courtesy-of-philips
and other research reports
Gartner Forecasts, BT Turret, Cisco Partners

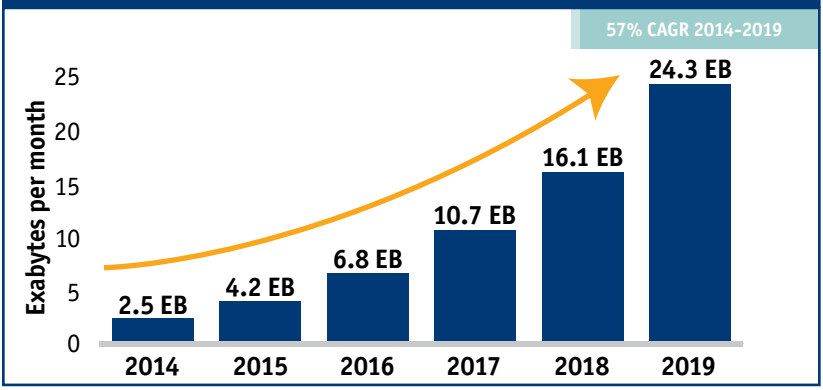
Source: 4-Pair Power over Ethernet Call For Interest. IEEE 802.3 Working Group.

Berk-Tek®
A NEXANS COMPANY

Evolution of Wireless Devices

Advancement in wireless technology is being driven not only by the sheer number of wireless IP devices being used, but also by the amount of content being generated and transmitted by each device **(Figure 1)**. Today, anyone with a mobile smart device can take pictures or record high-definition video content and transmit bandwidth-intensive files to any number of contacts.

FIGURE 1: CONTENT TRANSMITTED BY MOBILE DEVICES



Source: Cisco VNI Mobile, 2015

This growing demand is why the IEEE has developed the wireless standard called 802.11ac. This technology will roll out in phases, or waves. The first wave of products – both devices and wireless access points (WAPs) – began in 2013. As subsequent waves roll out, significantly more bandwidth is made available. By wave 4, WAPs will have the ability to transmit up to 6.9Gbps back to the IDF **(Figure 2)**. This means that if the theoretical maximum throughput is achieved by the WAP, seven Category 6 cables would be required to move that much IP traffic. This is why the TIA TSB-162-A recommends using Category 6A for each WAP.

In the midst of all this, the next generation of wireless is also being developed. This new technology – IEEE 802.3ax – will pick up where 802.11ac drops off. The goal of IEEE 802.3ax is to provide bandwidth of at least 4X what 802.11ac can deliver, with an estimated 30Gbps delivered back to the IDF. Additionally, as bandwidth goes up, the reach of each WAP goes down. Therefore, as 802.11ac technology advances to waves 3 and 4 and 802.11ax starts to become commercially available around 2020, more WAPs will be required for the same square footage.

FIGURE 2: 802.11AC WIRELESS TRANSMISSION RATES

Feature	802.11ac	
Access Points Peak Data Rates	Antennas	Rates
	1x1 2x2 4x4 8x8	866Mbs (Wave 1 2013) 1.7Gbs (Wave 2 2015) 3.4Gbs (Wave 3 est. 2016) 6.9Gbs (Wave 4 est. 2018)
RF Band	5 GHz	
Channel Width	20, 40, 80 MHz 160 (80+80 Opt.)	
MIMO	Multiple Users	

Berk-Tek®
A NEXANS COMPANY