



Making the Switch to 100G Optical Transport Service: The Time is Now

INTRODUCTION

It's no secret. We live in a constantly accelerating world. The speed at which business is done today would have been unthinkable a decade ago—thanks to the constant advancements of new and innovative technologies. Indeed, the sheer number of devices connecting to the Internet, or any network, makes their integration into exciting new services possible. That future of a truly interconnected world is upon us, thanks to ever increasing speeds, and bandwidth of public and private networks.

INCREASED DATA CONSUMPTION AND THE INTERNET OF THINGS

The amount of data being transmitted and consumed over the Internet is staggering nowadays. For 2015, an amazing 72.4 exabytes per month crosses the Internet. That's 72 million terabytes per month, or roughly 28 terabytes each and every second of the year. However, studies forecast that by 2019 that number will have more than doubled to a mind-boggling 65 terabytes each second. Luckily—no one single network has to carry such traffic. However, the implications are clear—network traffic everywhere will be increasing at an unprecedented rate.

Of course, the connected world is really driving such large data consumption and traffic. The sheer number of devices being connected to the Internet is about 18.2 billion devices for 2015. However— that number is forecasted to explode to over 50 billion in the next 5 years. On average, that comes out to 7 connected devices for each and every person on the earth by 2020. Some experts think that 50 billion may represent only 3% of all possible devices that could be connected to the Internet: general devices such as Internet-connected cars, wearable devices such a watches and clothing, as well as household devices like plugs, switches, and door locks. Whatever the future holds, existing networks will be hard pressed to keep up with the amount of traffic forecasted, as both the number of devices connected to any network rises, and the market penetration deepens for connected devices.

Many businesses, industries, and enterprises are already benefitting from at least 10 gigabits per second networking speeds—an unimaginable achievement a decade ago. The widespread use of fiber optics has helped many people achieve larger bandwidths and great speeds, unavailable over traditional twisted copper wire networks. However, given the upward trends in data usage, the standard 10G Optical Transport Service (OTS) may not be enough in the very near future. The pressures of increased speed, larger media files, and the sheer number of devices connecting to any network are forcing many companies to reassess if 10G, or even 40G, will be enough in even just 5 years.

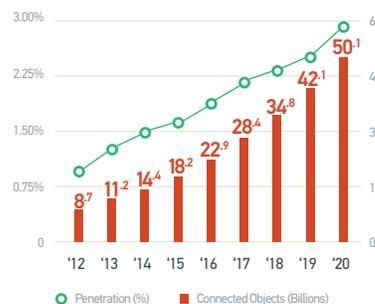
FIGURE 1:
Global IP Traffic Projections

(Source: Cisco: The Zettabyte Era: Trends and Analysis; May 2015)



FIGURE 2:
The Growth of the Connected World

(Source: Cisco: The Internet of Everything Is the New Economy; January 2014)





MORE DEVICES, BIG DATA

The sheer number of devices connecting to any network means the amount of data being generated increases exponentially. The growth of global data by 2020 is simply staggering.

Utilizing all this data, however, can be challenging. Not only is increased storage and processing required when interpreting large data sets—but more robust networks with increased speeds and enormous bandwidths are also required when data sets aren't just megabytes, or even gigabytes anymore. Where 10G bandwidths at one time seemed enormous—in the era of big data they simply won't

be able to cope. Transferring 10 terabytes (TB) might take about 2 hours using 10G—a feat that would've taken 6 days about a decade ago. But with data sets approaching 10TB becoming common—even 2 hours begins to seem too long. However, transferring 10TB over 100G drops down transport time down to about 13 minutes. Simply put; companies seeking to benefit from the explosive growth of big data need networks that can handle increasing larger amounts of data transfer without it taking hours or days.

FIGURE 3: Global Projections for Data Growth (Source: Computer Sciences Corporation: Big Data Universe Beginning to Explode; 2012)

THE RAPID GROWTH OF GLOBAL DATA

The production of data is expanding at an astonishing pace. Experts now point to a 4,300% increase in annual data generation by 2020. Drivers include the switch from analog to digital technologies and the rapid increase in data generation by individuals and corporations alike.

WHAT IS A ZETTABYTE?

1,000,000,000,000 GIGABYTES

1,000,000,000,000 TERABYTES

1,000,000,000,000 PETABYTES

1,000,000,000,000 EXABYTES

1,000,000,000,000 ZETTABYTE

SIZE OF TOTAL DATA
ENTERPRISE MANAGED DATA
ENTERPRISE CREATED DATA

2012: Customers will start storing 1EB of information

1 terabyte holds the equivalent of roughly 210 single-sided CD's

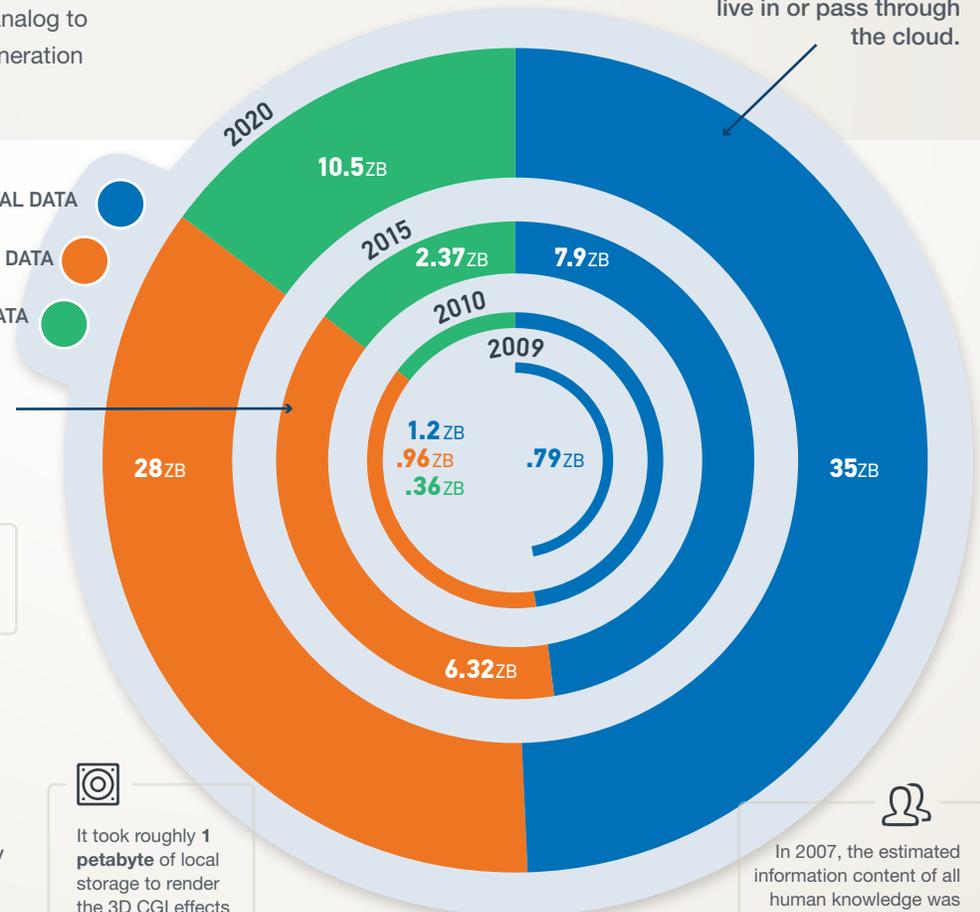


It took roughly 1 petabyte of local storage to render the 3D CGI effects in Avatar



In 2007, the estimated information content of all human knowledge was 295 exabytes

2020: more than 1/3 of the data produced will live in or pass through the cloud.



DATA PRODUCTION WILL BE 44 TIMES GREATER IN 2020 THAN IT WAS IN 2009

More than 70% of the digital universe is generated by individuals. But enterprise owns responsibility for the storage, protection, and management of 80% of it*.

* Source IDC Digital Universe Study, sponsored by EMC, May 2010. Chart above makes conservative assumption that enterprise will continue to generate 30% of data while being responsible for 80%



INDUSTRIES WHERE 100G IS NEEDED

While 100G networking may seem excessive to many right now, there are many industries where that 100G speeds are quickly becoming necessary. Certain markets and industries such as media and entertainment, healthcare, finance, government, and utilities already have high-bandwidth requirements that usually outpace the typical enterprise.

Media and Entertainment

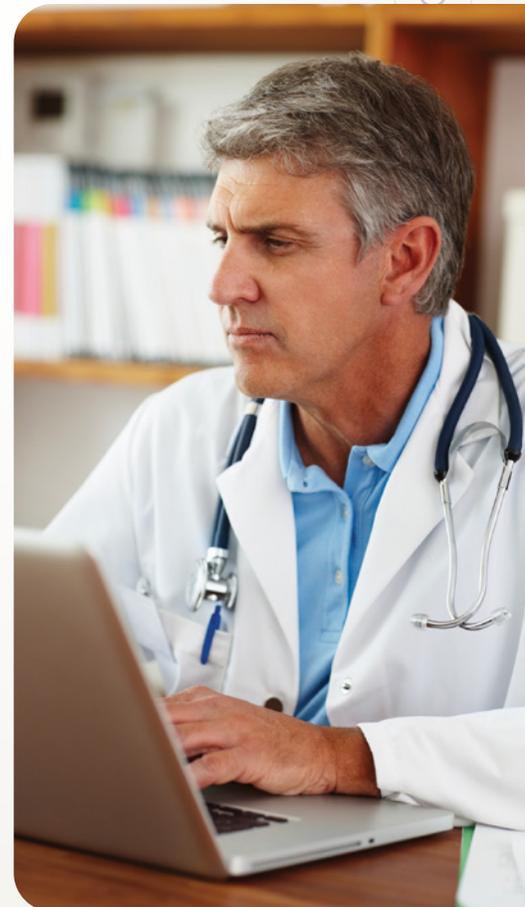
With the increasing adoption of the new Ultra High-Definition (UHD) or 4K standard, the media and entertainment industry now needs 100G networking more than ever. Already, streaming media giants Netflix and Amazon are delivering 4K movies and TV programs to remote customers. As file sizes increase to meet a growing UHD demand—both content providers and content creators in the media and entertainment industries will need faster, more robust bandwidths. The media and entertainment industry also faces increasing network pressure from the sheer number of mobile devices demanding access to streaming media files, and downloads of high-bandwidth content as well—a problem that will only increase as new high-definition standards and mobile devices evolve.

Healthcare

The medical or healthcare industry is beginning to struggle with bandwidth issues as high-resolution medical imagery becomes more common. Patient files may now house high resolution MRI scans, videos, or even 3D models constructed from thousands of individual images. Moving such information across slower, traditional networks is becoming challenging for healthcare providers, especially as transfers from multiple facilities across a healthcare network become both larger and more frequent. Also compounding the network problem is the amount of connected devices used in healthcare, such as terminals, laptops, cell phones, tablets, smart machines, and connected apps.

Finance

Financial institutions need to efficiently store and transfer large amounts of data for compliance as well as being able to react in a timely manner to changing conditions. Nightly back-ups to remote disaster recovery facilities is a common practice, but as the amount of information increases such transfers are taking longer and longer. Also—financial industries are beginning to use big data analysis more and more to understand complex market situations—meaning the amount of data flowing over their networks is increasing. The financial industry needs ultra-low latency offered by OTS solutions and unmatched security today, while still having the scalability to future-proof their networks for increasing traffic.





Government

Government agencies need 100G to maintain mission critical communications and data center connectivity requirements, while still meeting budget and resource constraints. With the resiliency and security offered by 100G—along with the increased bandwidth to carry every larger data transfers— local, state, and federal agencies find themselves rapidly reaching the limitations of standard 10G and even 40G networking.

Utilities

Public utility providers need to invest wisely for both today and tomorrow. They are looking for ways to offer cost-efficient communications between remote facilities with low latency in order to maintain constant service levels to their customers. 100G networking offer such a foundation by offering ultra-low latency networking standard to OTS solutions while still future-proofing for increased scalability.

WHO'S EMBRACING 100G TODAY?

The biggest adopters of the 100G networking standard today are communications companies and content providers that are operating their own content delivery networks. The reason for this is simple: their business relies on getting the lowest cost per transmitted bit and the most scalable bandwidths available. Two reputable analyst firms, Heavy Reading and Infonetics, both come to the same conclusion: 100G is the standard the communications providers are adopting—particularly long haul providers.

Of the three standards available today—100G accounted for half of all the bandwidth deployed in 2014—with forecasts for it to be 3 to 4 times that of 10G by 2018.

When it comes to network traffic, metro networks are predicted to be the largest impacted by the wired and wireless world. A study done by Bell Labs estimates the following:

- Total metro network traffic will increase by 560% by 2017
- Video traffic (including fixed and mobile) will increase 720% by 2017
- Cloud data center traffic will increase 440% by 2017
- Total metro traffic will grow approximately twice as fast as traffic going into the Internet backbone network by 2017

With such demand increasing so rapidly, metro networks have been big adopters of 100G. In fact, the growth of 100G is forecasted to skyrocket from now through 2018, becoming the dominant technology in the U.S. and beyond. All of this is exciting news for business and industries that need the increased bandwidth and speeds of 100G.

FIGURE 4:
Long Haul Line-Side Port Shipments clearly favor 100G
(Source: Heavy Reading: Deployment and Service Activation at 100G & Beyond; March 2015)

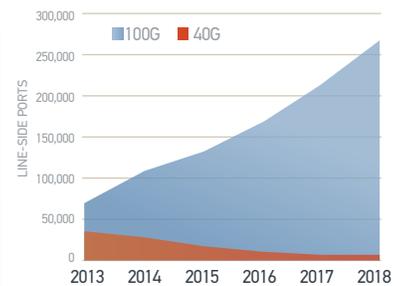
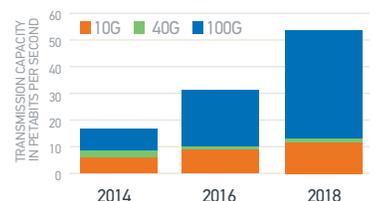


FIGURE 5:
Amount of Deployed Bandwidth by Carrier Networks

(Source: Infonetics Research: 10G/40G/100G Optical Transceivers: Biannual Market Size and Forecasts; Nov 2014)





100G: THE OPTICAL REVOLUTION IN THE DATA CENTER

While 100G adoption rates in the enterprise still lag behind 10G significantly in 2014—the next 5 years sees a dramatic shift within the optical landscape. By 2019, Infonetics predicts that over 50% of data center optical transceiver transmission will be 100G, eclipsing the growth of both 10G and 40G combined.

As data centers around the world explore their options for increasing network speeds and bandwidth, 10G has been a traditional favorite. However, given the growing explosion of data—many IT professionals are realizing that 10G, and even 40G, may not be enough in as few as 5 years. Given the many options available, 100G will become the standard most data centers will turn to.

The reasons for this dramatic shift and explosion of 100G networks in the near future are clear. Here's why:

Cost efficiency

100G now delivers a compelling price point, offering far greater capacity increases for the cost. In fact, 100G now rivals or exceeds 40G in the cost per transmitted bit while still future-proofing the network with unsurpassed bandwidth.

Proactive Scale

100G offers the expansion and scalability to support the reliability, manageability and flexibility demanded of modern networks while preparing data centers and businesses for future bandwidth and speed requirements. 100G is the technological end-game most forward thinking networking professionals are shooting for, and even 40G opportunities will be limited without a solid 100G roadmap in place.

Speed and Capacity

While 10G optical transport is impressive, the facts and predictions make it clear that it will not be enough for many industries, especially data intensive industries like media & entertainment, healthcare, government, utilities, and finance. 100G is specifically designed to transport enormous amounts of data with ultra-low latency—surpassing 10G and 40G significantly.

Flexibility

All indications are that 100G will be the preferred technology across long haul, metro, content delivery networks, and even data center by 2019. This gives 100G the flexibility and widespread industry adoption that 10G enjoys today. 100G networking can be customized, optimized, and easily expanded to allow for the dramatic changes coming in the next 10 years.

FIGURE 6:
Worldwide Metro Carriers Adopt 100G over 40G

(Source: Heavy Reading: Deployment and Service Activation at 100G & Beyond; March 2015)

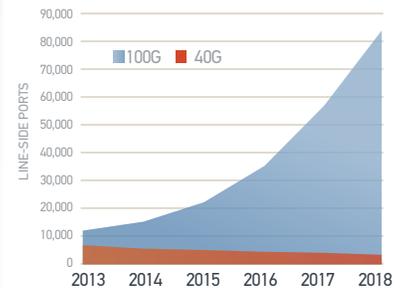


FIGURE 7:
100G Growth in the Data Center

(Source: Infonetics Research: 10G/40G/100G Data Center Optics: Biannual Market Size and Forecasts; April 2015)

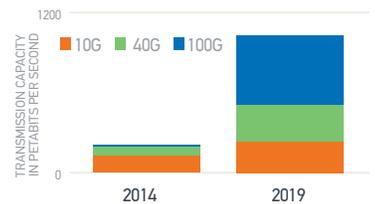


FIGURE 8:
Lightpath generic pricing without costs

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THE RISKS OF STAGNANCY

While making the switch to 100G may seem premature to many businesses, it really isn't. There could be significant business impacts to delaying a network upgrade until the need becomes painfully apparent. These risks include:

- Undue delays due to slow data transmission by reaching the current bandwidth breaking point
- Increased operating costs and capital expenditures in trying to maintain out-of-date network infrastructure
- Loss of competitive edge as network cannot supply end-users who need to manage large amounts of data to operate and make decisions
- Increased compliance violations or security risks as current network cannot provide the high levels of resiliency & security needed for mission-critical communications and data center connectivity requirements

Exercising a certain amount of caution when adopting new technologies is always a wise approach when dealing with network infrastructure. However, all indications are that

100G is the next networking standard embraced by long haul, metro, and enterprise networks across the world. The risks of adopting 100G now are making while the benefits to larger bandwidth, faster data transfers, and timely response make 100G a clear choice for any business.

CONCLUSION

After a long road to commercialization, 100G transport is here in force. With 100G entrenched in the long-haul networks, we are in the midst of a massive migration to 100G in the metro and data center networks; a migration that is just beginning. With such widespread adoption across so many sectors, 100G will have a long lifespan in all operator networks. The logical choice for many data intensive industries and businesses is to begin upgrading to 100G networking now. Lightpath 100G OTS is leading the charge by offering 100G at a competitive price point that makes migrating from 10G or even 40G an attractive way to future-proof your network now, not years from now.

