WHITE PAPER

Infinera

# Top Five Things To Know Before Upgrading Your Cloud Infrastructure

Over the last several years, the need for bandwidth has grown dramatically across all types of users. Some of the fastest growth is occurring between data centers and between customer sites (e.g., HQ, point-of-presence or co-location site) to data centers and/or Internet Exchange (IX) facilities and is heavily driven by the growth in both public and private Cloud use. Enterprises whose data center interconnection capacity needs are approaching or exceeding 100 Gb/s today have many options to help lower cost and drive scale.

For example, enterprises currently leasing circuits from their local service provider may find better value by leasing optical fiber and building their own optical Dense Wave Division Multiplexed (DWDM) networks, enabling lower costs and better scale. Users who previously deployed their own networks and are now considering an upgrade may also find that scaling their traditional optical networking gear can be complicated and expensive. In many cases, advancement in today's optical transmission equipment may offer significantly more bandwidth for far less than the current upgrade paths being considered.

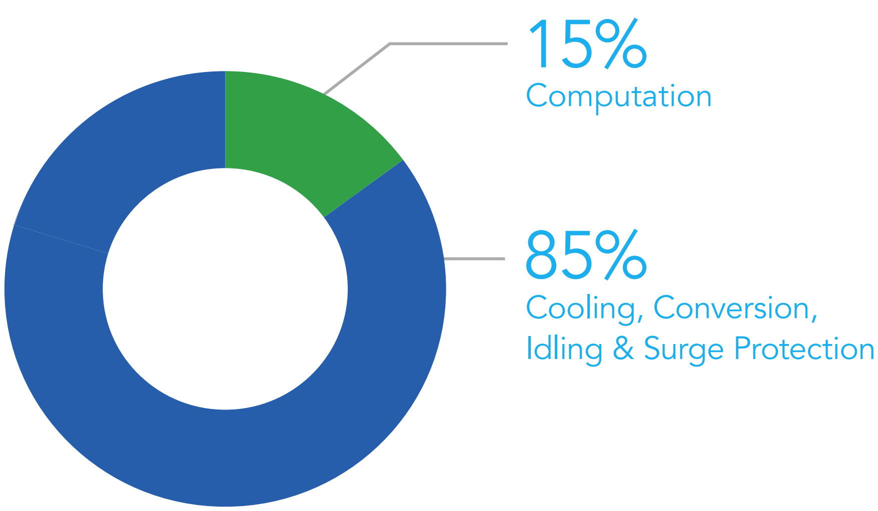
If you're considering options to help accommodate your data center bandwidth growth, we've put together a list of the top 5 questions you should be asking before you build or upgrade your network.

## #5 Energy Efficiency—How Many Watts per Gigabit?

In addition to being an ecological concern, the cost of power is a significant operational expense. For every watt of electricity consumed, heat is generated and that requires cooling. This multiplier effect can result in power-related costs as much as 600% of the actual power consumed by the IT device itself, as factored in by many data center owners.

A key metric to help you evaluate energy efficiency of your network equipment is how many watts are consumed per gigabit per second of traffic carried or W/Gbps.

Power inefficiency can also drive other costs and operational issues. Many data center racks are power limited, which impacts how much equipment can be deployed.




**Source:** The Future Of Data Center Critical Power - GP100 eBook – GE Critical Power June 2015

> **"Only about 25% of data center sites are capable of supporting greater than 12 kW and of those sites capable of higher power racks, only some percentage of the racks inside the buildings will be of the higher power variety. Thus, you can do the math and see today that the vast majority of racks are <12kW."**
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> **Source:** Telegeography Global Colocation Database Report 2014

Inefficient network devices can eat up all the available power in a rack, leaving lots of unusable rack space and requiring more racks to be leased.

### #4 Space Efficiency—How Many Gigabits per Rack Unit?

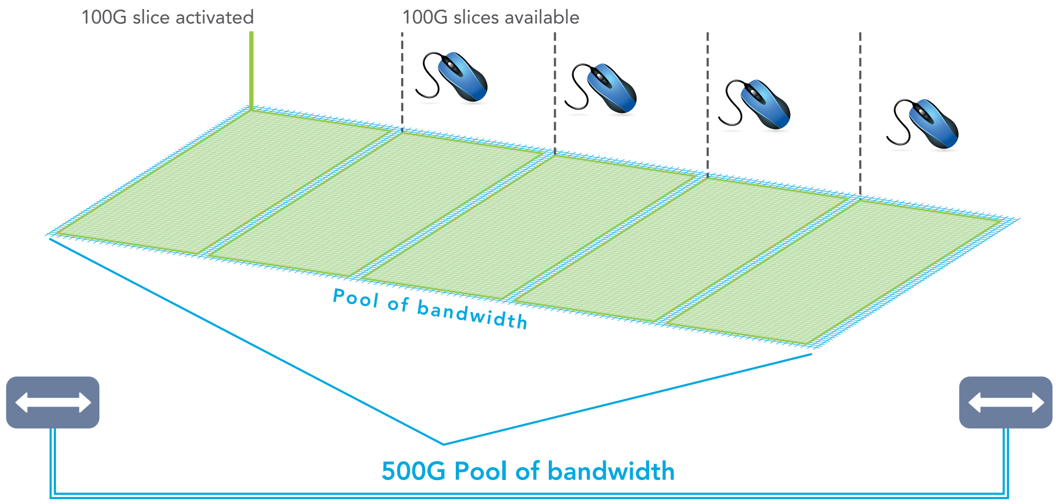
In today's IT environment, space is at a premium. The typical data center sells space for your IT infrastructure in rack units (RU). Each RU represents 1.75 inches of height in a 19-inch-wide rack space. A key measure to characterize the space-efficiency of your network equipment is Gigabits per Rack Unit (Gbps/RU). When thinking about Gbps/RU, higher numbers are better. A high Gbps/RU number allows you to fit your required networking capacity into less space than a low number.

Quick Tip: Be sure to consider other components required to complete the system. For example, many WDM systems will require external amplifiers, AC/DC power supplies, multiplexing equipment, etc., and each additional device reduces system density and raises overall power consumption.

Optical networks are an ideal solution to help lower costs in an expensive colocation facility. This can be accomplished by first colocating a majority of power and space-hungry equipment at a cost-effective facility. The second step would be to interconnect the first site to a premium data center, such as an internet/cloud exchange facility, using a small, low-power footprint optical networking platform and leased fiber. Such a multiple data center strategy has the potential to offer maximum connectivity to services, customers and partners located at the premium sites while minimizing overall operational costs and enabling scale.

### #3 System Scale—What Happens When I Need to Grow the Network?

IT organizations are challenged with Wide Area Network (WAN) scale requirements, and more importantly the speed at which network can scale. Service provider timelines for upgrades can vary widely, but can easily exceed 45 days. In some cases, upgrade requirements are too large for the service provider to easily accommodate, as traditional optical network equipment upgrades are complex. For example, meaningful upgrades (100Gbps+) can take months to add new hardware (e.g., line modules, new chassis), network testing procedures (e.g., optical test equipment and test engineering) and network implementation.



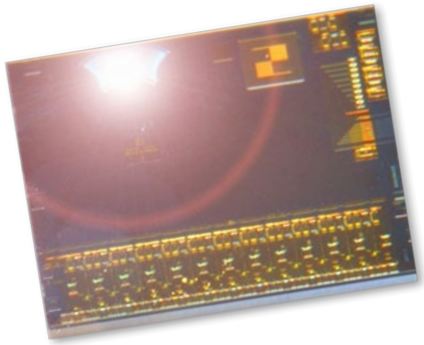

By contrast, some modern cloud-optimized networking hardware may offer simple license purchases to upgrades of WAN capacity up to 500Gbps. By creating a pool of bandwidth, new network capacity can be provisioned in increments of 100G of WAN capacity, with a few simple mouse clicks. Further, the simplicity of the network appliance approach enables adding more capacity in 500Gbps increments as simply as setting up a home wireless router, with additional units being rapidly stacked in a rack.

### #2 Manageability—How Hard Will it be to Manage This Network?

Frequently overlooked, manageability is critical to overall user experience. In today's cloud environment, there is a growing demand from network users to keep things simple and manage their network switches, routers and optical networks using a common Command Line Interface (CLI). Traditional optical networking solutions mandate the use of expensive and proprietary network management systems, which have required long training cycles to operationalize. With the trend towards network automation using Software Defined Networking (SDN), traditional optical networking gear is making network management more complicated than ever before. Users should look closely at their available options and evaluate the availability of CLI, a network management system for scale, and support for SDN.

### #1 Ease of Use—How Hard Will it be to Operate This Network

Traditional optical networks are complex. In fact, most optical networking equipment require many engineer, design and test cycles to install, add services, re-configure and upgrade the system. This adds considerable time and expense anytime the network operator needs to modify the system. However, the advent of the highly reliable Photonic Integrated Circuits (PICs) (http://www.infinera.com/go/pic/index.php) coupled with flexible user management models has changed that paradigm. In fact, the result is networking equipment that is an integrated network appliance having greatly reduced complexity compared to traditional optical networking equipment.



*http://www.infinera.com/video/podcasts/Podcast_3/pic_video.html*

Advantages of PIC based devices include easy setups, fast installation times, and touchless bandwidth upgrades  while remaining ultra-reliable. In addition, user errors are less likely, such as errors stemming from implementation of complicated configurations, and unboxing, assembling, cabling, activating and managing a DWDM network. New generation network appliances, like Infinera's Cloud Xpress featuring a 500Gbps PIC, are designed to enable most customers to get started by simply unboxing, plugging in and starting to use the device. I encourage users to examine this 'ease of use' issue closely by verifying how many steps it takes to activate a circuit, how parts are required to configure a system, how long it takes to assemble and provision services, and how often the parts/systems fail (MTBF).

## Conclusion

As IT applications continue to proliferate, so does the need for bandwidth. In particular, as enterprises move to build private, public or hybrid clouds, the need for scalable, easy to use, power-efficient network infrastructure grows. As CIOs and IT managers around the world continue to look for more efficient ways to scale bandwidth to support optimal application performance, they must balance this with controlling costs. Further, Cloud networking itself is ideally suited to optical networking to address the need for simpler, lower cost networks that can scale. DWDM technology powered by Photonic Integrated Circuits (PICs) offers lower space and power consumption and, coupled with innovative cloud-optimized designs, has emerged as a strong network connectivity choice for enterprises and operators. As you think about how you want to grow your network, consider how the parameters above will impact your total cost of ownership (TCO) and how the newest generation of optical networking systems can help you scale efficiently far into the future.

## Infinera's Cloud Xpress –

**The High Density, Low Power, Easy to Use Optical Networking Solution** To address this market demand, Infinera developed a new network appliance using requirements and feedback from cloud centric users and operators to help build DWDM networks optimized for tomorrow's users. The resulting two rack unit (89mm tall) Cloud Xpress is designed to deliver 1 Tb/s of input and output capacity with up to 500 Gb/s of line-side capacity over 10 GbE, 40 GbE and 100 GbE client-side interfaces. This appliance integrates redundant power supplies and fans, built-in amplifiers, and a hot swappable controller module, making Cloud Xpress an excellent option when rack space is at a premium and reliability is also paramount. Further, Cloud Xpress consumes less than one watt per Gb/s of traffic, providing efficiency in power consumption for metro Cloud solutions.

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Have a question about Infinera's products or services?
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