WHITE PAPER

Optelian

The business case for 100G

SEPTEMBER 2013

Dealing with demand

Service providers are having to respond quickly to explosive bandwidth growth driven by an exponential increase in the use of mobile devices for streaming video applications and the growing demand for cloud-based services. Today's standard network currency is 10G, but demand is outstripping the capacity available over existing 10G infrastructure and operators are seeking ways to rapidly meet the expectations of the market while keeping their costs low.

A recent Infonetics Research study surveyed global network operators to understand the drivers that would lead them to transition to higher bit rates. The study found that operators are leaning towards 100G technology rather than 40G, since market demand is driving 100G costs lower at a quicker pace. When asked to rate the reasons for deploying higher bit rate technology, the reduction of cost per bit was the primary incentive for over 60% of respondents.

A practical cost comparison

To quantify the value of 100G, consider the total CAPEX and OPEX associated with deploying 10G-per-wavelength services over a simple, short reach, point-to-point linear DWDM network and increasing service bandwidth requirements over time. This 10 Gb/s-based strategy can be compared with the costs associated with delivering the same 10G services aggregated over 100G wavelengths.

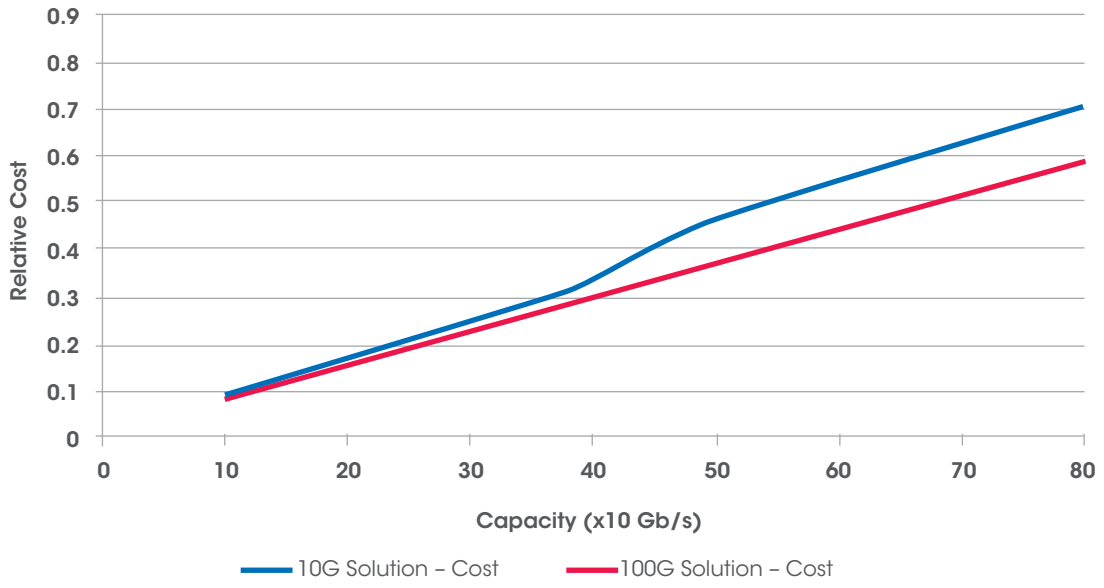
A fundamental driver for the decision to deploy 100G wavelengths is that it can co-exist with 10G services on the same network. Therefore, it is assumed that the OSNR tolerance of both the 10G and 100G examples are matched to ensure similar reach capabilities.

A number of assumptions are made to carry out these comparisons:

1. Both 10G and 100G wavelengths have G.709 FEC enabled to ensure that equivalent optical performance can be achieved in the presence of optical amplifier noise.
2. The network can support a maximum of 40 DWDM wavelengths on a single fiber pair. Additional fiber pairs are required when the channel count is exceeded.
3. In the 10G wavelength analysis, when the capacity exceeds multiples of 400 Gb/s, an industry standard fiber use charge is included. This can be interpreted as either: (a) an additional annual recurring cost to lease dark fiber where fiber resources are limited; or (b) lost revenue from available fiber where fiber resources are abundant.
4. The cost to turn up each wavelength is identical regardless of whether the wavelength is 10G or 100G, and is included in both models.
5. Requirements for rack space (RU) are also compared but not included as recurring costs (as would be the case for equipment deployed in co-location facilities).
6. A typical industry density of 5 x 10G per RU is assumed for the 10G wavelength services, while 10G services aggregated on the 100G wavelength are assumed to occupy 1RU, as is the case with the Optelian MPX-9110.

The following compares the relative costs for deployed capacity up to 800 Gb/s.

Figure 1: Relative cost of 10G to 100G, assuming a one-year dark fiber leasing cost for capacities higher than 400 Gb/s.

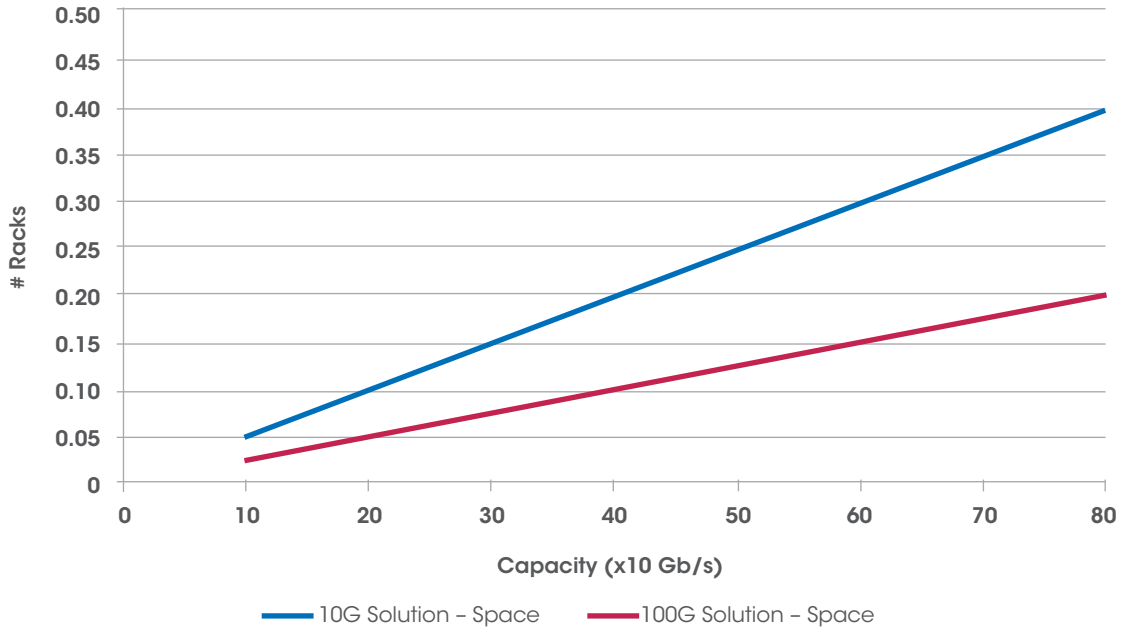


There is a cost advantage to deploying 10G services over a 100G wavelength even for the first 40 wavelengths of 10G capacity. Where required capacity exceeds 400 Gb/s, the annual cost of dark fiber drives the cost of a 10G wavelength implementation even higher.

Rack space comparison

Figure 2 shows the incremental requirement for rack space as capacity increases to 800 Gb/s. Here, 10 Gb/s services are aggregated onto a 100 Gb/s wavelength using the Optelian MPX-9110 compact 1RU flexible 100G platform. The 10G analysis assumes typical best industry density for 10G-per wavelength services of five 10 Gb/s services per RU.

Figure 2: Rack space requirements for 10G vs. 100G.

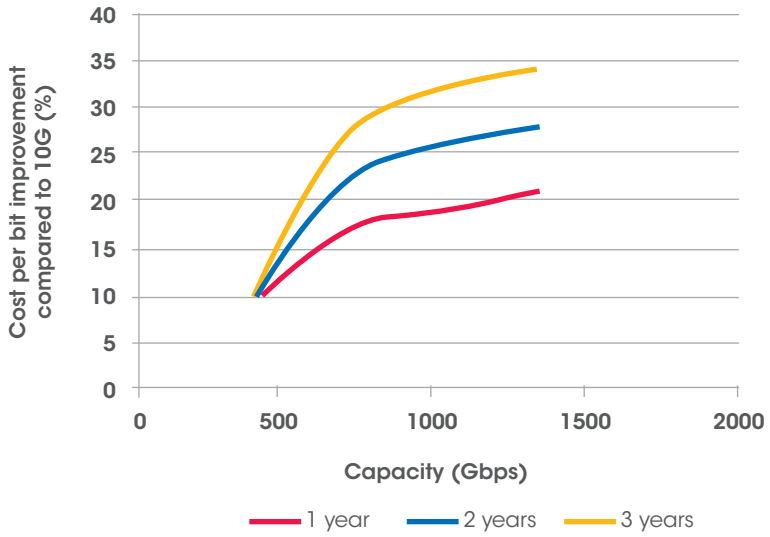


There is a clear advantage to delivering 10G services consolidated on 100G network connections, especially when using a stand-alone, compact, single RU platform. This becomes increasingly important when capacity is added at Ethernet Exchanges and colocation facilities, where the cost of leased rack space is high for multi-RU 10G service delivery equivalents.

Cost-per-bit analysis

Network operators are concerned with cost per bit when it comes to the decision to deploy 100G. To understand the impact of the costs associated with fiber resources, it is informative to look at the variation in the estimated cost-per-bit as capacity is increased over several years.

Figure 3: Cost per bit improvement of 100G aggregation vs. 10G wavelengths.



Deploying services over 100G wavelengths demonstrates a cost-per-bit improvement of 10 percent from the point of initial deployment, compared to 10 Gb/s implementations that use a single fiber pair with no additional recurring fiber costs. When additional dark fiber is required to deploy 10G wavelength services above 400 Gb/s, the cost per bit improvement leveraging 100G is even more significant—driving it above 30 percent as capacity grows over the three-year period.

The 100G advantage

Network operators are starting to plan for the deployment of 100G to address the burgeoning demand for additional service capacity in their networks. There is a distinct advantage to aggregating 10G services with a compact 100G service delivery platform compared to a 10 Gb/s per wavelength strategy. The analysis uses current cost estimates, but as more operators adopt 100G, the economic benefits will continue to improve as equipment costs drop over time.

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