

## **7 Economic Feasibility of NG-EPON**

The economic feasibility of NG-EPON systems is influenced by a number of factors, including costs of equipment (OLT and ONU), costs of outside plant (ODN), costs of installation at the CO (OLT) and at the target ONU location, as well as operational costs incurring on daily basis by operator using this technology.

### **7.1 Costs of outside plant**

The cost of deploying and maintaining the ODN infrastructure for EPON (1G-EPON, 10G-EPON) is well known and understood by operators using this technology today. Given the expectation that the NG-EPON operates over the very same ODN as the previous generations of EPON, the material and installation costs of fiber plant, splitters, and other passive components of the ODN remain unchanged.

Furthermore, the reuse of the very same ODN design allows operators to take advantage of the experience of field technicians, design teams, and civil construction teams, resulting in more agile and more cost-optimized deployment process. Network design, installation and maintenance costs are minimized by preserving the already existing network architectures, management, and software, as well as processes internal to individual operators. The ability to build on existing deployment and maintenance mechanisms is crucial for quick roll-out and successful integration into already existing network architectures.

Last but not least, the ability to support multiple generations of EPON on the same ODN extends the life span of the already deployed ODN, allowing operators to provide services to customers for a longer period of time without having to reinvest money into the PON infrastructure.

### **7.2 Costs of installation**

The costs of installation are primarily related with the complexity of the deployment of the OLT at the CO, deployment of individual ONUs at their target locations (depending on the selected PON architecture), and configuration process for services once the active devices are in place. Given that the deployment model for NG-EPON does not change when compared with previous generations of EPON, the costs of installation of active devices remain well understood.

Depending on the wavelength agility of NG-EPON ONUs, the service configuration process might require to allocate specific wavelength channels to particular ONUs, though it is expected that the extended MPCP protocol (to be developed by the future NG-EPON Task Force) makes this process semi-automatic, requiring no dedicated (colored) optics on the ONU side.

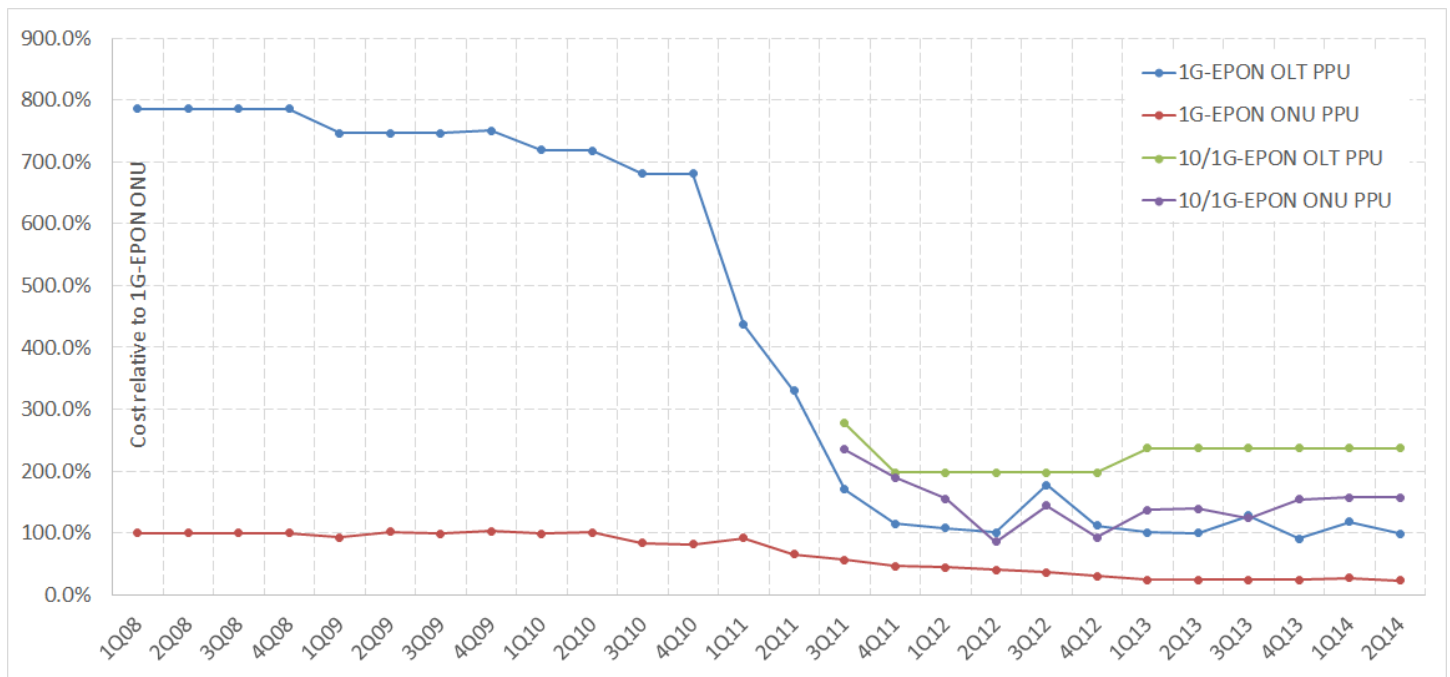
### **7.3 Costs of active equipment**

The costs of NG-EPON ONU and OLT devices are very hard to predict with any level of certainty. Figure 1 below presents the relative price of 1G-EPON and 10/10G-EPON active devices (ONU and OLT) over time, based on data from [ovum].

The price of 1G-EPON ONU in Q1 2008 is assumed to be equal to 1 unit. The chart shown in Figure 1 represents the erosion in the price of 1G-EPON ONU over time. The price of 10/1G-EPON ONU is presented relative to the price of 1G-EPON ONU in Q1 2008. It is worth noting that when the first commercial 10G-EPON ONUs were

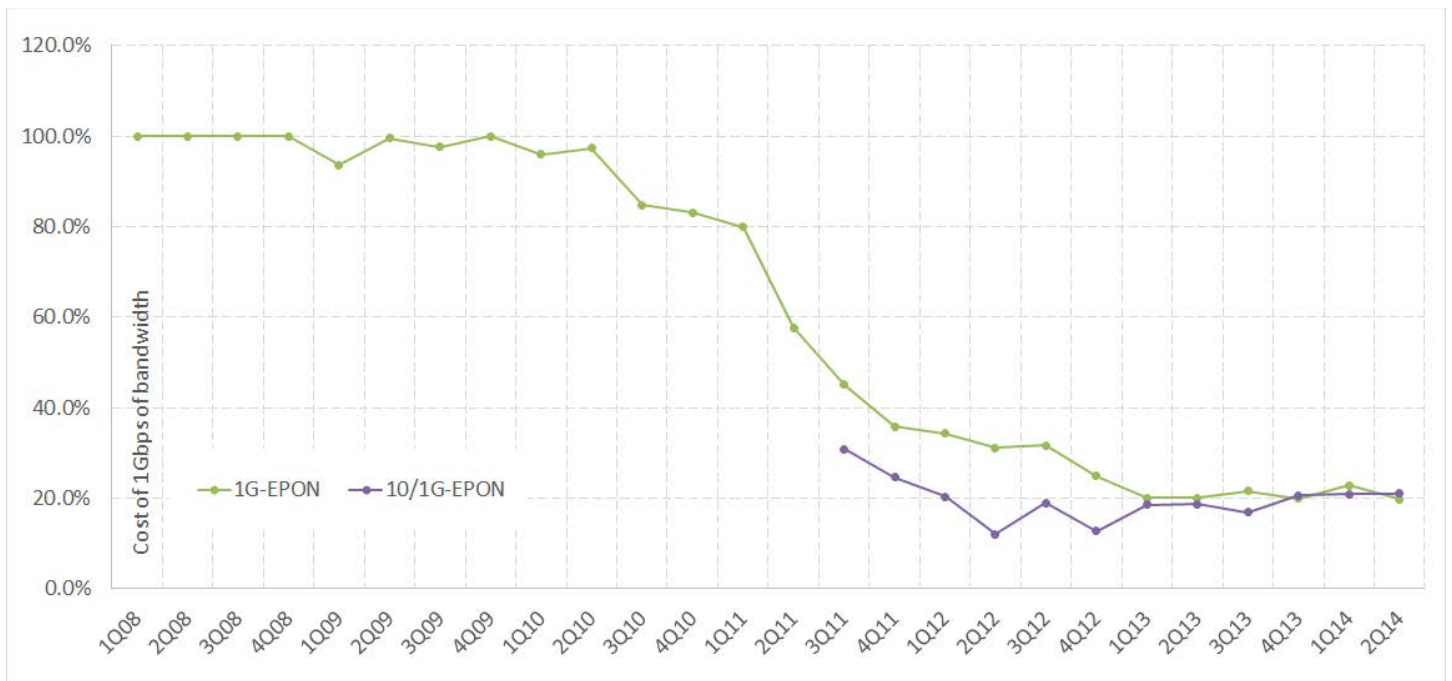
included in the [ovum] report in Q1 2011, their price was almost 2.5 times higher than the price of 1G-EPON ONU back in 2008, though they did provide much more bandwidth. Since then, by Q1 2014, the report indicates the price of 10/1G-EPON ONU stabilizing around 1.5 the price of 1G-EPON ONU. It is expected that the price of a single wavelength NG-EPON ONU be comparable to the price of 10/10G-EPON ONU, with the premium attributed primarily to the tunable optics (if used by operators). The price of higher capacity ONUs using multiple wavelengths will largely depend on the progress of optical integration and availability of higher speed SoC capable of handling more than 10 Gb/s. It is probably reasonable to expect the first generation of such ONUs cost 4 times more than current 10/10G-EPON ONUs, with additional premium for tunable optics (if used by operators).

The price of 1G-EPON OLT has also decreased over time, as shown in Figure 1. The price of the 10/1G-EPON OLT port relative to the price of 1G-EPON ONU port has been low in Q1 2011, and remains only slightly higher when compared with 1G-EPON OLT port. The cost of NG-EPON OLT port will largely depend on the progress of optical integration, and at this time it is hard to speculate on the relative value of such a device.



**Figure 1: Relative cost of 1G-EPON and 10/1G-EPON ONU and OLT devices over time**

The cost of 1 Gb/s of raw bandwidth has been used recently as a representation of the system’s ability to provide high speed data services in a cost-effective manner. Figure 2 presents the relative cost of 1 Gb/s of bandwidth in 1G-EPON and 10G-EPON, taking the cost of such bandwidth unit in Q1 2008 as 1 unit. The steady erosion in the cost of this bandwidth unit is visible, but what is more interesting is the fact that 10G-EPON remains competitive with 1G-EPON when it comes to the cost of 1 Gb/s of bandwidth.



**Figure 2: Relative cost for 1 Gb/s of bandwidth**

## 9 References

[ovum] OVUM report, 2014 Q2