

Fiber to the office meets the connectivity challenges of the education sector

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This blog discusses the benefits of fiber to the office (FTTO) in the educational sector. FTTO refers to a fiber-based local area network (LAN) that consists of fiber cabling, unpowered splitters, optical line terminals (OLTs) and optical network units (ONUs), and which is used in campus settings. The blog highlights why the education sector is a good fit for the deployment of FTTO. It focuses on how FTTO can meet the growing bandwidth requirements of the education sector, while also being well suited to the topology of educational establishments and being able to deliver both capex and opex savings versus traditional copper-based LANs.

Enhanced connectivity in the education sector is a growing priority for governments

The importance of good quality and environmentally friendly connectivity in the education system has been highlighted by various government initiatives and targets.

- In the US, the FCC has a bandwidth goal of 1Mbps per student in schools.
- In the European Union, gigabit connectivity for all schools is an EU Connectivity 2025 aim.
- In China, the Notice on Improving University Campus Network Management and Service Quality was released in 2021 and focuses on ensuring that there are better quality and greener networks in universities.
- The Japanese government's Global Innovation Gateway for All (GIGA) program has partly focused on ensuring schools have high-speed and high-capacity connections.

Stakeholders must therefore consider the benefits that FTTO can bring in order to meet these targets.

FTTO provides the high bandwidths required for high-tech educational experiences

The next generation of teaching will become more reliant on the kinds of interactive experiences that virtual reality and the metaverse can deliver. The metaverse, for example, could be a useful place for language students to practice in a more memorable way. Geography students can better understand the physical geography of different locations with the use of immersive virtual reality. Virtual reality could also be useful for vocational training such as for medical students. The use of high-capacity FTTO will enable the delivery of the multi-gigabit capacities required for this new breed of teaching. Importantly, investment in FTTO will deliver a better output in terms of a higher-quality education.

A related point is that there will be continued evolution in the type of immersive educational tools available and the use of such tools will also grow over time. In this way, FTTO solutions that support easy upgrades to higher bandwidths will come into their own. FTTO capitalizes on the near-limitless capacity of fiber and can be upgraded to support 50G PON simply with changes to OLT and ONU hardware. This is different for traditional copper-based LANs, where the physical cabling would need to be replaced to support these kinds of capacities, which would be a costly and time-consuming process.

In addition to providing high bandwidths, FTTO provides high-quality, reliable connectivity compared to copper-based LANs. Educational establishments might wish to build redundancy into their networks, for instance, to avoid disrupting teaching time. This can be achieved in multiple ways with FTTO, for instance, by deploying multiple fibers to different splitters or putting in place multiple OLTs.

The topology of educational establishments is well suited to FTTO

Educational establishments such as universities can be large in size and could easily encompass an area of 1 square kilometer and above.¹ This is important because copper-based LANs are limited to providing their maximum bandwidths at distances of no greater than 100 meters. To cover bigger areas, copper LANs will require more equipment, space, and cabling. For example, the University of Canada in Egypt has deployed FTTO and with the 200-meter width of the university's new library building two equipment rooms per floor would have been required if a traditional copper-based LAN had been used.² By contrast, FTTO offers greater flexibility and one OLT can serve multiple dispersed buildings connected by fiber in a university campus, for instance. In addition, the lower space requirements and fewer communications rooms that FTTO requires are important because such space can be repurposed, for instance, for an extra classroom, which again would improve the overall educational experience for students.

FTTO delivers both capex and opex benefits for the education sector

FTTO networks can deliver cost benefits versus traditional copper-based LANs throughout their lifecycle. Specifically with regard to the education sector, cost savings are important, firstly because some governments may be budget conscious. Moreover, any cost savings derived from using FTTO can be invested in further enhancing the overall education experience for students, for instance, by hiring additional teachers.

- Capex benefits:** In terms of capex, the initial cost and complexity of rollout can be reduced when using FTTO. Such savings are derived from the fact that less cabling is required when using an all-optical network, which reduces both material costs and installation times. For example, as part of an FTTO deployment at the Ocean University of China there has been a 60% reduction in cable footprint.³ In addition, the huge volume of FTTO rollouts across the world has delivered economies of scale and reduced OLT and ONU costs. Over time, there will be further capex savings compared to copper-based LANs because copper cables will need to be replaced when capacity needs to be upgraded, while fiber can stay in place.
- Opex benefits:** One important opex-related benefit of FTTO is its energy efficiency. This is one area where policymakers are placing increasing emphasis; for example, the South Korean Smart-Green School initiative has clear expectations for reducing greenhouse gas emissions. FTTO does not require any powered equipment between the OLT and ONU and, when compared to traditional copper-based LANs, there are lower energy requirements for equipment powering as well as air conditioning in communications rooms when using FTTO. Another benefit of FTTO is that it provides centralized management of the entire network from a single location, which delivers efficiencies, for example, when configuring and reconfiguring ports and troubleshooting issues.
- Efficiencies from running multiple services on the same FTTO network:** FTTO is also cost efficient because its high capacity means that it can support the delivery of multiple services across a single fiber network. For example, an FTTO network can support voice and data services such as fiber to university dormitories, classrooms, and Wi-Fi access points. It can also support video from surveillance cameras that are being used to keep students safe, as well as machine-to-machine (M2M) devices such as lighting that detects motion.

Appendix

Further reading

¹ HESA, “[Buildings and spaces by HE provider and academic year](#)” (retrieved December 2023)

² Huawei, “[Redefining Teaching with a Smart Campus Network Powered by Huawei Agile Campus and Agile POL Solutions](#)” (retrieved December 2023)

³ Huawei, “[Huawei Elevates OUC’s Campus Network with Comprehensive All-Optical Upgrade](#)” (retrieved December 2023)

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