USE CASE

CAMPUS NETWORKS:
SAVE ENERGY AND OPERATING COSTS WITH FIBRE OPTIC NETWORKS

What are the advantages of a fibre optic network on a site where different users from several organisations have access to a common IT infrastructure? This "use case" provides an answer.

Are you responsible for setting up a high-performance data network on the "campus" of a private or public organisation? Expanding or sustainably upgrading the existing one? In either case you are facing an exciting challenge. For these tasks require a good understanding of the local conditions and the legal framework, as well as of the technical possibilities and solutions available on the market.

At Datwyler we talk of a "campus network" when different users from several organisations on a self-contained site have access to a common IT infrastructure. These could be large shopping centres, universities and hospitals, trade fairs, airports or even companies. The users of a campus network – in the case of airports, for example, the management, airlines, shops, restaurants, hotels and car park operators – have one thing in common: their business activities depend on the reliable operation of the data network installed on the site.

This includes secure separate data connections, sufficient bandwidth and fast response times. As the installer or operator of a campus network you are thus creating a bridge between the many data outlets on the site and the central transfer point (hub) to a provider's wide area network (WAN).

High bandwidth and response time requirements

Today's state of the art provides a fibre optic network for such an application. This is the best way to meet the requirements of bandwidth and response times – at a reasonable investment cost. Not only have the components needed for a fibre optic network been fully developed and tried and tested for decades, but they also come in different country-specific versions. They easily bridge distances of several kilometres and also provide remote buildings and technical installations with extremely high bandwidth. A GPON (Gigabit Passive Optical Network), for example, currently permits

downloads of up to 2.5 and uploads of 1.2 gigabits per second.

The connections from the hub – in one of the buildings on the campus or in an outdoor enclosure on site – to the various buildings or parts of buildings are made with rugged high-fibre outdoor cables, typically using nodes with splitters. These are generally installed underground, but in many countries are also mounted on masts above ground. At the end of the cabling – in the buildings as a rule – the cables are divided into separate fibres which are available to the individual users. In an airport, for example, these are the shops on the floor of the departure lounges. In this way the operator of the campus network can offer each of them separate secure access to the WAN provider's broadband network.

Cost benefits

First of all, such a point-to-multipoint fibre optic network occupies substantially less space than a copper data network of equal performance – and is more difficult to "tap into".

In addition, between the optical line terminal (OLT) at the starting point and the optical network terminals (ONT) at the user's end the passive fibre optic network (PON) has no need for active components (switches and gateways).

This means that not only is the purchase price much more reasonable, but that it also saves on energy and maintenance costs, as demonstrated by a current Datwyler project with more than 1300 access points and three services – Internet, IP telephony and IPTV (Fig. 1).

CAPEX	TRADITIONAL NETWORK		GPON NETWORK		
Items	**Components**	**Cost**	**Components**	**Cost**	**Saving**
Active equipment	Internet & IP phone gateway	$ 195,000	1x 16-port OLT, 455x ONT, 2x mid range SFP	$ 125,000	
	35 switches & distribution switches	$ 100,000			
Passive equipment	Patch panels, modules, faceplates, patch cords, Cat.6 cable, around 110,000 m, riser cable	$ 125,000	Riser cable, FTTH cable, patch cords, splitter box, pigtails, FTTH faceplates	$ 70,000	
Total		**$ 420,000**		**$ 195,000**	**$ 225,000**

OPEX (kWh per year)*	TRADITIONAL NETWORK		GPON NETWORK		
Items	**Components**	**Cost**	**Components**	**Cost**	**Saving**
Active equipment energy consumption	20,720 watts per hour; 56 switches & distribution switches	$ 45,730	OLT: 76 watts, ONT: 15 watts each, 1x 16-port OLT, 455x ONT	$ 15,125	
Total		**$ 45,730**		**$ 15,125**	**$ 30,605**

* $ 0.25 per kwh

Fig. 1: CAPEX and OPEX comparison calculation – traditional copper and modern fibre optic network

APOLAN (The Association for Passive Optical LAN) calculates that, depending on the configuration, users of a fibre optic campus network can save between 30 and 50 percent of their operating costs by comparison with copper based networks. Here the lower costs are reflected particularly in error management and in the service level agreements for the active components (Fig. 2).

But that is not all: the value of a data network is measured by how well it matches the needs of its users. For example, what happens when one of the tenants wants to operate a small data centre on the site?

Whereas copper-based networks rapidly reach their limits in respect of bandwidth and maximum upload and download times, fibre optic networks permit the simple integration of local data centres, even those with the highest performance requirements.

Moreover they can easily be expanded using copper networks, should lighting controls, CCTV or other local Power-over-Ethernet applications so require.

From advice to operation

This clearly shows that a modern campus network involves far more than the cabling itself. What applications do you want to implement? How can you enhance user convenience? How can energy consumption be reduced? Can synergies be used? To clarify these and other questions it is worth consulting an experienced IT infrastructure specialist like Datwyler at an early stage.

Even prior to installation Datwyler provides assistance with network design and layout planning. Existing structures are audited for their future usability and evaluated in respect of their performance and possible vulnerabilities as against current norms and standards.

As a turnkey provider Datwyler IT Infra is also able to define all the components needed for a passive optical network from transfer point to individual data outlet, and to supply, install, test and accept them – including the civil works, for which qualified civil engineering companies are called in.

Last but not least, Datwyler is a tried and tested partner for the design and installation of a functional data centre or for the supply and integration of smart lighting components, CCTV cameras and other PoE-powered systems. ■

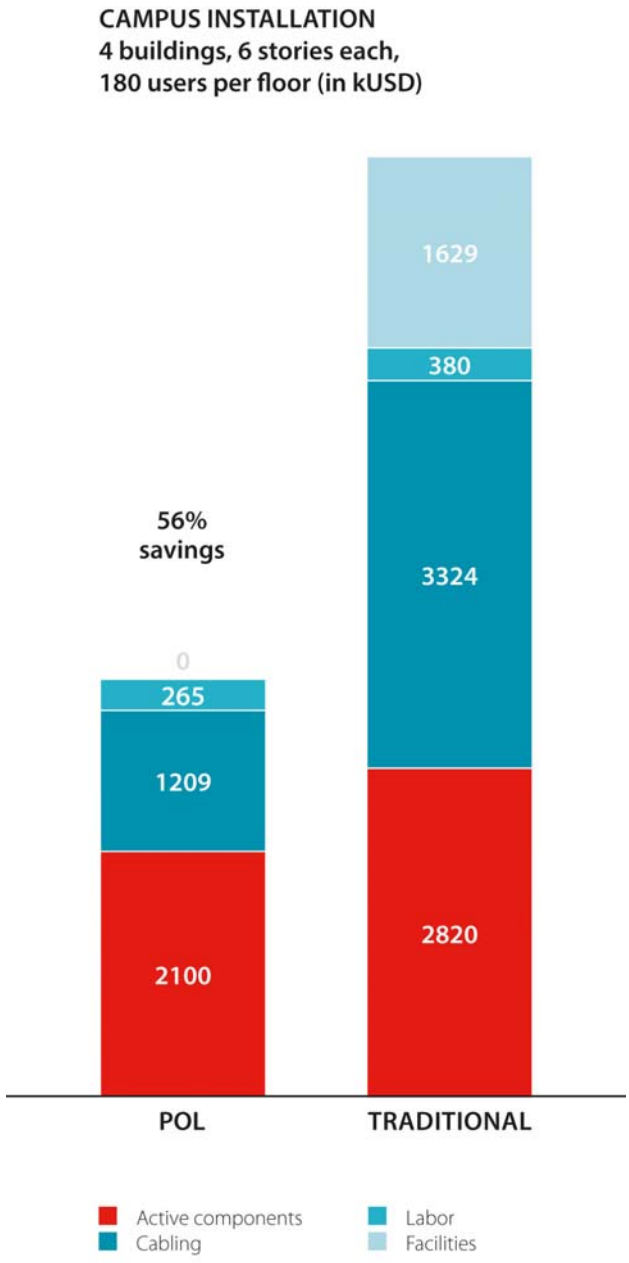

Fig. 2: Operating costs comparison calculation – passive fibre optic LAN (POL) at campus level and traditional copper network (source: APOLAN)

In the near future 5G mobile phone technology will represent an exciting alternative to fibre optic networks on the campus. In some countries it is already possible for an organisation to acquire a 5G frequency band to cover its campus site. It can then set up its own network of 5G antennae and connect with fibre optics to the provider's WAN. 5G data transfer is characterised by high bandwidths with extraordinarily low latencies (< 3 ms) and no need for expensive installation work. The disadvantages are high investment costs for the antennae and the licensing fee for the frequency band. In addition, some development work still needs to be invested in the 5G hardware at the device end in order to do justice to the wide range of possible applications. But even today it can be said that 5G technology will open up entirely new possibilities for applications in which high volumes of data are to be gathered on site and immediately processed – for example in the automatic process control and management of a chemicalplant with thousands of sensors and a network of local nodes. Datwyler and its technology partners can also provide interested parties with comprehensive advice on this subject. ■

