SOLECTEK

WHITE PAPER

10Gbps Backbone Network For Campus Connectivity

FUTURE PROOFING WITH 10G ETHERNET ON YOUR CAMPUS

Introduction

Just five years ago, network planners were upgrading to 1G networks with the thought that 1G Ethernet will give them sufficient cushion against future growth. Recent multimedia applications require additional bandwidth, which has made them rethink their strategies. For backbones with heavy network usage, many IT decision makers are now thinking 1G backbone networks are no longer future proof.

For organizations situated in campus environment with multiple buildings, Construction of a suitable primary and secondary backbone to connect these buildings is critical. However, new fiber deployment or fiber upgrade may be too costly (installation and leasing) and there are often permits and right-of-way issues that cause significant delays and added expenses in terms of both OPEX and CAPEX.

As an alternative, wireless backbone deployment presents a good way to resolve these problems. The cost can be contained to reasonable upfront infrastructure CAPEX (ROI estimated at less than 6 months) and time to completion can be literally measured in days rather than months or years. Wireless backbones can be deployed as either as the primary or redundant path to existing fiber connections. Because wireless backbones are not vulnerable to the factors that cause disruptions in fiber connections, they can become an ideal complement, either as a backup, a load-sharing arrangement, or flexible disaster recovery

E-Band PTP Links for Campus

E-band (70/80GHz) PTP links can operate in a large chunk of spectrum (2 x 5GHz, 71-76GHz and 81-86GHz) at short distances, leading to higher data capacities than all other types of PTP links. For campus networks, E-Band links are ideal because of two reasons:

(1) College or enterprise campuses often demand high bandwidth network capacity due to Internet for both academic research (video conferencing, video lectures) and personal multimedia applications (SNS and Youtube) which are increasingly driving bandwidth requirements. In addition, LAN traffic is growing due to internal applications that require access to servers for instruction material and other information. All these are putting pressure on the IT infrastructure as the data traffic amount continues to grow. E-Band radios provide the best capacity of any radio types in the market today.

(2) As referred to above, E-band radios are not suitable for long distance links, but campuses often tend to be limited in terms of geographic area, typically 1 mile or less across the campus. Building a ring architecture that covers all or most of the buildings will require 0,5 mile links and at this range, E-Band radios can be operated with the highest link reliability even when the radio link setting is at the maximum capacity.

Longer distance links typically use 4.9/5 GHz licensed/unlicensed frequency band or 11/18 GHz microwave links offered in other Solectek product series.

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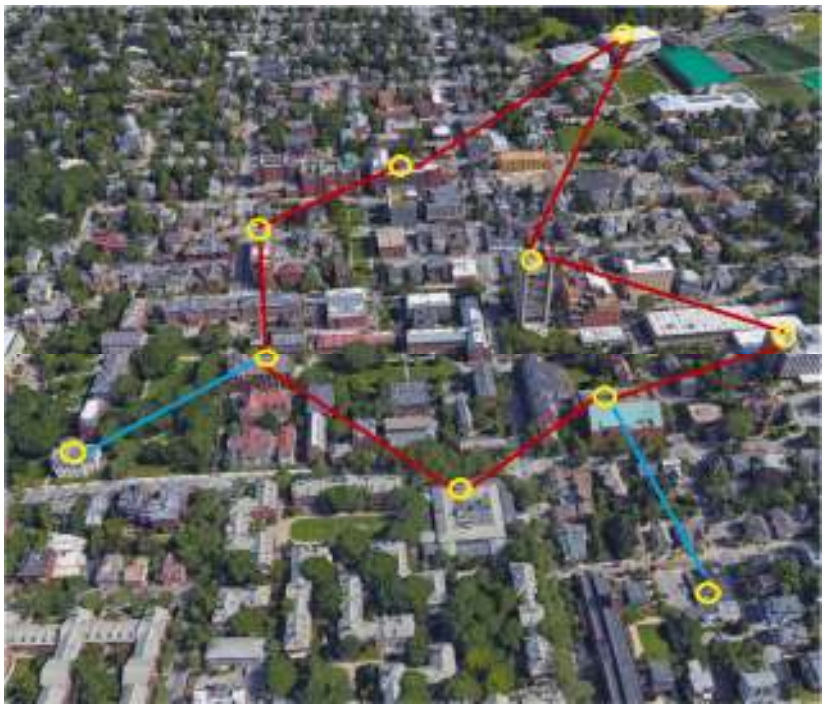

Typical Example of a Campus Ring:

A backbone ring is shown with sites (yellow circles) and radio links (red lines) for a complete ring with 8 nodes. Rings can be built by choosing buildings and find paths that have line-of-sight (fairly easy for short distance links). Additional sites can be connected by including them in the ring or as "spur" links (blue lines) from one of the ring nodes.

Ring architecture provides redundancy against a link failure and thus is most often used for improving the uptime of the network.

The picture shows a campus of a mid-size university. The distance across the campus is about 0.5 mile. Larger campuses may be 1 to 2 miles from one end to the other, In such cases, radio links may be 0.5 mile long, which is well within the ranges of E-band links at full capacity.

Installation and Licensing

Installation is quite simple, especially for shorter distance links. Radio units are equipped with 1G/10G SFP ports for fiber connectivity down to the switch closet at each location. The user can choose to enable advanced networking features or operate the radios units as simple bridges.

Licensing is also quite simple at a very low cost. Each link needs to be licensed with the FCC, but unlike microwave links, it is more like a registration rather than licensing for a short review, so the process can be completed within days of application.

Links to New and Off-Site Locations

Aside from backbone connections, E-band links can be used for new buildings that are yet to be connected via landline (as a temporary link) or off-site locations where fiber is not available or cost-prohibitive. For locations where fiber line can be leased by carriers, radio deployment costs will have a short payback against the recurring expenses to a service provider.

As seen in the picture above, off-site locations can be connected to campus as a "spur" link from a node site in the wireless ring. Either way, an E-band radio connection can be used for connecting sites without viable alternatives in terms of cost and schedule.

Solectek GB-X10 links

The latest generation E-Band link product from Solectek features a full 10Gbps radio path and will carry your 10G Ethernet traffic in a seamless and transparent manner. The interface is 10G SFP+ port so the Ethernet interface also fully support 10G Ethernet. Adaptive features (modulation and bandwidth) will make sure that the link will reliably operate even in adverse weather conditions at a safe lower speed and restore the link to full speed when the condition returns to normal.

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