

Fibre To The Lodge – FTTL

Conwy Lodge Park



A PREFORMED LINE PRODUCTS COMPANY

Customer	Conwy Lodge Park
Location	Wales, UK
Requirements	To enable every lodge on the park to experience and enjoy a minimum of super-fast broadband
Equipment	GPON - Gigabit Passive Optical Network

Introduction

The client is the owner/proprietor of “Conwy Lodge Park” based on the outskirts of Conwy town in North Wales. The site commands a superior position on a 100acre site with 360° views of Conwy Valley, Llandudno Great Orme, Anglesey, Conwy Castle and Snowdonia National Park.

The client has a very clear strategy and a vision for the Luxury Park. His ambition and driving force is behind the significant and on-going developments that makes Conwy Lodge Park such a success.

Part of that vision is to have the ability to deliver **Super Fast & Ultra Fast Broadband** to each and every lodge across the whole site. Clients paying £250-£500k per lodge would not expect anything less.



Objective

To enable every lodge on the park to experience and enjoy as a minimum **Super Fast Broadband** and have the capability to provide **Ultra-Fast Broadband**

By special request experience Warp Speed Broadband greater than 500Mgbs

This is broadband connectivity without compromise



Network High Level Perspective

Connection from CO (Central Office) to WAN -WWW is:-

- Variable on demand EAD (Ethernet Access Direct) on 10Gig barer.
- Technology used to deliver services across the Park is **GPON**
- Network type - **FTTL** Fibre To The Lodge
- Number of users 50 rising to 400.



Technology

GPON - Gigabit Passive Optical Network

GPON is a fibre broadband technology that uses multiplexing to allow multiple customers via optical splitting to share a fibre connection whilst delivering a secure connection and Gigabit+ speeds.

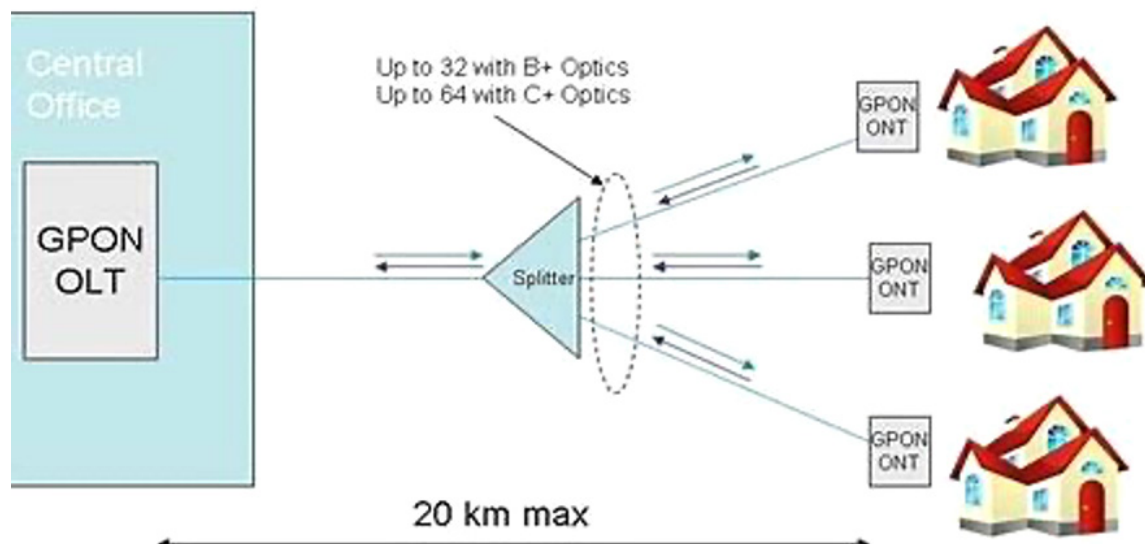
GPON has only passive light transmission components in the access network with active components only in the central office and the customer premise equipment. At the central office the termination point is in Optical Line Terminal Equipment (OLTE). At the customer optical network terminals or ONT is the termination point. Between OLTE and NTE is the passive optical network, comprising fibre links and PLC (Planar Lightwave Circuits) passive splitters.



With the price of OLTE/NTE the active component within a GPON system continuing to fall in price, it now looks to be a cost-effective solution on smaller Campus / Residential environments.

We are talking about GPON, so it is also important to point-out that GPON provides 2.5Mbps of bandwidth downstream and 1.25Gbps upstream shared by a maximum of 64 users.

GPON provides a 20 km reach with a 28dB optical budget using class B+ optics with a split ratio of 1:32. This reach can be extended to 30 km by limiting the splitting factor to a maximum of 1:16, or by the help of enhanced optics C+, this optical link can add up to 4 dB to the budget and extend optical reach up to 60 km. The 10G-EPON can also provide 20 km reach with a 29dB optical budget. To make it easier to understand, below is a simple diagram of GPON.



GPON

- GPON reduces demand on duct space from CO, splitting further down the line.
- GPON provides on demand high bandwidth capacity to the client.
- GPON supports many advanced services for revenue growth VOP/Gaming/
- GPON has lower plant maintenance and operating costs
- GPON near cost parity with low-bandwidth copper-based network.
- GPON features long reach without amplification typically 20km
- GPON has no active electronics in OSP equipment.
- GPON has longer physical and economic lifespan.
- GPON is Fast & Quick to deploy
- GPON can upgrade and expand network very easily
- GPON allows small diameter & light weight cables thus small space occupancy.
- GPON is secure & immune to electromagnetic interference.



In FTTH system signals are combined, multiplexed, converted to light signals & interfaced to a single fibre by the Optical Line Terminal (OLT) placed in the exchange. The signals are transported & distributed to the end users, directly or through splitters, where the signals are converted through ONT to electrical signals.

Typically GPON system is used with single mode fibre G652 but more recently G657 (Bend insensitive Fibre)

GPON Performance

Detail	Downstream	Upstream
GPON Speeds	2.488Gbps	1.244Gbps
Wavelength	1490nm	1310nm

Planning of the ODN (Optical Distribution Network) is critical to a successful GPON deployment. The network needs to be well planned to take into consideration optical budgets bandwidth performance number of clients and distance involved if we are to deliver a good service.

From an infrastructure perspective FTTH networks are very similar in design and layout to the copper network configurations and elements. In comparison, it consists of a Feeder (primary) and Distribution (secondary) network, Fibre Distribution Terminal (Pedestal / Cross connect cabinet), Fibre Access Terminal (Distribution Point) and Drop fibre (buried or aerial service) via a demarcation box.

Method

The park benefits from a lattice of ducts extending across it, typically 100mm plastic ducts. If there is a need to deploy new ducts then this is a relatively easy task for the park owner. He owns the land he has the plant and the skills at his disposal.

From a planning perspective there are detailed plans approved by Conwy Borough Council which clearly identify what lodges can go where. From this and GIS mapping we are able to generate plans to cover all the services to include Electricity / Water / Gas / Sewer & Communications.

On the communications layer we are now able to strategically plan the deployment of pedestals taking into consideration the existing ducting and plot locations and where necessary, the planning of additional ducting. We also take into consideration at this stage the need and flexibility to enable expansion. The park currently has at least 3 phases with a rollout programme over the next 3yrs. Therefore it is important to have sufficient capacity in the network. Typically all ground works (ducts) are complete for all three phases, additional tubes and fibre can be added as we move through the phases and align ourselves with demands.

We need to get a Fibre connection from the CO to the Client, this is achieved via a lattice of multi microtube and OSP Cabinets (Pedestals). So we now have a physical tube connection from the CO to the demarcation box. Typically we will have a primary fibre from the CO ODF terminating at the OSP pedestal where we will split the fibre either 16 or 32. This will enable 16-32 client connections. We have a tube running from the Pedestal to each property terminating at a demarcation box. The network from the CO to the demarcation box is Passive - PON (Passive Optical Network)

Each pedestal has a minimum of 4 primary fibres from the CO. Giving capacity, flexibility and redundancy. These additional fibres may also be used for other activities associated with the park such as CCTV / Barrier control / NPR etc.

Traditional methods are used to deploy the tubes. These are pulled in via draw ropes to each location. Specific tubes are dropped off and terminated via inline connectors and extension tubes. This continues and is replicated across the site.

When an OSP is deployed with terminated tubes and secure, we are now ready to Blow EPFU (Enhance Performance Fibre Units) down the tubes. This will entail primary and secondary fibres. All primary fibres are blown from the CO. However, all secondary fibres are blown from the OSP to client location.

All fibre connections are fusion spliced



Technical Services and Support

During the planning process we worked closely with a number of potential suppliers of Optical Connectivity products. But it was Micos www.micostelcom.com range of products that provided a cost effective solution for our particular FTTL (Fibre To The Lodge) network.

The Micos product range is stocked and distributed through **Cable Management Warehouse (CMW)**. The CMW technical services fibre division provided on the ground support for product selection installation, test and commission.

Product Selection

External Optical Closure – SNM 288

Optical closure designed for placement of up to 288 fibres. Wall mounted with good fibre management for splice and patch. Easy removal of ODF to enable easy access and splicing of fibres. Two of these units are installed at the old reception area. Unit 1 to feed the primary fibre to the GPON pedestals the 2nd unit to provide primary fibres to a new fibre distribution centre. An added complication here was the need for the SNM 288 to be on Umbilical Cord/s, waiting erection of new Central Office.

Optical Overground Closure – SNM 48/72/144

Optical closure designed to terminate and manage 48/72/144 fibres. Quick easy deployment with duct access underground. Ideal for bringing in and securing feeder and distribution tubes. Easy removal of ODF to enable easy access and splicing of fibres.

Demarcation box-ORM3

External demarcation box complete with splice tray and fibre management. Accepts 3/5mm tubing presents customer connection via armoured patch cord.

Optical Splitters PLC (Planar Lightwave Circuits)

PLC splitters with SCAPC connectors for reduced back reflection. Used a combination of 4/8/16 way splits. The 4 & 8 way splits used at the head end with the 16 fibre downstream for client splits.

Armoured Patch Cord

Simplex SCAPC patch cord with spiral steel armour to protect against rodent attack

EPFU (Enhance Performance Fibre Unit)

G657 fibre unit both 4 & 12 used for both primary and secondary connections. Easy to strip good blowing performance.

LCAPC Pigtailed (900u)

Small form factor connector higher packing density in CO / ODF. APC for reduced reflection. Easy strip buffer.

SCAPC Pigtailed (900u)

Active and PLC splitters are supplied in SCAPC hence the need for SCAPC pigtailed. APC for reduced reflection. Easy strip buffer.

Technical Specs

Description	Part Code	Specification Link
Optical Closure	85N4.80/0000F-CON	
Pedestal	8588.80/S100F	SNM 48 SIS Datasheet
Closure	85K3.40/0000F	ORM 3 SL 12S-SH 24S Datasheet
Optical Splitters	FPLC1-16SCASCA	
Armoured Patch Cord	FPCS9SCASCA-ARM-10	
EPFU 4	F-OSM-04C-CFU	
EPFU 12	F-OSM-12C-CFU	
Micro Tube 2	F-B-TUBE-2W-5MM-EXT	
Micro tube 4	F-B-TUBE-4W-5MM-EXT	
Micro tube 7	F-B-TUBE-7W-5MM-EXT	

Conclusion

GPON technology has the flexibility to develop and migrate as demands grow within a campus/village small convection environment. It also has the added advantage to better manage and stage capital expenditure, aligned with a project programme. GPON Technology continues to develop and evolve giving rise to improved functionality, better control and it is more accessible and manageable. The cost per OLTE port is very competitive given that 1 port can deliver services to 64-128 clients.

It is important that we ultimately understand what the client expects. If the client is investing £500K in a Luxury Holiday Lodge then we must have the capability to provide Ultra-Fast broadband, there can be no compromise.

Tel: +44 (0)1234 848030

Cable Management Warehouse Ltd, Units 5/6 Arkwright Road Industrial Estate, Bedford, MK42 0LQ

