Systems & Network Training

Essential GPON and FTTx networks

A 5 day Hands on training course

Save on expenses. This course is also available on your premises.

Description

Designed to benefit those requiring an in depth knowledge of the principles and applications of Ten Gigabit and Gigabit Passive Optical Networking and Fibre to the X in NG Networks applications and their associated equipment, its flexibility and function within a modern transmission network.

Using an effective mix of “hands on” equipment instruction and correlation to theory based learning the delegate will gain a complete understanding of the equipment and the tasks to be undertaken in a real life situation.

Key outcomes

By the end of the course delegates will be able to:

- ✔ Compare PON/FTTx systems.
- ✔ Explain network elements and designs.
- ✔ Support applications and network interfaces.
- ✔ List circuit provisioning and bandwidth requirements.
- ✔ Understand upstream & downstream issues.
- ✔ Describe headend & network elements/OLT-ONT.
- ✔ Perform network testing with OTDR test sets.

Training Approach

This structured course uses Instructor Led Training to provide the best possible learning experience. Small class sizes ensure students benefit from our engaging and interactive style of teaching with delegates encouraged to ask questions throughout the course. Quizzes follow each major section allowing checking of learning. Hands on sessions are used throughout to allow delegates to consolidate their new skills.

Details

Who will benefit?
Anyone working with GPON and FTTx.

Prerequisites
Introduction to data communications and networking.

Duration: 5 days

Overall rating: ★★★★★

Generic Training	Small Class Sizes	Hands On Training	Our Courseware	Customise Your Course
Generic training compliments product specific courses covering the complete picture of all relevant devices including the protocols “on the wire”.	We limit our maximum class size to 8 delegates; often we have less than this. This ensures optimal interactivity between delegates and instructor.	The majority of our courses use hands on sessions to reinforce the theory.	We write our own courses; courseware does not just consist of slides and our slides are diagrams not bullet point text.	Please contact us if you would like a course to be customised to meet your specific requirements. Have the course your way.
“*Friendly environment with expert teaching that teaches the why before the how.”* G.C. Fasthosts	*“Excellent course. The small class size was a great benefit...”* M.B. IBM	*“Not many courses have practice added to it. Normally just the theoretical stuff is covered.”* J.W. Vodafone	*“Comprehensive materials that made the course easy to follow and will be used as a reference point.”* V.B. Rockwell Collins	*“I was very impressed by the combination of practical and theory. Very informative. Friendly approachable environment, lots of hands on.”* S.R. Qinetiq

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Course Content

FTTN, FTTC, FTTH: SMF, MMF, Fibre safety and properties (dispersion/attenuation), Fibre reel cables and types, Fibre installation and air blown fibre, Transmitters and receivers – power budget/laser classes. Fibre to the home (FTTH), FTTC (Fibre to the Cabinet), FTTN (Fibre to the node) , FTTD (Fibre to the desk), FFTH topologies and wavelengths, Active or passive optical network.
WDM equipment and GPON OSP design: Wavelength considerations, WDM/DWDM/CWDM, EDFA optical amplification, AWG (Arrayed Waveguide Grating) splitters , Couplers (splitters) and losses, Optical splitters 1x2, 1x4, 1x8, 1x16, 1x32, 1x64, 2x64.
PON variants: Gigabit passive optical network (GPON), Gigabit Ethernet passive optical network (GEPON), Time division PON (TDM-PON), Wave Division Multiplexing PON (WDM-PON), 1Gbps, 10Gbps, 40Ggps, 100Gbps FSAN (Full Service Access Network) NGA (Next Generation Access), Strategies for TDM-PON to WDM-PON migration, Architecture of NG-PON (hybrid WDM/ TDM PON), Additional services than triple play.
GPON design: GPON OSP centralized and distributed design, GPON PON splitters x4 x8 x32, Fibre splice trays /cassette trays & enclosures, GPON field testing and installation verification, GPON physical layer testing, Optical time domain reflectometer (OTDR), Optical power source & meter, Optical return loss (ORL), APON/ BPON/GPON/EPON comparisons.
GPON ITU-T G.984.1: Reference model, terminology & architecture, Access network system management functions. ONT & OLT functional block examples. FTTx scenarios, 4 switching arrangements for external access network backup.
GPON ITU-T G.984.2: Physical layer, Enhancement band, Bit rate and wavelengths, FEC and RAMAN.
GPON ITU-T G.984.3: Frame structure, GPON encapsulation method (GEM), GTC adaptation and framing sublayer protocol stack, Status reporting & traffic monitoring DBA (SR-DBA & TM-DBA), Transmission container (T-CONT) types, Downstream & upstream multiplexing, GEM port identifier, Media access control and ONU registration, Extended bandwidth assignment model scheduling architecture, PLOAM & alarm messages, Downstream & Upstream FEC, Process order in a GTC transmit flow.
GPON ITU-T G.984.4 and G.988 ONT management and control interface (OMCI): Management interface, Reference model, Typical ONT with SCTE 55-1 or SCTE 55-2 compliancy.
GPON ITU-T G.984.5 enhancement band: Band options, GPON NGA, Wavelength allocation.
GPON ITU-T G.984.6 optical reach extension (G.984.re): Reach extension (RE), OA-based and OEO-based reach extenders, Protection, Reach extender with OTDR blocking filters (BF) and bypass (BYP) filters.
GPON ITU-T G.984.7 long reach: Quiet Window.
10-GPON ITU-T G.987.1 (XG-PON): Scenarios, reference access network architecture, XG-PON with G-PON through WDM1r, G-PON and XG-PON wavelength allocation, G-PON and XG-PON co-existence with video overlay option, RE migration scenarios.
G.989 40Gbps XG-PON2: Functional reference architecture, NG-PON2 system coexistence with legacy systems, Definitions of legacy compatibility terminology.
GPON issues and standards: GPON components GPON OLT / GPON ONT, GPON management, Operational support systems (OSS), Network management systems (NMS), OMCI (ONT Management control interface), RG (Residential gateway), Data and prioritised voice channel product, GPON broadband-forum standards, Broadband-forum , TR-069 and TR-156, HPNA (home phone network alliance), Powerline carrier (PLC), GPON DLNI G.hn or G.9960, MOCA, FTTH council certification standard for network certification. Fibre-connected home badge, Ethernet in the first mile (EFM), GPON frame synchronization to network timing, Direct clock synchronization interface (BITS), Multiservice access platform (MSAP), Software planning tool, Superconnected cities / voucher scheme.
Hands on practical assignments: Single and multimode fibre recognition, Fibre Cleaning methods, Checking cleaning with an optical microscope, Optical light source and optical power meter referencing, PON splitter and fibre drum testing with an optical power meter, 6km classroom passive optical network testing with an OTDR at 1310/1550nm, Using decibels (dB's) and decibel milliwats (dBm's), Designing networks up to 20km long using vendor specifications (power budget), Fault finding with a visible fault locator.