



smartoptics
It's really simple!

Active
WDM Networking

Company Introduction

SmartOptics designs and markets all types of fibre optical transmission products. Headquartered in Oslo, Norway, we serve Storage, Data and Telecom Networks worldwide with a unique and cost effective portfolio of optical transmission components & Systems.

Customers are turning to SmartOptics because we have a product portfolio which allows them to build the most cost effective and reliable transmission networks possible. Whilst our customers are experts in their fields, they still appreciate the valuable knowledge and experience that SmartOptics offers for optical transmission solutions.

Optical transmission projects have historically been prohibitively expensive and complicated, but Smartoptics products allow solutions which are simple to design and easy to install.

The T-Series consists of a comprehensive range of active and passive WDM solutions to suit all network requirements in an incredibly compact form factor resulting in low space and power requirements.

SmartOptics products now make optical networking, especially 4G, 8G and 10G connectivity, simple and affordable.

Product portfolio:

C/DWDM transmission systems

- 32 x 10Gbps DWDM
- 128 x 1G Ethernet connections
- 32 x 4G Fibre Channel connections
- 16 x 8G Fibre Channel connections
- down to 2 Mbps

Passive WDM network solutions

- C/DWDM Mux/Demux and OADM units
- 19" or 23" rack mountable
- CWDM and DWDM for indoor and outdoor environments

Optical & electrical transceivers

- all bit rates
- all distances
- all form factors

Storage Networking

- 32 x 4G Fibre Channel DWDM
- 16 x 4G Fibre Channel CWDM
- 16 x 8G Fibre Channel CWDM

Terje Hallan, CEO



T-4400 & T-4900 Series

Introduction

The T-4400 and T-4900 product families are ultra compact optical transmission systems used for WDM networking and distance extension applications. They fulfill all Telecom and Datacom requirements and define a new level of compact multifunctional solutions.

The T-4408 handles all data-rates from 2 Mbps up to 4.25 Gbps, including:

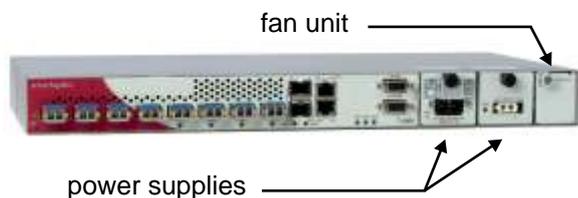
- Gigabit Ethernet
- 4x/2x/1x Fibre Channel/FICON
- SDH STM-16/4/1
- SONET OC-48/12/3
- DVB-ASI, SNTF

The T-4900 handles all data-rates from 9.94 Gbps up to 10.8 Gbps, including:

- 10G Ethernet
- 10G Fibre Channel
- SDH STM-64/SONET OC-192

Ultra compact building practise

Each platform is an ETSI-300 compliant 1U pizza box with 2 redundant and hot pluggable power supplies and 1 pluggable fan unit with 4 fans.



19"-, 23"-rack brackets and fiber management trays are available to ensure easy setup. The power supplies are redundant and hot-swappable. -48 VDC and 120/240 VAC power supplies can be used simultaneously.



Element Management System (EMS)

Each element has an embedded web server and SNMP agent. The network elements can be accessed via RS232, 10/100 Base-T Ethernet or optical 100Base Ethernet.

Multiple users and user levels are available, eg administrator or guest, giving a clear demarcation between configuration and monitoring levels for large scale implementations.

The firmware on the T-4400 and T-4900 series consists of dual images in the units and offers a "hitless" upgrade path for the future.

The configuration files can be extracted and stored for backup reasons or to simplify installation of multiple units.

The units also support:

- Additional unit/site information
- Loop backs
- Automatic Protection Switching (APS)
- Event logger
- Alarms
- Native Ethernet and SDH performance monitor
- Optical monitoring Tx & Rx power levels

Each of these functions are monitored or configured via http/GUI or SNMP



External Alarm input

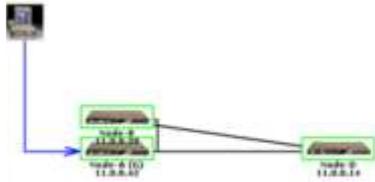
An external alarm input is available to configure and monitor external alarm signals. This removes the need for additional equipment to monitor door alarms for example or other external equipment.



Network Topology

If the optical surveillance channel is being used, the network topology is automatically discovered and a dedicated DCN is generated. If fiber rings or 1+1 connections exist, the RSTP protocol generates a redundant DCN.

If more than one unit is required at site, these units can be stacked together and configured to appear as one site in the network management system. This gives a fast overview about the network topology.



Automated Protection Switching (APS)

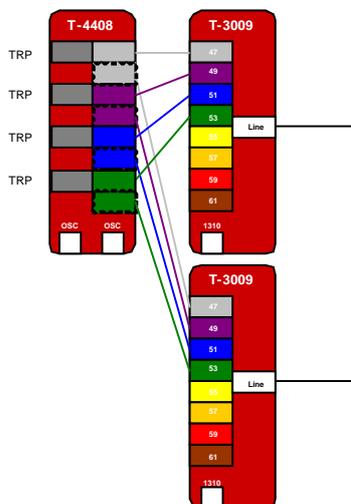
All units offer APS as a standard feature. It is used to configure 1 client port to 2 line ports thus enabling 1+1 line protection.

With fibre breaks accounting for over 95% of all network failures, this feature is essential to service providers who need to offer a guaranteed service connectivity via diverse fiber routes.



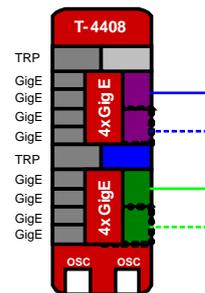
The 8 channel T-4408 unit can offer up to 4 protected services, see figure (above).

The 1+1 line protection divides the connection in a "working line", transporting the traffic in production and a "protection line", transporting the standby traffic. Both paths are constantly monitored and protection switching is done automatically or manually.



TDM aggregation

TDM (Time Division Multiplexing) aggregation functionality is available for aggregating up to four individual Gigabit Ethernet channels onto a single 4.25 Gbps datastream. This feature allows wavelengths to be utilised much more efficiently and a 32 wavelength channel system for example can transport up to 128 Gigabit Ethernet connections.



Aggregation and APS functionality can be combined.

Optical Amplifier - EDFA

The T-4904-Exx and T-EDFA-ExxExx incorporate optical amplifiers and the T-EDFA-ExxExx also has inline dispersion compensation.

The EDFA's can be configured in:

- Automatic Power Control (APC)
- Automatic Gain Control (AGC)

Resulting in the ability to optimize the network for transmission distance or capacity.

Amplifiers are available with maximum optical output powers of:

- +14 dBm (4 channels)
- +17 dBm (8 channels)
- +20 dBm (16 channels)

Performance Monitoring

The T-4408-PM and T-49xx-PM units offer full performance monitoring for Gigabit Ethernet, SDH/SONET and Fibre Channel/FICON.

Full performance monitoring checks the CRC checksum for Gigabit Ethernet and Fibre Channel/FICON traffic data as well as the B0 byte in the SDH/SONET traffic. Operators can now offer a fully managed and monitored service by using the SmartOptics solution.

Product Overview

T-4408



- 8 channel Multirate 100 Mbps – 4.25 Gbps
- STM-1/OC-3, STM-4/OC-12 & STM-16/OC-48
- Fast Ethernet and Gigabit Ethernet
- ESCON, FICON, FC100/200/400
- Video (DVB-ASI), 2.488G/1.244G GPON
- all ports are SFP based (open ports)
- Automatic Protection Switching
- Up to 4 clients can be protected
- Performance Monitoring: Optical Tx and Rx levels

T-4408-PM

- full performance monitoring for SDH/SONET, Gigabit Ethernet and FibreChannel/FICON

T-4902-PM & T-4904-PM



- 2 channel (T-4902-PM)
- 4 channel (T-4904-PM)
- Multirate 9.94 Mbps – 10.52 Gbps
 - STM-64/OC-192
 - 10G Gigabit Ethernet
 - 10G Fibre Channel
- Performance Monitoring
- 2x OSC channel SFP slots
- Automatic Protection Switching

T-4904-PM-Exx

- 1 EDFA with xx dBm optical output power
- xx= +14 dBm, +17 dBm or +20 dBm

T-4904-PM-ExxExx

- 2 EDFA'a with xx dBm optical output power
- xx= +14 dBm, +17 dBm or +20 dBm

T-4900-ExxExx

- 2 EDFA'a with xx dBm optical output power
- xx= +14 dBm, +17 dBm or +20 dBm
- DCM module incorporated

SFP



- CWDM SFPs for up to 200 km transmission distance
- DWDM SFPs for up to 300 km transmission distance
- copper SFP for STM-1, Fast Ethernet & GigE
- 850 nm and 1310 nm client SFPs

XFP



- CWDM XFPs for up to 20 km transmission distance 1270 nm - 1610 nm, 18 channels
- CWDM XFPs for up to 40 km transmission distance 1270 nm - 1330 nm, 4 channels
- DWDM XFPs for up to 160 km transmission distance 40 channels
- DWDM XFPs with FEC for up to 600 km transmission 40 channels

Mux/Demux, OADM and DCM units



- 8/16 channel CWDM Mux/Demux units
- 8/16/32 channel DWDM Mux/Demux units
- 1/2/4 channel Optical Add/Drop Multiplexers (OADM)
- 40, 60, 80 km Dispersion Compensation units (DCU)

Technical Specifications

System

Topology Point-to-Point, OADM and Ring
 Transport Network Metro WDM / dark fiber
 Approvals CE Class B, FCC, RoHS-6

Software upgrade Traffic hitless - dual image
 Protection Facility and Equipment

Optical Amplifier

Applications In-line, Booster
 Output Power +14, +17, +20 dBm
 Gain 10 dB to 20 dB
 Control APC and AGC
 Eye Safety Automatic laser power reduction

Environment

Operating Temp. -5° C to +55° C

Network Management

Management Ports 2x10/100Base-T RJ-45, RS-232 DB-9
 2x 100Base-FX SFP
 Protocols SNMP, FTP, HTTP Web server
 DCN LAN/WAN/VPN
 Management Web server application (GUI)
 Management Channel Optical Supervisory Channel (OSC)
 Visual Indicators LED status indicators for client ports, line interfaces, power, shelf

Power Supply

Characyeristics 120/240 VAC, -48 VDC, <65 Watts
 Redundancy Single or dual feeding, pluggable

Physical Dimensions

Size 45 mm (H) x 440 mm (W) x 313 mm (D)
 Weight 5.5 kg

