Application Note

HUBER+SUHNER Cube Optics

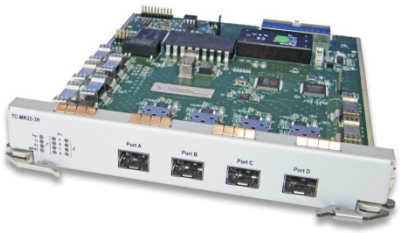
TRANSPORT CUBE for simplicity, security and reliability D-5122

Introduction

Due to existing myriad of network topologies and data transmission standards interoperability has been of utmost importance. Various devices have been developed to enable connection of different networks. The TRANSPORT CUBE series is a carrier grade, cost effective and very flexible modular platform that combines a multi-protocol transport platform for metro applications with optionally build-in test and measurement equipment (OAM and performance monitoring). The TRANSPORT CUBE enables network operators to implement a wide range of signal boosting, media conversions and information security with a comprehensive set of quality of service (QoS) features.

Highlights

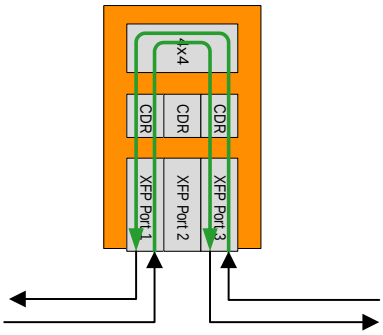
- Extremely simple plug and play installation with user friendly graphical interface.
- High density chassis design with modular structure.
- Supporting multiple services from 10Mbps to 10.7Gbps for Ethernet, SDH, Fiber Channel, OTN, digital video, others.
- Media conversion, repeater (2R/3R), Ethernet demarcation, performance monitoring (QoS), optical protection switching, build-in line protection options.
- Option of amplification (EDFA or SOA) for reach extension.
- Optional encryption for information security.
- Cost efficient carrier-class OAM.
- Highly reliable.



Application : Reach extension

1) Repeating

The TRANSPORT CUBE can be utilized for the applications where the link length is much more than the defined power budget. The TRANSPORT CUBE can be placed as a repeater in the middle of the two locations. It then first converts the incoming optical signal to an electrical signal and performs re-amplifying, reshaping and retiming, commonly known as 3R functions. The electrical signal is then used to drive the laser, which generates the optical signal having the same optical wavelength as the received signal.



2) Amplifying

In addition, reaches may be extended by SOA and EDFA amplifiers which can be used in combination with the transponders or as stand-alone, to boost and / or pre-amp signals. The SOA PREAMPLIFIER Unit extends the reaches of pluggable 40Gbase-LR4 and 100Gbase-LR4 transceivers from 10 to ca. 40km. The DWDM AMPLIFIER Unit is an EDFA which be used for C-band DWDM applications to maximize the transmission reach.

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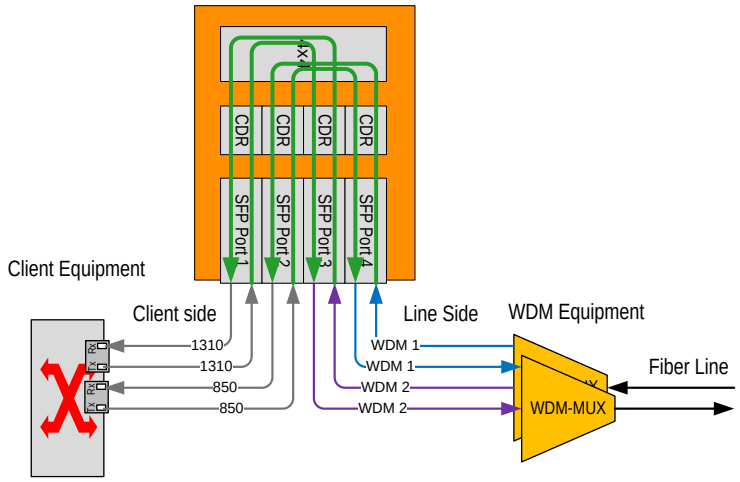
Application : Media and/or WDM Conversion



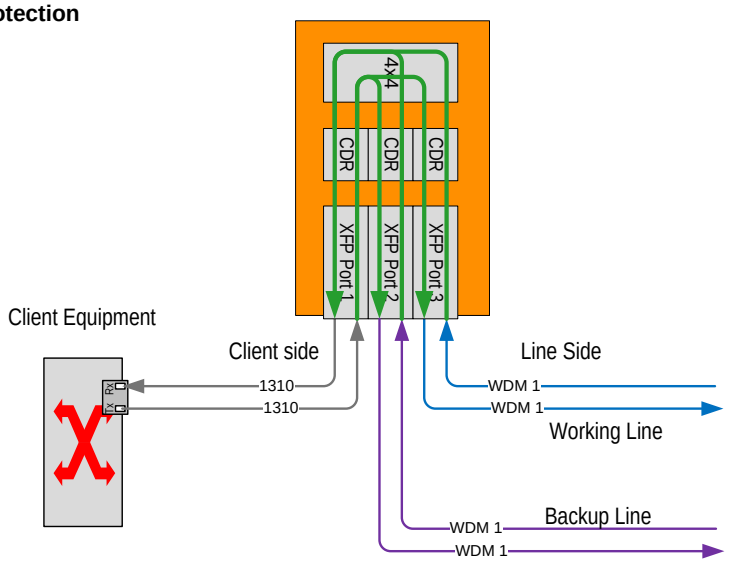
The TRANSPORT CUBE can be utilized for the applications where client utilizes 850nm/ 1310nm multimode or single mode signals and has to be converted to specific CWDM/DWDM wavelengths. The converted signals can then be multiplexed together to transmit into single mode fiber. On the output side, incoming CWDM/DWDM signals are first de-multiplexed and then converted back to 850nm / 1310nm for transport by the customer equipment. The TRANSPORT CUBE can operate in 850nm, 1310/1550nm, CWDM, DWDM wavelengths depending on the transceivers. With the aid of WDM schemes, TRANSPORT CUBE can expand the useable bandwidth of a single optical fiber.

Application : Security

The TRANSPORT CUBE provides the option of information security via Layer 2 encryption for the network. Since this is a hardware level processing the latency is less than having IP security, typically <5us. It requires no extra overhead and is multirate and helps protect the Ethernet against eavesdropping and harmful manipulations.

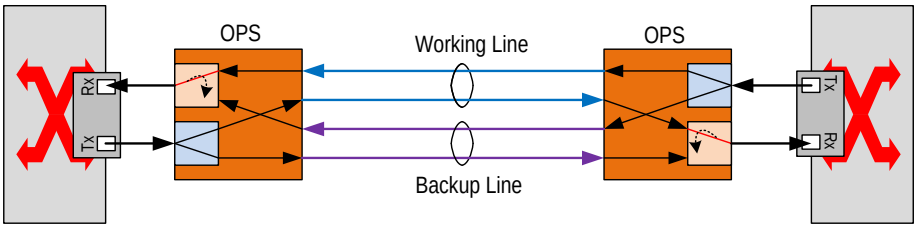
Application : Protection

1) Active Line Protection



The TRANSPORT CUBE provides full automatic, semi-automatic or manual options for fiber switching function to protect the network from service outages. The TRANSPORT CUBE switches with low latency to the backup inactive line at the event that the optical signal is below the defined optical threshold or when the frame loss is high. In the full automatic mode, the switching will be reversed back to the line side once there is no more signal degradation while in semi-automatic and manual options, it has to be done manually.

2) Optical Protection Switch

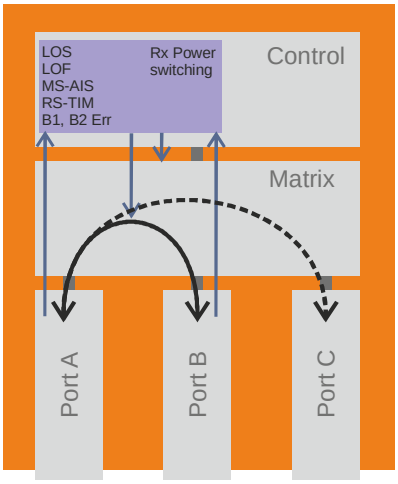


Additionally, an optical protection switch (OPS) can be deployed after the client equipment to protect the client signal. The OPS duplicates the client signal and transmits it on both working and backup lines. At the receiver the OPS switches to the backup line if the optical power in the working line is below a certain threshold preventing from network disruption.

Application : Performance monitoring and Quality of Service (QoS)

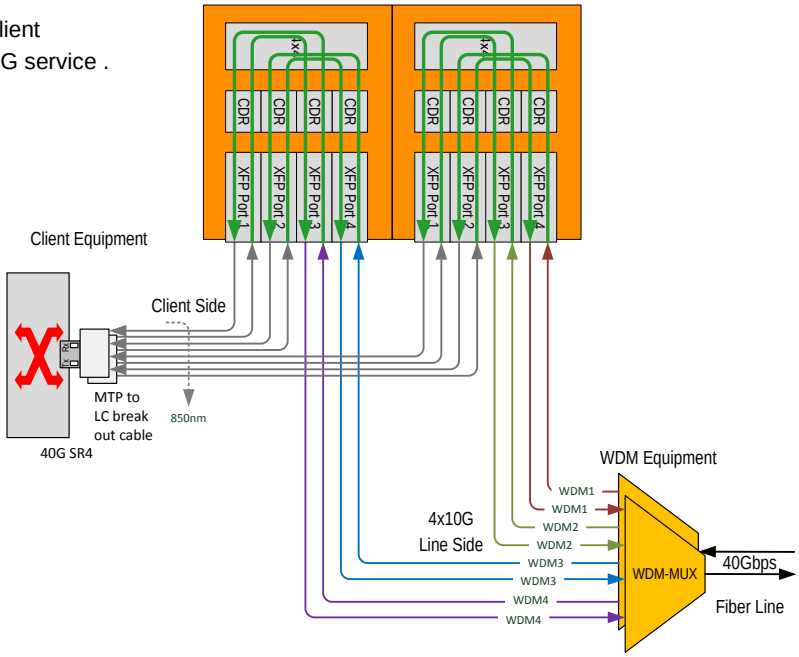
The TRANSPORT CUBE combines all transponder and switching features with OAM events as defined in IEEE 802.3ah and 802.1ag (Ethernet) and with protocol monitoring for SDH (G.826, G.7710). It performs detection and handling of SDH and Ethernet transport layer events such as LOS, LOF, MS-AIS, RS-TIM, B1&B2 parity (SDH); LOS, FCS (Ethernet). These events can be implemented for protection switching decisions.

The transport layer events are mapped to performance monitoring definitions according to G. 826, G.7710 and Y.1563: SES, ES, and BBE. Statistics database is maintained according to G.7710 with 15 minutes or 24 hours containers. Optionally redundant database can be maintained. All of the alarms and events are logged.



Application : 40/100Gbps Metro Service

The TRANSPORT CUBE enables 40/100Gbps metro transmission by translating the 10G SR optics at the client side to DWDM 10G and multiplexing them to a 40/100G service . The 40Gbps service over metro is depicted below.



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is certified according to ISO 9001.

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