FOX660 multiservice utility multiplexer
All in one: PDH / SDH / 10 GbE / MPLS / CES / OTN / WDM

FOX660 is a multiservice platform for utility communication systems, supporting traditional PDH / SDH services but at the same time powerful Ethernet / LAN / MPLS-TP and Circuit Emulation services (CES) features. FOX660 can be equipped with large a number of FE / GE / 10GE-ports providing even OTN – support across xWDM. All services and technologies can be combined with so far unseen flexibility.

Description

FOX660 is a member of ABB's comprehensive FOX Family of utility-proven communication solutions. It is positioned as hybrid TDM / strongly packet oriented high-end multiservice multiplexer, complementing the portfolio of FOX access and transport nodes.

FOX660 combines in an unseen way the transport of mission-critical TDM-based services like teleprotection, high-capacity PDH and SDH connections and Ethernet. It aggregates more functionality, higher capacity and port density on less space than any other utility multiplexer.

All types of network topologies like line, mesh and multiple ring structures are supported and FOX660 offers the unique flexibility to be used either as pure TDM device, as powerful 10 GbE L1 / L2-LAN / MPLS-TP switch or any combination thereof including full redundancy. With Release 4 of FOX660, ABB has added OTN-capabilities increasing traffic efficiency further while keeping the often required service segregation.

Benefits of FOX660

- Complements ABB's existing FOX Family with a migration path towards 10 GbE including Circuit Emulation (CES)
- Flexibility to be used either as pure TDM device, as power-ful L1 / L2-LAN or MPLS-TP switch or any combination thereof
- OTN support enables a next step into a new generation of optical networks
- Fully redundant for carrier-grade availability and reliability for mission-critical applications
- Optimized footprint (2 height units) and high port density
- All ports SFP / XFP based
- Type-tested for harsh utility environment conditions
- Managed by ABB's NMS suite

All in one: PDH / SDH / 10 GbE / MPLS / CES / OTN / WDM

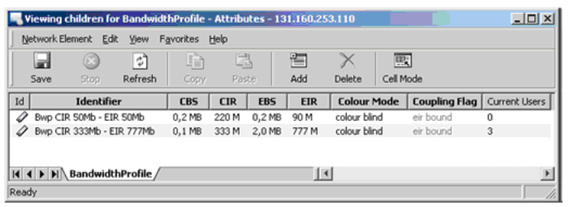
SDH committed to Ethernet

FOX660 is a true multiservice device, combining traditional PDH / SDH with latest Ethernet / LAN technology. Existing TDM systems can be enhanced in capacity, while new LAN-based services can be smoothly added, without compromising mission-critical utility applications such as teleprotection.

Apart from native Ethernet trunks, packet and even MPLS-TP traffic can be transported over the SDH core benefiting from GFP, VCAT and LCAS in terms of guaranteed bandwidth, fast traffic-protection schemes and strict timing.

Depending on the different user groups of an utility network, Ethernet services can be configured either as Ethernet line services in a point-to-point configuration similar to leased lines (EPL: Ethernet Private Line), e. g. for interconnecting two SCADA control centers via TASE.2 / ICCP. Another option is the Ethernet LAN service type, which is a multipoint service used to interconnect several locations to create a Wide Area Network (WAN), e. g. for RTU front-end communication.

More sophisticated network types and services can be created by using VLAN, VPN and MPLS features supported by FOX660. Utilities considering to offer SLA-based LAN / WAN services to third parties will benefit from FOX660's features of bandwidth policing with profiles like CIR / CBS and ingress rate limitations with granularities from 500 kbps up to 10 Mbps depending on the chosen LAN interface (FE / GbE / 10 GbE).



Ready for IEC 61850

FOX660 is like all other recent FOX Family members ready to cope with IEC 61850-related requirements. The extension of the initial substation-oriented set of functionalities to applications and communication between substations and between substations and control center increases the need for highly reliable and performance-wise predictable communication networks. With its strong EoS features, FOX is the ideal solution to carry time-critical GOOSE- and SV messages. Latest synchronous Ethernet features and IEEE 1588v2 open the door for new time critical applications, where timing and time distribution across packet services are key.

Full redundancy and protection

FOX660 commits to full redundancy. All functionalities can be protected by an 1:1 scheme. Service modules carrying electrical user traffic (e. g. E1, E3) can be equipped in a redundant way. Duplicated system controllers carrying the cross-connect, data-switch and the controller functionality provide total protection to each other. Their optical interfaces support all common SDH / LAN protection schemes.

The -48VDC supplies can be connected redundantly as well, either to two system controllers or to one of them plus dedicated power connector module. They feed all other individual modules over duplicated power rails on the backplane. Each board generates the required operational voltages locally. In case of failure of an optical interface port, the SFP can be replaced on the fly; no board replacement is required. FOX660's redundancy concept and modularity minimizes repair times and stock-holding costs and guarantees at the same time an availability of > 99.999 %.

MPLS-TP and circuit emulation included

IP / MPLS implementations often do not fit the utilities real requirements for various reasons, while MPLS-TP as implemented on FOX660 meets their needs.

It combines the reliability of SDH to guarantee QoS, the flexibility of a connection-oriented protocol and eliminates shortcomings of IP / MPLS. In combination with latest circuit emulation functionality of FOX660, MPLS-TP offers an unseen level of flexibility packed into in a single equipment. No other utility-oriented device allows such smooth, uncompromising transition from the TDM into the packet world.

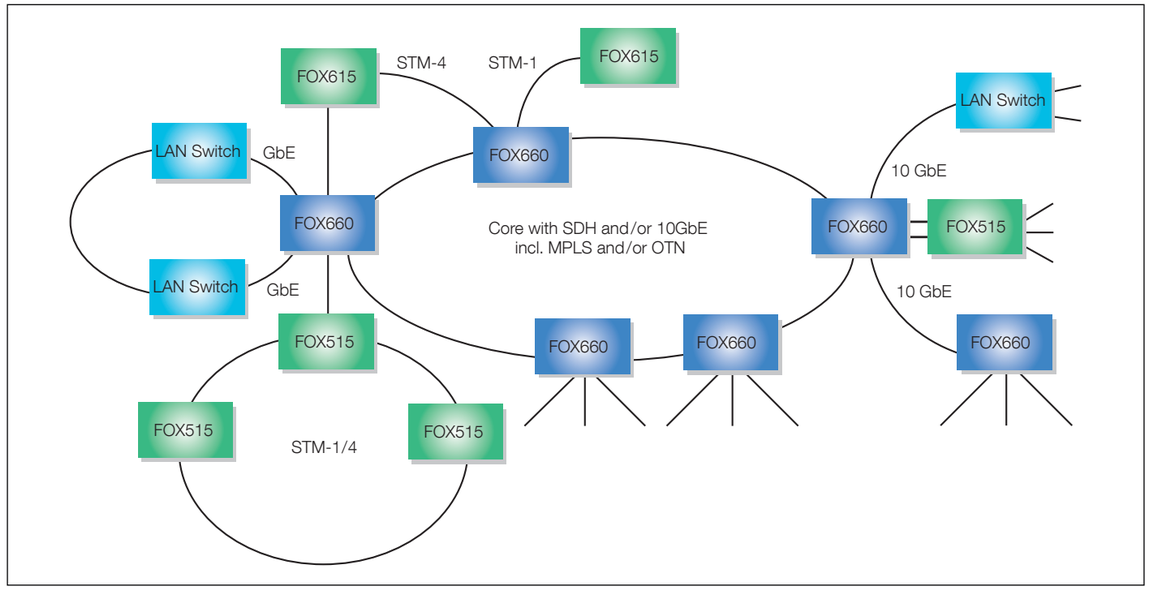
OTN adds new network dimensions

FOX660 provides a range of OTN interfaces supporting ODU0 / 1 / 2 / 2e. These allow transporting native SDH- & packet-streams in a structure agnostic across xWDM trunks. The same interfaces can be operated in muxponder- as well as in transponder mode adding additional flexibility.

NMS suite for overall network management

All members of the FOX Family are managed by ABB's network management suite. In hybrid networks with combinations of fiber optics, power line carrier technology, teleprotection or even radio applications, all network elements can be managed from a single NMS.

Merging 10 GbE LANs and SDH



The flexibility of the FOX Family allows optimizing utility networks with any kind of topology.
Traditional TDM services including teleprotection can be combined with LAN / MPLS applications over FE / GbE / 10GbE and OTN

Technical key parameters

General

The device is designed to meet the appropriate sections of recommendations ITU-T G.703, G.704, G.707, G.783, G.957, G.7041, G.7042, G.841, G.842, G.694.2, G.813, G.8261, Y.1731, G.8032, ISDN PRA, IEEE 802.1D, 802.1Q (ad, ag, ah, Qay), 802.3, 802.3 ah, IEEE 1588v2, MEF 3, 8, 10.1, 11 and 22, RFC 2328, 2474, 3147, 3916, 4553, 4664, 4665. The FOX660 is certified for MEF 9 and 14; OTN-support acc. ITU-T G.709

Electrical interfaces

63 x E1: LFH connector
E3 / T3 (34 / 45 Mbit / s) 75 Ohm: 1.0 / 2.3 connector
STM-1e (155 Mbit / s) 75 Ohm: 1.0 / 2.3 connector
Ethernet / LAN: RJ45 (for local management)

Optical interfaces (all SFP / XFP-based)

STM-1 / STM-4 / STM-16 / multirate
Ethernet / LAN 100BaseFX, 100BaseLX10,
1000 BaseSX / LX / ZX
10 GE BaseSR / ER / LR, Fully WDM-compatible

Synchronization

Sources STM-N, E1, external 2 Mbit / s or 2 MHz
Output 2 Mbit / s or 2 MHz
Internal / holdover
Synchronous Ethernet and IEEE 1588v2

Power (distributed power concept)

DC -48VDC (±15 %) or -60VDC (±15 %) Dissipation max. 450 W

EMC / safety / temperature

EMC EN 55022 / IEC 61000-4 / EN 300386
Safety EN 60950 and EN 60825
Typical operating temperature acc. ETS 300 019-1-3,
(equipment type-tested at > 55°C)

Mechanics

Dimensions (H x W x D) 88 x 445 x 240 mm (2U for 19")

Technical data

List of abbreviations	
10 GbE	Ethernet with 10 Gigabit/sec capacity
ADM	Add-drop Multiplexer
CBS	Committed Burst Size
CES	Circuit Emulation Services
CIR	Committed Information Rate
DCC	Data Communication Channel
EoS	Ethernet over SDH (with GFP/VCAT/LCAS)
GbE	Gigabit Ethernet
GFP	Generic Framing Procedure
GOOSE	Generic Object-Oriented Substation Events
ICCP	Inter-Control Center Communications Protocol
IP	Internet Protocol
LAN	Local Area Network
LCAS	Link Capacity Adjustment Scheme
MPLS-TP	Multiprotocol Label Switching/Transport Profile
MSP	Multiplex Section Protection
NMS	Network Management System
OTN	Optical Transport Network
PABX	Private Automatic Branch eXchange
PDH	Plesiochronous Digital Hierarchy
QoS	Quality of Service
SDH	Synchronous Digital Hierarchy
SFP	Small Form-Factor Pluggable
SLA	Service Level Agreement
SNCP	Subnetwork Connection Protection
SNMP	Simple Network Management Protocol
SV	Sampled Value
TASE.2	Telecontrol Application Service Element 2
TDM	Time Division Multiplexing
TM	Terminal Multiplexer
VCAT	Virtual Concatenation
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
WDM	Wavelength Division Multiplexing

For more information please contact:

ABB Switzerland Ltd
Power Systems
Bruggerstrasse 72
5400 Baden, Switzerland
Phone: +41 58 589 37 35
Phone: +41 58 585 77 44
Fax: +41 58 585 55 77
e-mail: communication.networks@ch.abb.com

www.abb.com/communicationnetworks

Power and productivity
for a better world™

1KHA-001334 – SEN 1000 – 04/13 – Printed in Switzerland