

## FOX615 - CESM3

### High-capacity core unit for FOX615 platform



Delivering scalable packet networks with outstanding performance, CESM3 is the new core unit for FOX615 platform with increased packet switched capacity and enhanced timing/synchronization.

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01 CESM3

CESM3 addresses the needs for large-scale packet (MPLS-TP) operational utility networks, offering up to 4 x 10 Gbit/s MPLS-TP ports per unit or 8 x 10 Gbit/s per FOX615/612. CESM3 increases FOX615 packet switching capacity and supported MPLS-TP resources by multifold. Similar to CESM1/2, CESM3 performs all node management functions of the FOX615/612 and the data transport for the packet traffic. CESM3 fully supports the hybrid approach of FOX615 enabling parallel SDH and MPLS-TP networks and a smooth migration from SDH to MPLS-TP.

FOX615/FOX612 is ABB's multiservice platform made for highly demanding and harsh utility environment. Platform's truly hybrid approach allows a smooth migration from traditional TDM to scalable Packet Switched Networks. Mission critical services with strict timing constraints must be transmitted in a highly secure and reliable manner along with IP-based applications. The new central card CESM3 brings increased MPLS-TP capacity into the chassis, which makes it suitable for large-scale MPLS-TP networks. CESM3 delivers high-precision timing (frequency, phase, and time) and synchronization with the in built Stratum 3E oscillator. This ensures excellent time accuracy also during network resynchronization phases. CESM3-based networking solution uniquely addresses emerging network timing and synchronization concepts for electrical grid application needs.

# Key Features

Key features and benefits of the new CESM3 core unit for FOX615:

- Enabling large-scale packet (MPLS-TP) networks
- 4x 10G/GbE front interfaces via SFP+/SFP and 1x 100/1000Base-T Electrical front port
- Up-to 146 Gbps switching core unit capacity for external and internal traffic on FOX615 variants
- Multifold increase in number of supported LSP and VPLS instances compared to CESM1/2
- High-capacity hardware-based BFD for high-capacity traffic supervision and guaranteed 50 ms switchover times
- 10 Gbit/s access to 5 service units for broadband applications
- Delivering network timing and synchronization with highest accuracy and precision, supporting:
  - PTP IEEE1588v2 boundary clock, ordinary clock and transparent clock at the same time
  - Synchronous Ethernet
  - Highest precision phase and frequency with exceptional stability for extended holdover times in case of network rerouting
  - Network clock concepts with exceptional resiliency and stability
- Smooth legacy migration to packet (as CESM1/2 core unit)
- True hybrid of advanced packet and legacy (TDM) technologies and applications
- OSPF routing for management traffic (as CESM1/2 core unit)
- Fully interoperable with CESM1/2
- Hardware-based equipment and 1:1 path protection with < 50 ms switchover times

## MPLS-TP Transport

To build large-scale packet networks, CESM3 provides MPLS-TP enhanced functionality. MPLS-TP allows provisioning of explicit co-routed bidirectional connection-oriented path-protection (1:1) and restoration mechanisms (below 50 ms), comprehensive set of functions for operation and maintenance of a network without a dynamic control plane and IP forwarding. Additionally MPLS-TP provides end-to-end channel supervision. CESM3 can function as Label Edge Router LER or as Label Switch Router LSR, or as a combination of both.

## Interfaces

CESM3 provides transport of packet-based data streams via MPLS-TP. For that, the unit provides four 10G/GbE front interfaces by means of SFP+/SFP admission as well as a further electrical FE/GbE interface. Active or redundant 1:1 transport paths can be realized via these interfaces.

### 1:1 Equipment Protection

CESM3 can be installed redundantly in the chassis. In this configuration, one CESM3 is in standby mode and takes over operation in case a failure occurs in the active unit. This mechanism ensures highest availability of the system. The component redundancy covers the packet data layer, timing and synchronization as well as network element management.

### Operation, Administration and Maintenance (OAM)

CESM3 provides hardware-supported OAM functions, proactively or on demand. OAM functions include delay measurements, continuity verification VF/LSP Ping and route tracing TR etc. These functions ensure the availability and quality of service of data paths, enabling the operator in trouble-shooting.

### Timing and Synchronization

The timing and synchronization functionality contains two 2,048 kHz reference clock inputs and outputs. The front ports support Synchronous Ethernet (SyncE) and IEEE-1588v2 PTP. These options allow for synchronous timing and a very high timing precision of sub-microseconds that are required for various applications.

### Management

All FOX615 functions are managed centrally via the management system FOXMAN-UN or via a local craft terminal (graphic configuration tool FOXCST).

# Technical data

Interfaces CESM3	
Optical	4 x 10G with SFP+ modules / GbE with SFP modules
Electrical	1 x FE / GbE
Management	1x 10/100/1,000 Mbit/s electrical local management interface (RJ45)
Backplane	Access to the GbE and 10 G stars (5x) in Fox615/612 chassis

Packet Data Functions CESM3	
MPLS-TP	MPLS-TP function in accordance with IETF RFC5921 Deterministic (static) LSP/PW configuration without application of control plane protocols Co-routed bidirectional LSP support 1:1 linear protection, switching time below 50 ms
L2 VPN	Virtual Private Wire Service VPWS (point-to-point) up to 2000 instances Virtual Private LAN Service VPLS (multipoint) up to 100 instances Hierarchical VPLS H-VPLS
VLAN services	In accordance with IEEE 802.1Q, 4096 VLANs are supported Port-/PCP-/DSCP-based classification (CoS) of the ingress traffic

Timing and Synchronization	
Synchronization sources	Local oscillator on CESM3 or SDH or Circuit emulation units External 2.048 MHz synchronization inputs Synchronous Ethernet on CESM3 front interfaces IEEE1588v2 on CESM3 front interfaces Local SETS function of a SDH component
SyncE	Synchronous Ethernet in accordance with ITU-T G.8262 ESMC Ethernet Synchronization Messaging Channel in accordance with ITU-T G.8264
PTP	Precision Time Protocol Version 2 in accordance with IEEE 1588-2008 Stratum 3E oscillator ± 0.01ppm/24h
OAM	BFD from 3.3ms up to 1000ms, 500 sessions Continuity check CC, remote defect indication RDI, LSP Ping/ continuity verification CV, delay measurement DM

Management CESM3	
General functions	Management and monitoring of the chassis and the Line-Cards Database with management information, Embedded-Software Download Storage and display of internal and external alarms (alarm input and output) OSPF-routing for management data, management via PDH/SDH ECC and MPLS MCC
FOXCST	For local management system
FOXMAN-UN	For central management system

Power Supply	
Input voltage nominal (min/max)	-48/-60 V DC (-39.5 V DC ... -72 V DC)

Operation Environment	
Temperature range and humidity	According to FOX615 environmental specifications

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