

## FOX615 SENC1

Quantum-Safe end-to-end encryption for mission-critical real-time communication networks



The encryption card SENC1 secures data transfer in critical infrastructures. It is used in mission-critical real-time applications for controlling and monitoring energy networks.

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01 FOX615 SENC1 4 port version (left) and 8 port version (right)

- Offers end-to-end encryption against cyber-attacks in packet-based transport networks (MPLS-TP)
- Includes an integrated QRNG (Quantum Random Number Generator) for the Quantum-Safe user data encryption.
- 4 (8) x SFP+ 1/10 GbE ports per encryption unit
- Causes near zero delay in PTP (Precision Time Protocol IEEE1588) packets
- Tamper-protected to prevent mechanical manipulation

### Overview

For the encryption card on the FOX615 platform, ABB uses a hardware-based QRNG (Quantum Random Number Generator) to generate highly secure keys that really are random. The basis for the trustworthy and protected distribution of keys is provided by a centralized and decentralized generation of keys.

There is no single-point-of-failure and all nodes can securely communicate with one another.

This permanent-encryption method offered by ABB prevents the creation of so-called network islands.

SENC1 encrypts the complete network traffic end-to-end natively on layer 2.5 in MPLS-TP transport networks with ultra low latency times of under four micro-seconds. The card is characterized by parallel high-security end-to-end encryption in mission-critical networks and ensuring very high data availability while providing precise timing.

### Highly secure encryption

Encryption and authentication is done through the most secure, state-of-the-art, verified and recommended algorithms currently available to guarantee maximum security.

- Master key (session key encryption)
- Session key (user traffic encryption)
- The Atomic master key exchange without interruption.

For symmetrical encryption, the AES-GCM (Galois Counter Mode) encryption and authentication algorithm with a key length of 256 bit is applied. The session keys are updated every 60 seconds and offer fully automatic key management based on the “set and forget” principle.

**Failsafe operation**

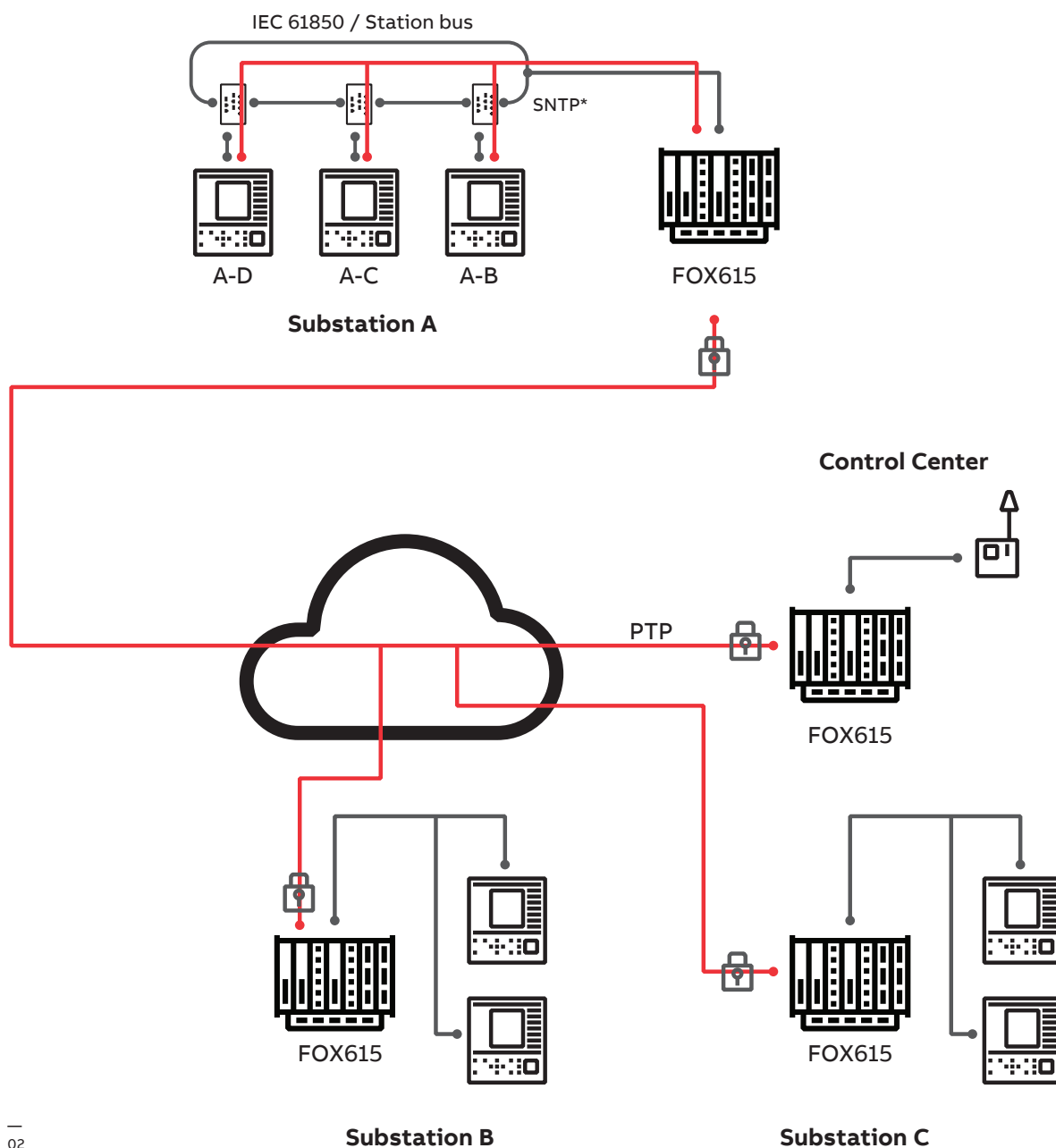
Failsafe operation plays a vital role in mission-critical networks. Therefore the card can be operated in a redundant setup.

**High compatibility**

The SENC1 can easily be integrated into existing networks. No adjustments of network structures nor changes on end devices are required.

**ABB “Trusted Security”**

In the framework of its “Trusted Security” concept, ABB researches, develops and produces in Switzerland and in Europe. ABB Trusted Security includes meeting the highest security requirements, certified employees, a central management of data transfer systems as well as deploying encryption technologies. ABB systems fulfill the applicable standards of the industry and comply with the high requirements operators of mission-critical networks have with respect to high availability and low maintenance.





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03 Easy integration into existing networks

## Technical Data

### Hardware

4-port (SENC1-4) and 8-port (SENC1-8) hardware version

FPGA based

Fanless version available (SENC1F4, SENC1F8)

### Interfaces

SENC1-4 - 4x 1/10 GbE optical ports (2x encrypt, 2x decrypt)

SENC1-8 - 8x 1/10 GbE optical ports (4x encrypt, 4x decrypt)

1 GbE electrical front port and backplane connection for management

### Data throughput

Up to 10 Gbps

### Timing

Latency of user traffic <4  $\mu$ s Delay variation <50 ns (including PTP packets)  
Jitter and wander Transparent through-timing. PLL bandwidth 50 Hz

### Quantum Random Number Generator (QRNG)

Optical component from ID Quantique

Random numbers for AES-256 encrypted session keys

Truly random

Up to 1.5 Mbit/s

### Tamper Protection

Tamper-protected features to prevent mechanical manipulation

Fully covered through metal plates

Tamper action secured by local on-board battery with >20 years life-time (changeable)

### Encryption Features

MPLS-based Encryption Layer 2.5 (MPLS-TP)

End-to-End encryption of up to 2048 SENC1-4 (4096 SENC1-8) MPLS-TP tunnels

### Management Communication Key

Encryption and authentication of all communication between the DIRAC server and encryption devices (including transmission of the master key)  
-Post-Quantum Cryptography ready.

### Master Key

For session key encryption and automatic tunnel deployment. Encryption and authentication with AES-CTR Key length: 256 bit  
Key change: manual, non-disruptive.

### Session Key

User traffic encryption. Encryption and authentication with AES-GCM (Galois Counter Mode) Key length: 256 bit  
Key change: automatically min. every 60 seconds, non-disruptive

### 1588v2 PTP compatible

Encrypts PTP packets with near zero delay variation

### Management

#### FOXMAN-UN

Sets up the bidirectional LSP / MPLS tunnels as well as the encryption policy for each tunnel

#### Dirac Server (Software)

The DIRAC server is a centralized key management system and is responsible for the generation and distribution of the Master Keys used by the SENC1 Crypto Engines.

#### Command line interface (CLI)

Configuration, supervision, management and activation of the Dirac server and the encryptors

## Technical Data

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### Power supply

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Input voltage nominal (min/max) -48/-60 V DC (-40.5 V DC ... -72 V DC)

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### Operation environment

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Temperature range and humidity Acc. to FOX615 environmental specifications

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