FOX515 is an universal communication platform based on TDM-technology (time division multiplexing). The modular architecture is supporting:

- SDH up to STM-4 (622Mbit/s) of transport capacity
- PDH for voice and legacy data services
- Specific utility services such as teleprotection interfaces based on IEEE C37.94 or hard-wired commands
- IP/Ethernet services for operational and corporate applications
- Hardware and traffic protection schemes

The utility-grade multiplexer FOX515 is used to build up reliable communication networks for all required utility services.

- As an access multiplexer FOX515 allows to collect all local services and feed them into hi-cap transport equipment building up a nation-wide backbone network.
- As a multi-purpose equipment FOX515 can also provide sufficient capacity to transport the locally collected services throughout the utility communication network. Transmission distances may go over more than 300 km – repeater-less!
FOX515 utility-grade telecommunication platform integrating SDH and PDH in one single equipment.

With highly flexible FOX515 all types of network topologies are supported: Linear, ring and meshed networks.

Such a network allows combined transmission of operational and corporate services – without interference between each other!

FOX515 is handling a full range of standard telecom services, such as
- SDH STM-1 and STM-4 on optical fibers
- Ethernet/IP over SDH
- Legacy data e.g. V.24/28 or RS 232, V.11/X.24, V.35
- Voice communication, subscriber lines FXS/FXO
- Traditional analogue trunk lines 2/4-wire E&M

Offering IP/Ethernet interconnections over SDH (EoS DH), the FOX515 is the basis for ABB's fiber optic network solutions.

Additionally FOX515 is supporting specific interfaces for interconnection of
- Differential protection relays using C37.94 interface
- Protection commands from substation to substation
- Alarm and status signals (binary signals)
No intermediate converters required towards the protection relays.

Network Management System FOXMAN

The powerful Network Management FOXMAN allows to fully supervise the communication network in real time. FOXMAN can configure and upgrade FOX515 nodes remotely.

An optional Networking Package allows to configure complete links end-to-end (trail handling) down to 64kbit/s.

FOXMAN is based on a client-server concept with Linux as operating system for the server.

FOX-family

FOX515 fits perfectly into ABB’s product range of hi-cap FOX multiplexers to build powerful communication networks to transport IT-services and operational services.

FOX515 is part of the extended FOX-family of equipment with upgrading possibilities up to STM-16, STM-64 (10Gbit/s) and Gb-Ethernet (1 and 10Gbit/s).
Specialized for turnkey solutions

Power Utilities

The network on the right shows an STM-16 backbone together with a PDH branch. Such backbones are used to interconnect corporate services and operation centres. FOX515 can be used as an access device for the backbone – with NxE1 or STM-1 interconnections. With FOX515 dedicated operational networks can be set up operating on STM-1 or STM-4 using various protection mechanisms.

Also existing installations on e.g. 8Mbit/s and 2Mbit/s on HDSL copper lines can be integrated in new SDH networks with FOX515. The whole range from 64kbit/s up to 622Mbit/s (STM-4) can still be covered:

All services are fully supported. FOXMAN-Management and UCST Configuration Tool are covering also older equipment generations.

Pipeline Communication

The geographic implementation of a network can be linear rather than ring-like. In such topologies flattened rings can be deployed to connect stations to a ring. Such configurations appear typically along power lines, pipelines, or railway tracks.
Typical railway networks interconnecting main stations with high-capacity back-bones and smaller, less important villages and remotely controlled stations with links of lower bit rates. While only a few signals are needed in remotely controlled stations, traffic increases drastically towards the control centre.

A similar type of communication network is used along pipelines, with pump, compressor stations, and intermediate block valves.

ABB provides solutions with repeaterless links of over 300 km.
**Main features of FOX515**

- Optical transmission on 8Mbit/s, 155Mbit/s (STM-1) and 622Mbit/s (STM-4). All optical SDH ports (STM-1, STM-4) are using SFP components to adapt to different fiber distances.
- Collecting all type of voice and data signals from 0.6kbit/s up to 64kbit/s and 2Mbit/s (E1).
- High capacity IP/Ethernet traffic over SDH, supporting GFP, VCAT and LCAS.
- The PDH part contains a non-blocking cross-connection matrix of 128 x 2Mbit/s with a granularity of 64kbit/s.
- Technical specifications of FOX515 are verified by type-testing procedure witnessed by independent test institutes.
- The network management FOXMAN is connected through multiple routing (using the TCP/IP OSPF-protocol) to all FOX515 nodes.

=> 0.6kbit/s up to 622Mbit/s (STM-4) in one shelf makes FOX515 an outstanding product.

**Features for utility applications (mission-critical)**

FOX515 supports the latest standards for most demanding applications in power utilities

- Electrical and optical interfaces for distance and differential protection (IEEE C37.94)
- SCADA-communication according to IEC 60870-5-104 or -101, DNP3
- Connecting a wide range of ABB teleprotection equipment (NSD570) and protection relays – and also many protection relays from other vendors.

**Redundancy**

- Traffic protection using path protection (PDH), SNCP (SDH) and MSP1+1 protection schemes
- Hardware protection for centralised functions and key modules for voice and data
- Stand-by schemes for management package FOXMAN.

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**Electromagnetic Compatibility (EMC) and Security**

FOX515 is fully complying to

- EN 50082-2, EN 55022 class B
- EN 50081-1 class B
- Safety EN 60950 class V1
- and several IEC 61000 standards
- ANSI/IEEE C37.1 and C37.90

**Mechanical design**

- FOX515: 19" (or ETSI) shelf for up to 21 plug-in modules.
- FOX512: Compact 8-slot version available.
- Can be mounted horizontally or vertically.
- All modules are hot-pluggable.
- Earthing rail and front cover ensuring increased EMC.
- Front cover to completely protect all modules, no dummy plates required.
Communication solutions for utilities

The FOX-family of equipment forms an important part of ABB's comprehensive range of solutions for Utility Communications. As a turnkey provider, ABB has answers to all kind of communication requirements. The following list summarizes the portfolio, which complements the FOX-family in a perfect way:

**Optical communication for long distances**

As spans in utility networks tend to be much longer than in public telecom networks, ABB provides specific solutions for long-haul solutions to extend FOX-links repeater-less to more than 300 km.

**Power Line Carrier**

ABB's combined analogue/digital Power Line Carrier solutions are based on the ETL500/600 product family. ETL600 reaches so far unseen transmission rates and self-adapting speed- and multiplexing features to obtain optimized transmission capacities.

**Teleprotection systems**

ABB's NSD-family has a long tradition of stand-alone teleprotection devices. The latest generation of NSD570 provides highly reliable protection signaling over a wide choice of media (dedicated fiber, analogue / digital interfaces).

**Voice systems solutions**

To cover the requirements for traditional analogue or up-coming IP-based telephony services, ABB works closely with selected partners and adds utility specific voice communication features to the overall solution.

**Wireless solutions**

Where no fibers can be installed due to missing rights of way or topographic reasons, ABB can provide microwave, VHF/UHF radio, cellular and satellite solutions, tailored to the local situation and available frequencies.

**In-plant communications**

In-plant communications refer to the applications and technologies used internally in a substation or a power plant. It includes video, public addressing systems, local radio, access control, intruders detection and similar services. The FOX platform enables not only the integration between them but also the connection to the out-plant systems and allows the remote access, a key functionality in the modern utility.