FOX515Hs is the compact version of FOX515H. It complements ABB’s FOX-portfolio as a mid to high range next generation utility multiplexer, covering the full TDM-connectivity range from E1 up to multiple STM-16 interfaces. In addition, FOX515Hs provides strong Ethernet over SDH features.

FOX515Hs can be configured for full hardware redundancy and the network element supports various SDH-traffic protection schemes including 2/4-fibre MS-SPRING. EoS features are implemented based on GFP including LCAS and VCAT.

All optical ports are SFP based and the majority of them support multirate configuration including WDM. Most of FOX515Hs interface boards can be used in FOX515H and vice versa. These similarities including the exactly same management concept reduce training and maintenance costs. FOX515Hs is logical consequence for scalable and cost-optimized utility communication networks.

Like all other FOX family members, FOX515Hs is fully designed & tested for utility applications and integrates seamlessly into ABB’s network management suite.
FOX515Hs is a member of ABB’s comprehensive FOX-family of utility proven communication solutions. FOX515Hs is positioned as extremely compact mid to high capacity next generation backbone multiplexer complementing the portfolio of FOX access multiplexers like:

- FOX515: Powerful utility access-MUX with trunk-capacity up to STM-4 providing a wide range of user interfaces for legacy, data and voice. Integrated teleprotection and C37.94 functionalities are just a few of its utility specific features.
- FOX505: Smart and space-efficient utility access-MUX with trunk-capacity up to STM-1 and the full range of user interfaces required for typical utility applications. FOX505 provides along with traditional services a rich set of LAN-features including TDM-circuit emulation over LAN.

FOX515Hs is a highly scalable device, which allows backbone capacities from STM-1 up to STM-16 for the transport of TDM- as well as of Ethernet-traffic. For applications where more interface slots or multiple STM-64 trunks are required, the full-size FOX515H is recommended instead.

This very compact FOX515Hs (2U high only) provides extensive protection mechanisms such as HW-protection for MPUs and the full set of traffic protection methods like MSP, SNCP and/or 2/4-fiber MS-SPRING for SDH-connections.

The robust mechanical and EMC-design including the redundant power concept of FOX515Hs is optimized to cope with harsh environments typical for utilities. Like all other FOX-devices, FOX515Hs is subject of exhaustive tests by an accredited Swiss test-lab.

Most interfaces are provided with multirate SFP cages enabling each individual port to have a different configuration with a wide variety of optical wavelengths for WDM, connectors and available ranges.

FOX515Hs offers various types of main processing units (MPUs), comprising the system-controller, the clock & synchronization functionality and a non-blocking cross-connect matrix (DXC). For efficient network design and traffic grooming, the DXC even allows cross-connecting at DSO (64kbps) level. If equipped redundantly, the hot swappable MPUs work in main/standby protection mode.

Flexible network management

As provider of turn-key communication solutions for utility networks, ABB knows about the importance of flexible network management system (NMS) solutions. Lean on-site management as well as integration of a variety of different communication devices of a utility network into an overall solution is key. With its NMS-suite (FOXMAN / FOXView) and web-based management approaches, all NMS requirements can be covered in a modular, customer-friendly way. Management not only addresses fibre optic equipment but also ABB's comprehensive range of PLC, wireless and switch / router solutions.

Element specific management tasks can be performed either by using the integrated secure web-server of FOX515Hs or by the functionality of the overall NMS-suite. The powerful PC-based tool supports provisioning / trail-handling for legacy services (e.g. voice or serial data channels on FOX505) up the planning and automated node configuration of STM-64 trunks including sophisticated traffic analysis and reporting features.

In the shelf-view, individual objects (ports, Status indicators etc) can be clicked to retrieve additional Information or to configure features of the concerned item.

NMS Shelf-view example of FOX515Hs
## FOX515Hs MPU types

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DXC4G-2</td>
<td>is an MPU with a HO/LO cross connect capacity equivalent to 4G (26xVC-4/78xVC-3/1638xVC-12), an embedded DSO (64 Kbit/s) cross connect matrix with 252xE1 equivalent capacity and two SFP based STM-4/1 configurable ports.</td>
</tr>
<tr>
<td>DXC30G-2</td>
<td>is an MPU with a HO/LO cross connect capacity of nearly 30G (160xVC-4/480xVC-3/10080xVC-12), an embedded DSO (64 Kbit/s) cross connect matrix with 504xE1 equivalent capacity and two SFP based STM-16/4/1 configurable ports.</td>
</tr>
</tbody>
</table>

## FOX515Hs interface cards

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM-2STM16</td>
<td>is STM-16 SFP interface card with two STM-16/4/1 multirate ports</td>
</tr>
<tr>
<td>TM-4STM4</td>
<td>is STM-4 SFP interface card with four ports</td>
</tr>
<tr>
<td>TM-8STM1</td>
<td>is STM-1 SFP interface card with eight ports</td>
</tr>
<tr>
<td>TM-3E3T3</td>
<td>is interface card with three E3/T3 (34/45Mbit/s) coaxial ports with BNC connector</td>
</tr>
<tr>
<td>TM-12E1</td>
<td>is compact interface card 12x E1 (2.048Mbit/s/120Ω)</td>
</tr>
<tr>
<td>TM-32E1</td>
<td>is interface card with 32x E1 (2.048Mbit/s, 120Ω) ports</td>
</tr>
<tr>
<td>TM-63E1</td>
<td>is interface card with 63x E1 (2.048Mbit/s, 120Ω) ports</td>
</tr>
<tr>
<td>TM-GBE155</td>
<td>is interface card with one GBE combo port and eight electrical ports. GFP/VCAT/LCAS, QinQ, DSCP, flow control, etc</td>
</tr>
<tr>
<td>TM-2GBE</td>
<td>is interface card with two GBE SFP ports, two electrical GBE and six electrical FE ports. GFP/VCAT/LCAS, L1 transparent bridge/L2 switch, VLAN, QinQ, STP/RSTP, EAPS, link aggregation, IP precedence, policing, traffic sharing, jumbo frames. The TM-2GBE card requires the DXC30G-2 MPU.</td>
</tr>
<tr>
<td>MM-HK</td>
<td>is miscellaneous interface card with Alarms 4xIn/2xOut, V.11 service interface, clock In/Out</td>
</tr>
</tbody>
</table>

## Chassis & system

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis</td>
<td>2U high with 10 slots (var. types) 87 x 480 x 265 mm (H x W x D) Redundant -48/-60 VDC power concept</td>
</tr>
<tr>
<td>Synchronization</td>
<td>Input: STM-n, E1 (2.048 Mbit/s), 2 MHz Output: 2 MHz</td>
</tr>
<tr>
<td>Emission tests</td>
<td>EN61000-6-4 EN55022</td>
</tr>
<tr>
<td>Immunity tests</td>
<td>EN61000-6-2 and utility specific tests</td>
</tr>
<tr>
<td>Safety tests</td>
<td>EN60950-1 and EN60255-5</td>
</tr>
<tr>
<td>Climatic tests</td>
<td>IEC60721-3-3</td>
</tr>
<tr>
<td>Operation</td>
<td>ETSI EN 300019-1-3 Temperature -5º to 55ºC (peak) Humidity 95% r. h. (non condensation)</td>
</tr>
<tr>
<td>Transport</td>
<td>ETSI EN 300019-1-1 Temperature -25º to +70ºC</td>
</tr>
<tr>
<td>Storage</td>
<td>ETSI EN 300019-1-1 Temperature -25º to +70ºC</td>
</tr>
</tbody>
</table>
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 repeaterless 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- & 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 medias (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.

For more information please contact:

ABB Switzerland Ltd
Power Systems
Brown Boveri Strasse 6
5400 Baden, Switzerland
Phone: +41 58 589 37 35
or +41 844 845 845 (Call Center)
Fax: +41 58 585 16 88
E-Mail: utilitycommunications@ch.abb.com

www.abb.com/utilitycommunications

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>2Mbit/s signal according to ITU-T G.703 / G.704</td>
</tr>
<tr>
<td>EMC</td>
<td>Electromagnetic Compatibility</td>
</tr>
<tr>
<td>EoS</td>
<td>Ethernet over SDH</td>
</tr>
<tr>
<td>EPS</td>
<td>Equipment Protection Switching</td>
</tr>
<tr>
<td>Gb</td>
<td>Gigabit (Gbit/s)</td>
</tr>
<tr>
<td>GFP</td>
<td>Generic Framing Procedure ITU-T G.7041</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>Transmission Control Protocol / Internet Protocol</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network; Today mostly based on Ethernet</td>
</tr>
<tr>
<td>LCAS</td>
<td>Link Capacity Adjustment Scheme according to ITU-T G.7042</td>
</tr>
<tr>
<td>MPU</td>
<td>Main Processing Unit</td>
</tr>
<tr>
<td>NMS</td>
<td>Network Management System</td>
</tr>
<tr>
<td>OSPF</td>
<td>Open Shortest Path First: Dynamic Routing Protocol</td>
</tr>
<tr>
<td>PDH</td>
<td>Plesiochronous Digital Hierarchy: multiplexing hierarchy based on 64kbit/s</td>
</tr>
<tr>
<td>PLC</td>
<td>Power Line Carrier</td>
</tr>
<tr>
<td>SDH</td>
<td>Synchronous Digital Hierarchy: Multiplexing hierarchy based on 155Mbit/s</td>
</tr>
<tr>
<td>SFP/XFP</td>
<td>Small-factor pluggable unit: Pluggable unit containing complete electrical/optical signal interfaces</td>
</tr>
<tr>
<td>STM-n</td>
<td>Synchronous Transport Module, level n: STM-1, STM-4, STM-16, STM-64</td>
</tr>
<tr>
<td>TDM</td>
<td>Time Division Multiplexing (e.g. PDH or SDH technology)</td>
</tr>
<tr>
<td>VCAT</td>
<td>Virtual Concatenation (of SDH transport containers)</td>
</tr>
<tr>
<td>WDM</td>
<td>Wavelength Division Multiplexing</td>
</tr>
</tbody>
</table>
Contact us

Americas
ABB Ltda
Av. Monteiro Lobato, 3411
07190-904 - Guarulhos - SP
Brazil
Phone: +55 11 2464 8188
or: +0800 014 9111 (Call Center)
Fax: +55 11 2464 8361

ABB Inc.
Utility Communications
3450 Harvester Road
Burlington, Ontario L7N3W5
Canada
Phone: +1 800 263 9110 (Toll free)
or: +1 905 639 8840
Fax: +1 905 333 7506

ABB SA
Power Systems
José I - Rucci 1051
B1822CJU - Válen tin Alsina
Buenos Aires, Argentina
Phone: +54 11 4229 5500 (Switchboard)
Fax: +54 11 4229 5819 (Power System)

Europe
ABB SpA
Power Systems Division
Via L. Lama 33
20099 Sesto San Giovanni (MI), Italia
Phone: +39 02 2414.3869
or: +39 02 2414.3855
Fax: +39 02 2414.3916
E-Mail: power.systems@it.abb.com

ABB Russia LTD
Power Systems Division
Utility Communication Systems Department
2nd Kabelnaya St., 2,
111024 Moscow, Russian Federation
Phone: +7 495 956 62 77
Fax: +7 495 956 62 76
E-Mail: es@ru.abb.com

ABB Switzerland Ltd
Power Systems
Brown Boveri Strasse 6
5400 Baden, Switzerland
Phone: +41 58 589 37 35
or: +41 54 484 58 45 (Call Center)
Fax: +41 58 585 16 82
E-Mail: utility.communication@ch.abb.com

ABB Limited
Oulton Road, Stone
Staffordshire
ST15 0RS
United Kingdom
Phone: +44 1785 825050
Fax: +44 1785 819019
E-Mail: utility.communication@cn.abb.com

IMEA
ABB Automation Co.Ltd.
P.O.Box 441,
Riyadh 11383
Saudi Arabia
Phone: +966 1 265 3030
or: +966 1 265 2112
E-Mail: info@sa.abb.com

ABB LLC Oman
218 Hatat House
P.O. Box 778, Postal Code 131.
Al Hamriya, Sultanate of Oman
Phone: +968 24 567 410
or: +968 24 567 961
Fax: +968 24 567 406
E-Mail: abboman@omantel.net.om

ABB Industries LLC
Utility Communications Systems
9th Floor, Concord Tower, Media City
P.O Box 11070
Dubai, U.A.E
Phone: +971 4 4241900
Fax: +971 4 493046

ABB South Africa (Pty) Ltd
Power System, Utility Communications
No 2 Lake Road,
Longmeadow Business Estate (North)
Modderfontein, Gauteng, South Africa, 1610
Phone: +27 10 202 6995
or: +27 10 202 5000 (Switchboard)
E-Mail: sales@za.abb.com

ABB India Limited
22-A, Shah Industrial estate,
Off Veera Desai Road,
Andheri (West),
Mumbai – 400 053, India
Phone: +91 22 6671 7272
Fax: +91 22 2873 0842

Asia
ABB Engineering (Shanghai) Ltd.
Power Systems
No. 5, Lane 369, Chuangye Road,
Kangqiao Town, Pudong District,
Shanghai, 201319, P.R. China
Phone: +86 21 61056666
Fax: +86 21 61056677
E-Mail: utility.communication@cn.abb.com

www.abb.com/utilitycommunications