# FOM Family

## Gigabit Fiber Optic Multiplexer

# MDD-FMUX1000S

FMUX1000S is an innovated gigabit multi-service fiber optic transport system which can transmit both E1/T1 and Ethernet data streams over redundant gigabit fiber optic links. The gigabit wire-speed Ethernet traffic and a separated 16 E1/T1 transparent data are multiplexed into 1.25Gbps by using a patented physical coding method to achieve a high performance and economic broadband access solution. The FMUX1000S can be adopted as a broadband backhaul of 3G mobile networks or private network access for campus and office building.

FMUX1000S is a modular design which supports E1/T1 and combo Ethernet interface cards.
There are 4 hot swappable tributary slots equipped for each FMUX1000S system. The Ethernet tributary card is equipped with two 10/100/1000 RJ45 and two Gigabit SFP fiber ports, These 4 ports are part of 4 gigabit ports in an Ethernet switch core. For E1/T1 card, the 4 E1/T1 ports can be programmed as either E1 or T1 individually. Any combination of Ethernet and E1/T1 cards can be placed in the four plug-in slots.

## Features

- Wire-speed GbE traffic and separated 16E1 data are transmitted simultaneously
- Higher than 800Mbps throughput for aggregate Ethernet traffic
- Support advanced Ethernet interface features like jumbo frame size(9K bytes), Provider Ethernet bridge by VLAN stacking (QinQ, IEEE802.1ad), QoS and traffic rate control
- Support various loopback and BERT for system diagnosis
- 1+1 protection switch and Automatic Laser Shutdown[ALS] for aggregate fiber interfaces
- Built-in EOC channel for OAM&P
- Support VT100, Telnet, SNMP and client server based NMS interfaces
- Loss of Power indication for power failure of the remote unit
- Remote software upgradable
- Support order-wire for craft person's voice communication
- Support one RS-232 Async. channel for auxiliary data communication
- AC and DC power redundancy
- Form C relay contacts for audible and visible alarm outputs
- comply with the specifications of class A of CISPR 22 and class A of FCC Part 15 Subpart B Rules of U.S.A
- Comply with the electrostatic discharge immunity (ESD) IEC 61000-4-2 level 2
- RoHS Compliant

## Specifications

| ***System*** | |
|---|---|
| System capacity | Any combination of E1/T1 and Combo Ethernet cards for 4 x hot swappable tributary plug-in slots. Max. for 16 E/T1 or 8 GbE combo ports |
| Aggregate Ethernet throughput | 1 Gbps wire-speed |

| ***Aggregate – Gigabit Optical Interface*** | |
|---|---|
| Number of port | 2, 1+1 protection |
| Line rate | 1.25G bps |
| Optical central wavelength | 1310 nm nominal |
| Connector type | LC (SFP housing) |

| ***Tributary T1/E1 card*** |
|---|
| 4 x T1/E1 ports per plug-in card, programmable for E1 or T1 individually |

| ***E1 Interface*** | |
|---|---|
| E1 frame | PCM31,PCM31C,PCM30,PCM30C and unframed<br>Meet ITU-T G.703 and G.704 standard |
| Line Code | HDB3 |
| Rates | 2.048Mbps+/-50ppm |
| Output Signal | ITU-T G.703 |
| Input Signal | ITU-T G.703 |
| Impedance | 75 ohm unbalanced or 120 ohm balanced,<br>software programmable |
| Jitter requirements | Meet ITU-T G.823 |
| Connector | DB25 (optional DB25 to wire-wrap connector available) |
| Surge Protection | IEC 61000-4-5 class 3 |

| ***T1 Interface*** | |
|---|---|
| T1 frame | SF, ESF and unframed<br>Meet ITU-T G.703 and G.704 standard |
| Line Code | AMI / B8ZS(selectable) |
| Rates | 1.544M bps ± 50 ppm |
| Output Signal | DS1 with 0, -7.5, -15 dB LBO |
| Input Signal | DS1 with 0 dB to -26 dB ALBO |
| Impedance<br>Pulse Template | 100 ohm , balanced<br>Per AT&T TR 62411 |
| Connector | DB25 (optional DB25 to wire-wrap connector available) |
| Surge Protection | IEC 61000-4-5 class 3 |

| ***Combo Gigabit Ethernet (GbE) card*** | |
|---|---|
| Ethernet type | 10/100/1000Mbps, comply with 802.3, 802.3u,<br>802.3ab and 802.3z |
| Connector | RJ45 for twisted pair GbE and LC (SFP) for optical GbE |
| No. of ports | 2 x RJ45 and 2 x SFP |

## Specifications

| Ethernet Function | |
|---|---|
| Basic features | Giga Port with Combo Interface (SFP + RJ45) |
| | MDI/MDIX for 10/100/1000M BaseT, comply with IEEE 802.3, 802.3u, 802.3ab, 802.3z,802.3x |
| | Provider Ethernet Bridge, VLAN stacking(QinQ, IEEE802.1ad) |
| | Support Packet length up to 9.6k bytes (Jumbo Frame) |
| Packet Transparency | Packet transparency support for all types of packet types including IEEE 802.1q VLAN and Support IEEE 802.1ad (Q-in-Q) |
| | BPDU packet transparency |
| | Pause Frame transparency |
| QoS | Packet classification based on the 802.1P CoS. |
| | 4 priority queues for packet classification |
| | Support Strictly Priority or WRR Scheduling of the 4 priority queues. |
| Traffic Control | Rate control granularity: 256Kbps, 512Kbps, 5Mbps and 50Mbps for different ranges of port speed |

| SNMP Card | |
|---|---|
| Ethernet type | 10/100BaseT, IEEE802.3, Auto-negotiation(10/100M) |
| | Auto MDI/MDIX, Full or half duplex |
| | Rack MCU card provides SNMP proxy with single IP for a rack system |
| Connector | RJ-45 |

| Management | |
|---|---|
| Console Port | Electrical: RS232, DCE |
| | Protocol: VT-100 |
| | Connector: DB9, female |
| Telnet | Access via SNMP Ethernet port |
| SNMP | SNMP v1, v2c; Up to 3 Trap IPs |
| Management | Embedded operations channel over fiber |
| Loss of Power | Loss of power indication for remote unit |
| Auxiliary Data Channel | 300 – 115200 bps , RS232C |
| Order-wire | 300 – 3.4K Hz voice channel, RJ11 4 wire telephone handset interface |

| Alarm | |
|---|---|
| Alarm History | Alarm Type (i.e. RAI, AIS, LOS, LOF, CV, ES, SES, UAS, LPR) |
| Alarm Queue | Maximum 100 alarm records which record the latest alarm type, location, and date & time |
| Alarm Threshold | CV, ES, SES, UAS |

| Power | |
|---|---|
| AC Module | 90 to 240 VAC, 60 +/- 3Hz |
| 48 Vdc Module | -42 to -56 Vdc |
| Redundancy | AC+DC, DC+DC or AC+AC |
| Power Consumption | Max. 20W per system |

| Physical and Environmental | |
|---|---|
| Dimensions (W x H x D) | Standalone: 441 mm x 445 mm x 320 mm<br>Rack: 430 mm x 355 mm x 370 mm |
| Temperature | 0 - 45°C (shelf) or 0 - +65 °C @ 10 – 90 % RH, Non condensing (Outdoor) |
| Mounting | 19 inch standalone desktop stackable and rack mount |

| Certification | |
|---|---|
| EMC | EN55022 Class A, EN55024, FCC Part 15 Class A |
| Safety | EN60950-1, IEC60950-1 |

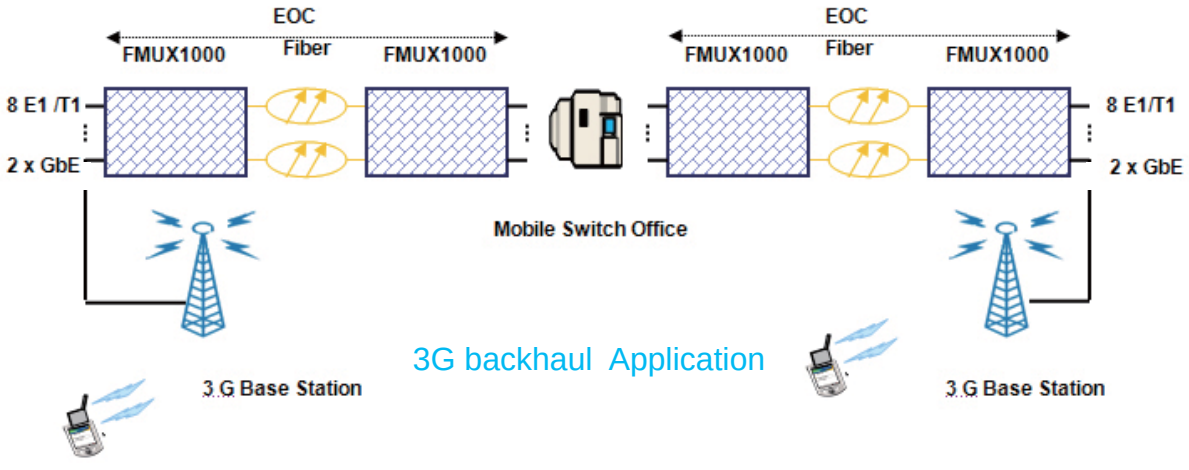
| Standards Compliance | |
|---|---|
| ITU-T | G.703, G.704, G.823, G.826 |
| IEC | 61000-4-5 class 3 |
| IEEE | 802.3, 802.3u, 802.3z, 802.3x, 802.1q, 802.1ad (Q-in-Q) |
| IETF | RFC 1643, RFC 1157, RFC 1213, RFC 1406, RFC 2863 |

## Ordering Information

| Model Name | Description |
|---|---|
| | *Stand-alone* |
| FMUX1000S | 1U, 19" standalone, fiber multiplexer with LCD control panel |
| FMUX1000S-AC | FMUX1000S AC power module (90 to 240 V) |
| FMUX1000S-DC | FMUX1000S DC power module (-42 to -56 V) |
| | *Slide-in card* |
| FMUX1000-ET1G | 2x 10/100/1000-T to 2x Gigabit SFP slot Ethernet card |

MDD-Multi Data Digital GmbH
Kaiser Friedrich Promenade 37
D 61348 Bad Homburg
www.mdd-gmbh.de

## Application




3G backhaul Application