

## Ethernet / Fast Ethernet Twin Bridge module

### Description

#### Fast Ethernet Bridge

The bridge enables connection of copper and fiber segments to Ethernet and Fast Ethernet whilst at the same time altering the speed. The new twin bridge achieves a higher port density in the distribution equipment by integrating two bridges per card.

#### Redundancy

When the card is configured correctly, the two bridges can be switched to one bridge for redundant connections. This means that important connections can be secured using this module without the need for such costly features as spanning trees. Two routes are possible via both, fiber and copper. Switching occurs physically by recognizing links.

#### 4 Port Switch

The card function has a further setting that permits the connections to be grouped into a 4-port switch with two fiber ports (100Base-FX) and two copper ports (10/100Base-TX). This switch makes it extremely easy to implement service networks, e.g. for coupling management agents or rack monitoring systems in existing connections.

#### Bandwidth limitation

An additional operating mode allows the card to be configured as a fiber/ fiber bridge with the option of limiting bandwidth. Service providers can use this to release data rates to customers in a targeted way. If the customer is not prepared to pay for the maximum bandwidth or if a lower performance is sufficient they can make a targeted reduction. If migrations are completed later the required bandwidth of up to 100 Mbit/s is released by reconfiguration, it is not necessary to swap out the hardware. The copper connections can also be used as mirroring interfaces at the same time, e.g. for sniffer analyses.

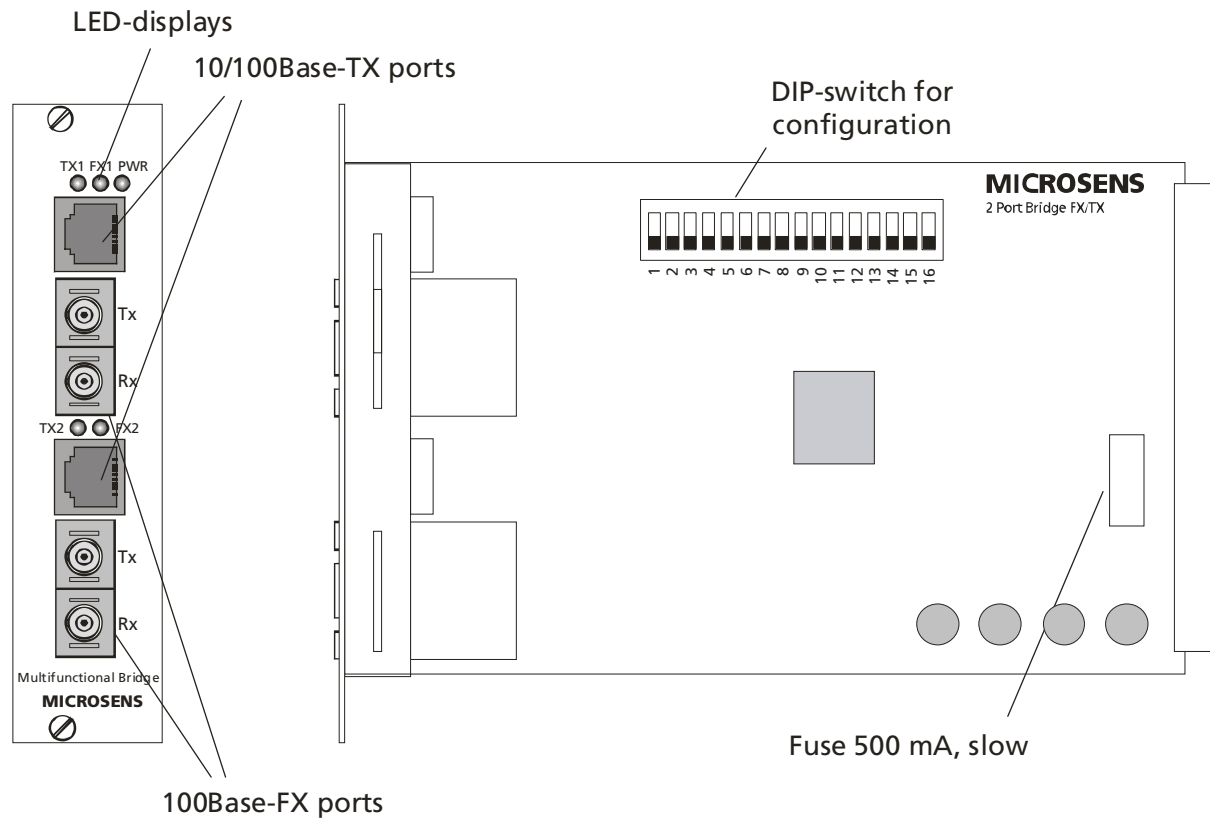
In addition to multimode versions, MICROSENS also offers single mode bridges with altered optical parameters, which enable long-range segment links of up to 125 km. These single mode designs are used in particular for Fiber To The Home (FTTH) projects. The end user can obtain internet services, video on demand and VoIP applications using the familiar 10/100Base-TX copper connection.

The configuration of the features can be done by the network management or the integrated configuration switches.

## Technical Specifications

<b>Type</b>	2 Port Fast Ethernet Bridge For the coupling of Ethernet and Fast Ethernet segments for the installation in the MICROSENS modular chassis
<b>Fiber type</b>	Multimode 50 or 62,5/125µm optional single mode 9/125µm duplex
<b>Opt. output power</b>	-19 dBm (1300 nm Multimode min.) -15 dBm (1300 nm single mode min., 15 km version) -5 dBm (1300 nm single mode min., 40 km version) -5 dBm (1550 nm single mode min., 80 km version) 0 dBm (1550 nm single mode min., 125 km version)
<b>Opt. sensitivity</b>	-31 dBm (1300 nm Multimode) -31 dBm (1300 nm single mode, 15 km version) -34 dBm (1300 nm single mode, 40 km version) -34 dBm (1550 nm single mode, 80 km version) -37 dBm (1550 nm single mode, 125 km version)
<b>Max. distance</b>	Full duplex: 2 km (Multimode), 15..125 km (Single mode), Half duplex: 412 m
<b>Cable type</b>	Shielded Twisted Pair cable, 100 Ohm, Category 5
<b>Data rate</b>	10 or 100 Mbit/s
<b>Max. distance</b>	100 m
<b>Configuration</b>	10/100Base-TX: Autonegotiation, Auto Crossing 100Base-FX: manual per DIP-switch
<b>LED displays</b>	<i>PWR</i> ready for operation <i>TX1</i> first Twisted Pair-connection <i>FX1</i> first fiber connection <i>TX2</i> second Twisted Pair-connection <i>FX2</i> second fiber connection
<b>Power supply</b>	12 V DC / max. 500 mA via backplane
<b>Operating- /Stor.temp.</b>	0°C to 55°C / -20°C to 80°C
<b>Rel. humidity</b>	5% to 80% non condensing
<b>Dimensions</b>	3 HE x 6 TE (128 x 31 mm)
<b>Management</b>	Status monitoring and configuration via SNMP/web based management with management module MS416020
<b>Configuration</b>	Hardware level per DIP-switch (DIP-switch 13: off) per Management (DIP-switch 13: on)

**Construction**



**Configuration**

All operation modes can be configured with the network management (with MS416020) or the DIP switches. The selection about the configuration is done by DIP switch 13.

Function	Switch 13	Description
1	ON	Configuration through management (DIP switches 1-12 and 14-16 <b>without</b> function)
2	OFF	Configuration per DIP switches

To configure the different operating modes the module has several DIP switches. The selection of the main functionality is done by **DIP switches 14, 15 and 16**:

Function	Switch 14	Switch 15	Switch 16	Description
1	OFF	OFF	OFF	Fiber-Bridge
2	OFF	OFF	ON	2 channel Bridge
3	OFF	ON	OFF	Redundant Bridge
4	OFF	ON	ON	4 Port Switch

The function of the other DIP switches depends on the selected main functionality.

**With changing the main functionality, the functions of the DIP switches 1-12 changes!**

**Function 1: Fiber-Bridge**

The module is configured for the data transmission between the two fiber ports. The twisted pair ports can be used for monitoring. Further it is possible to adjust the speed between the fiber ports by using the management (32 kB blocks) or the integrated DIP switches (see table below).

Following Dip switches are available for the configuration of the fiber ports:

DIP switch	Function (ON/OFF)
1	ON: FX-Port 1 full duplex      OFF: FX-Port 1 half duplex
2	ALM for fiber port 1
3	Link Through from fiber port 1 to 2
4	ON: FX-Port 2 full duplex      OFF: FX-Port 2 half duplex
5	ALM for fiber port 2
6	Link Through from fiber port 2 to 1
7	ON: Mirroring of the data of both fiber ports on TP port 1 OFF: Mirroring FX-Port 2 on TP-Port 1 and FX-Port 4 on TP-Port 3
8	ON: Flow control activated
9 – 11	Bandwidth limitation
12	Flashing for fiber Port 2 and Port 4

The Dip switches 9 to 11 are offering the possibility for the bandwidth limitation.

Switch			Maximum data rate between the Ports Fiber 2 and Fiber 4 each direction
9	10	11	
0	0	0	100 Mbit / Sec. (100Base-TX), no limitation
0	0	1	75 Mbit / Sec.
0	1	0	50 Mbit / Sec.
0	1	1	34 Mbit / Sec. (E3)
1	0	0	20 Mbit / Sec.
1	0	1	10 Mbit / Sec. (10Base-TX)
1	1	0	8 Mbit / Sec.
1	1	1	2 Mbit / Sec. (E1)

0 = switch OFF, 1 = switch ON

**Function 2: Two channel Bridge**

The device has two independent bridging channels. The data is transmitted separately and a cross connection between the channels is not possible.

Following DIP switches are available for the configuration of the ports:

Channel	DIP switch	Function (ON/OFF)
1	1	ALM for fiber port
	2	Link Through from copper to fiber
	3	Link Through from fiber to copper
	4	ON: fiber full duplex                      OFF: fiber half duplex
	5	ON: TP Autonegotiation                  OFF: TP 100 Mbit full duplex
	6	Flashing for fiber port
2	7	ALM for fiber port
	8	Link Through from copper to fiber
	9	Link Through from fiber to copper
	10	ON: fiber full duplex                      OFF: fiber half duplex
	11	ON: TP Autonegotiation                  OFF: TP 100 Mbit full duplex
	12	Flashing for fiber port

**Function 3: Redundant Bridge**

The device is working on channel 1 as a bridge. If the fiber port of channel 1 fails, the second fiber port takes over the data transfer. The function of the copper port is the same. The switching time to the redundant port is lower than 100 ms.

The configuration of both ports for the copper and the fiber ports are the same, so the settings for the fiber port 1 are also valid for fiber port 2.

Following Dip switches are available for the configuration of the ports:

DIP switch	Function (ON/OFF)
1	ALM for fiber port
2	Link Through from copper to fiber
3	Link Through from fiber to copper
4	ON: fiber full duplex                      OFF: fiber half duplex
5	ON: TP Autonegotiation                  OFF: TP 100 Mbit full duplex
6, 7	Reserved
8	ON: Flow control on                      OFF: Flow control off
9-11	Bandwidth limitation (see fiber bridge)

**Function 4: 4 Port Switch**

The device is working as a standard 4 port switch. In this mode the device has two 10/100Base-TX and two 100Base-FX ports. All ports are having the same priority. The switch is "outband managed" with the integrated management features for the rack chassis.

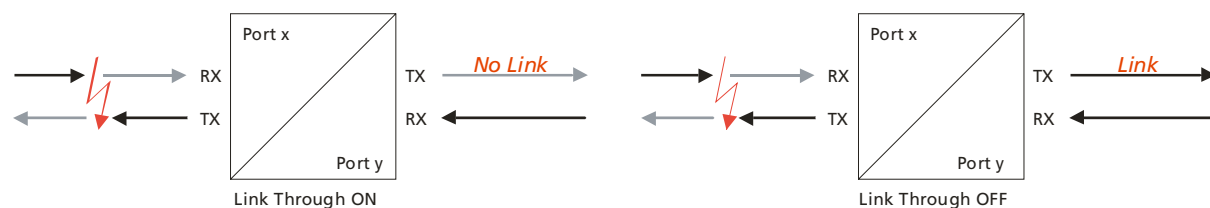
Following Dip switches are available for the configuration of the ports:

DIP switch	Port	Function (ON/OFF)
1	1 (TP)	ON: Autonegotiation      OFF 100Mbit, full duplex
2	2 (FX)	ON: full duplex              OFF: half duplex
3	3 (TP)	ON: Autonegotiation      OFF 100Mbit, full duplex
4	4 (FX)	ON: full duplex              OFF: half duplex
5		Link Through from port 2 to 4 (fiber)
6		Link Through from port 4 to 2 (fiber)
7	2 (FX)	ALM for fiber port 2
8	4 (FX)	ALM for fiber port 4
9	2, 4 (FX)	Flashing for both fiber ports
10- 12		Reserved

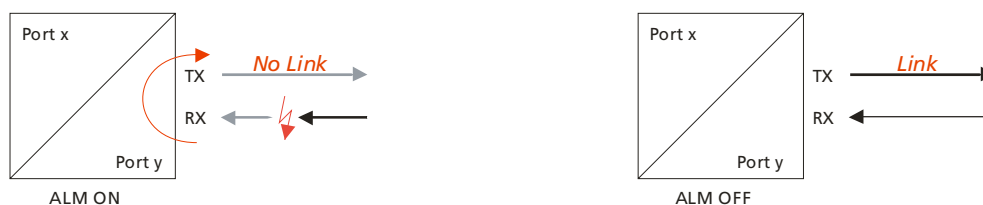
**Link Trough / ALM**

The link status of each segment is forwarded, that means in case of a missing link on one side, the link on the corresponding side is also switched (physically) off .

**Attention:** In idle state (no cables connected) there are no link signals send by the bridge. This is no malfunction.



With activated ALM (Advanced Link Monitoring) the same port, which does not receive a link signal, is also not sending an output link signal (loop back). This ensures that both directions (transmit and receive) of the channel are having the same link status.



## Operation

The module is designed for the mounting into a MICROSENS modular chassis. It can be combined with all other converter modules of the same series.

The power supply is done by a central power supply unit via the backplane of the chassis. Together with the power supply it is possible to insert up to 12 modules into the 3 U chassis. Optional it is possible to insert a second redundant power supply. In this case it is possible to use up to 10 converter modules.

Beside the 3 U chassis there is an additional 1 U chassis (horizontal slots) available. This chassis has an integrated power supply (MS416006), which can be also redundant (MS416007).

Furthermore there are in addition to the 19" racks, desktop chassis for one (MS417001) or two (MS417041) modules available. With the wall bracket (MS417001-WH) it is possible to mount the desktop chassis on the wall.

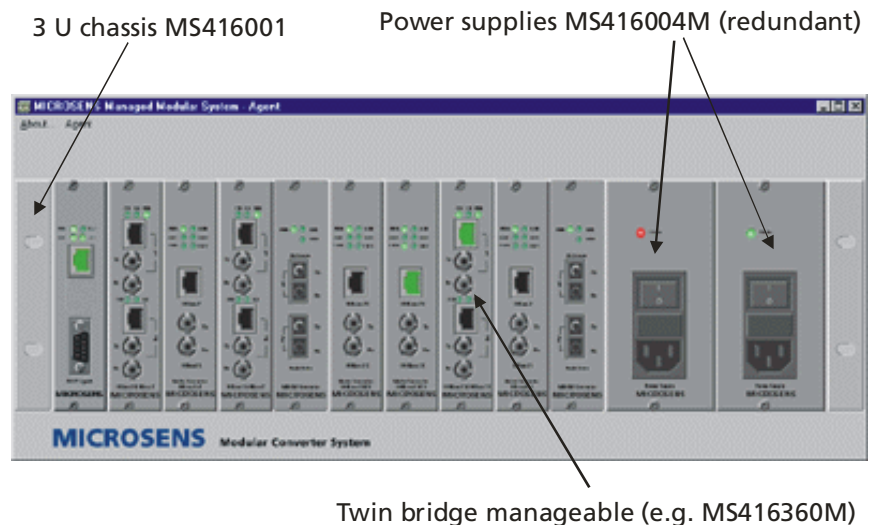
## Management

The module can be configured and monitored by the central management agent. There are two different modes possible:

- DIP-13 off** Monitoring of the actual configuration and operation states, configuration through the NMS is not possible.
- DIP-13 on** Monitoring with Network management (SNMP- and web based), configuration by web management, terminal or telnet connection.

The SNMP and web based management features of the system are provided by the management master module (MS416020). When choosing the management features it is necessary that the chassis (e.g. MS416001M) and the power supply (MS416004M) are also supporting the management.

Visualising - and configuration- example with an SNMP management platform:



To access the data of the modules via SNMP it is necessary to integrate the structure of the MIB into the existing network management. The MICROSENS MIB file can be downloaded from the web based management of module. The MIB file is in ASCII format.

The configuration of the network management is protected by a password. The following values are default from the factory.

	Console: Read only	Console: Admin	WEB: Configuration
Username	user	admin	
Password	microsens	microsens	microsens

The password for the web based configuration is the same as the administrator password of the console and can be changed together with it.

## Safety Notes

**WARNING:** Infrared radiation as used for data transmission within the fiber optic, although invisible to the human eye, can nevertheless cause damage.

*To avoid damage to the eyes:*

- *never look straight into the output of fiber optic components – danger of blinding!*
- *cover all unused optical connections with caps.*
- *commission the transmission link only after completing all connections.*

The active laser components used with this product comply with the provisions of **Laser Class 1**.

## Order Information

Art.-No.	Description	Connectors	
MS416360M	Twin Bridge Module, 10/100Base-TX/100Base-FX 1300nm Multimode ST	2x RJ-45 4x ST	10/100TX 100Base-FX
MS416361M	Twin Bridge Module, 10/100Base-TX/100Base-FX 1300nm Multimode SC	2x RJ-45 2x SC	10/100TX 100Base-FX
MS416362M	Twin Bridge Module, 10/100Base-TX/100Base-FX 1300nm Single mode Laser min. 15 km, SC	2x RJ-45 2x SC	10/100TX 100Base-FX
MS416363M	Twin Bridge Module, 10/100Base-TX/100Base-FX 1300nm Single mode Laser min. 15 km, ST	2x RJ-45 4x ST	10/100TX 100Base-FX
MS416364M	Twin Bridge Module, 10/100Base-TX/100Base-FX 1300nm Single mode Laser min. 40 km, SC	2x RJ-45 2x SC	10/100TX 100Base-FX
MS416368M	Twin Bridge Module, 10/100Base-TX/100Base-FX 1300nm Multimode MT-RJ	2x RJ-45 2x MT-RJ	10/100TX 100Base-FX

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