MICROSENS

4 port Fast Ethernet/ESCON/STM1 or 1 port STM4 Multiplexer Module

Overview

4 port TDM Multiplexer module is a part of MICROSENS 10G Transport Platform, a high performance and flexible carrier-class transmission system. The 10G Transport Platform enables increasing transport capacitities in CWDM, DWDM and SDH networks. The use of wide range TDM modules permits to reduce the number of necessary wavelengths and to decrease the overall cost of the application. Ethernet over SDH modules enable using exisiting SONET/SDH infractructure for IP transmission.

The general features of the system:

- 19“ 2U Chassis with 5 module slots and management card
- Max. 5x single size modules f.ex. 2x double size + 1x single size module
- Hot swappable modules & power supplies
- Redundant power supplies with -48 VDC input (opt. 230 VAC)
- Exchangeable air- and filter module
- Wide range of functional xWDM and TDM modules available

The functional modules of 10G Transport Platform include:

- TDM 8x GBE or 8x GFC to 10G/OC-192/STM-64
- TDM 5x GBE or 5x 2GFC to OC-192/STM-64
- TDM 4x OC-48/STM-16 to 10G/OC-192/STM-64
- TDM 2x GBE and 2x GFC to OC-48/STM-16
- 10G transponder with 3R, XFP and fixed Laser Versions
- 10G protocol converter 10G LAN to 10G WAN (OC-192/STM-64)
- DWDM MUX/DeMUX, OADMs, EDFAs

Introduction

MICROSENS 4 port TDM multiplexer range is a MICROSENS 10G Transport Platform allowing multiprotocol aggregation and transport of up to:

- 4 x OC-3/STM-1 over one 1.25G line
- 1 x OC12/STM-4 over one 1.25G line.

Features

- Four STM-1/OC-3 client port interfaces
- One STM-4/OC12 client port interface
- Fully transparent transport of STM-1 or STM-4 client signals
- One 1.25G line interface compatible with MS43060xM, MS43062xM client interfaces
- SFP modules for Line and client port physical interfacing
- DDM (Digital Diagnostic Monitoring) information from SFPs

System description

The functional description of SW Unit STM4 is identical to SW Unit STM1 with only one STM-4/OC-12 client port instead of 4xSTM-1/OC-3 client ports. Within the present section only the SW Unit STM1 description will be detailed, unless otherwise stated.

MICROSENS 10G TDM Multiplexer is a bi-directional device. It therefore has different sections:

- Upstream Section:
  1. SW Unit STM-1: four STM-1/OC-3 optical inputs to 1.25G optical output
  2. SW Unit STM-4: one STM-4/OC-12 optical input into a 1.25G optical output
- Downstream Section:
  1. SW Unit STM-1: one 1.25G optical input to four STM-1/OC-3 optical output
  2. SW Unit STM-4: one 1.25G optical input to one STM-4/OC-12 optical output
- Common sections composed of :
  1. Controller block, providing interfacing to the Chassis controller board hosting the SNMP Agent.
  2. Power supplies: generates different internal power supplies from the -48V of the Chassis backplane
  3. Front panel LEDs indicating the status of the ports, line and the MS430614M common functions

Upstream section

Input Ports interfacing and 10/8B decoder

The upstream section has up to four optical inputs, which individually support STM-1/OC-3 (155.52 Mb/s) input signal.
Client Optical interfacing is done through standard SFP modules.

The following information is provided to the controller on a per port basis:

- SFP absence
- Loss of optical input signal
- Loss of Frame
- Non intrusive B1 errored seconds counting: this counter is incremented every time at least one error is detected in a second on the incoming STM-1 signal

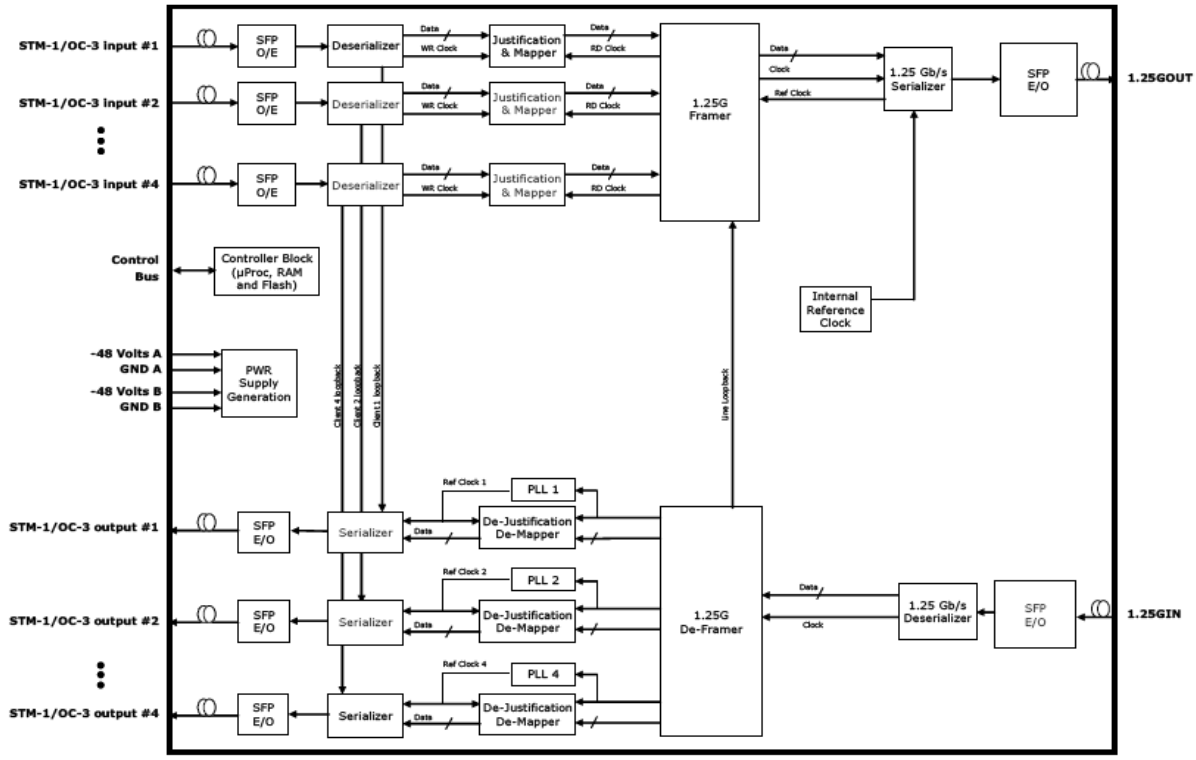

Figure 1: MS430614M Block diagram – 4xSTM-1 mode.

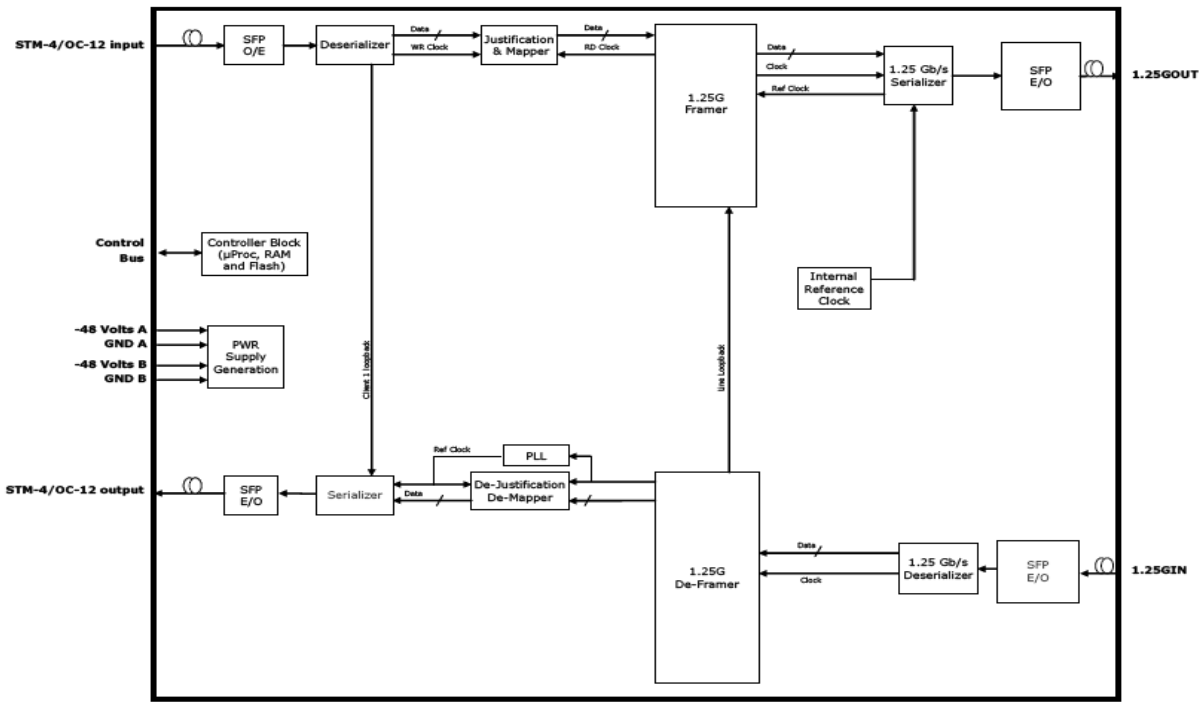

Figure 2: MS430614M Block diagram – 1xSTM-4 mode.

Justification and Mapper

Incoming signals must be synchronized and are mapped transparently in a proprietary frame prior of being multiplexed together for framing in a proprietary 1.25G line signal.
Synchronization of client signals is performed by a justification process.

For each individual incoming STM-1/OC-3, signals frequencies have a tolerance of ±20 ppm. Local system clocks have a tolerance of ±20 ppm. The justification process ensures that the clock frequency of the STM-1/OC-3 data stream restored at the far end will be the one of the initial incoming STM-1/OC-3 signals.

Synchronized STM-1/OC-3 incoming signals are mapped in a proprietary frame. This frame transports the following information in addition to the data:

- Client Signal Fail indication: a bit in the mapping frame is set in case one of the following conditions are present on the incoming signal (see Figure 3)
  1. SFP not present
  2. Loss of incoming signal
  3. Loss of Frame
  4. Justification buffer overflow
- A client BIP-8 parity (CBIP) is computed over each mapped client signal and inserted in the corresponding mapping frame.

The following information is provided to the controller on a per port basis:

- Client Signal Fail asserted

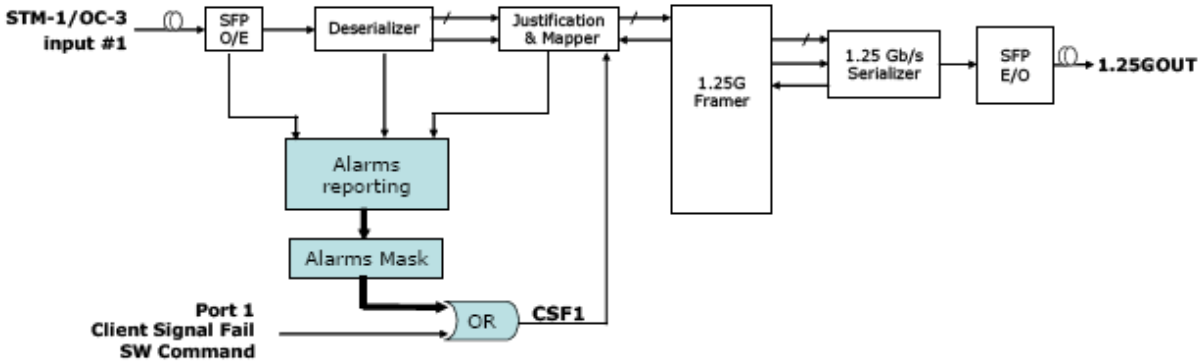

Figure 3: Upstream Client Signal Fail assertion principle.

Framer

Each of the mapped signals are multiplexed together and framed into a 1.25G proprietary output signal with the following characteristics:

- Frame total length is 2080 bytes
- FCS which is part of these 2080 bytes is computed over every frame
- The intergap bandwidth between frames, not occupied by the 4xSTM-1/OC-3 mapped signals is filled with 10B IDLE words.

Line signal is 8B/10B encoded before being passed to the line optical interface module.

Line Optical Interfacing

Line Optical interfacing is done through standard SFP modules. The following alarms can be read from the Line Optical Interface:

- SFP absent
- Transmitter fault
- Optical output shut down

The following controls can be sent to the SFP:

- Shut down optical transmitter

DownStream Section

Line Optical Interfacing

Line Optical interfacing is done through standard SFP modules. The following information is provided to the controller on a per port basis:

- SFP absence
- Loss of optical input signal
- Digital diagnostic monitoring information

De-Framer

1.25G proprietary signal is received from the line optical interface. 10B/8B decoding is performed on this signal and the following information is extracted from there:

- 10B/8B decoder loss of synchronization
- 10B/8B decoding violations counting

FCS is computed over incoming frames and errored frames are counted.

The result of 10B/8B decoding violations counting and FCS errors counting is presented to the controller block as a counting of errored seconds:

- 10B/8B decoding violations errored seconds : when at least one error in a second occurs the counter is incremented
- FCS errored seconds: when at least one incoming frame is errored in a second, the counter is incremented

De-Mapper and de-justification

The de-mapper extracts STM-1/OC-3 data from the proprietary mapping frame.
The de-justification process allows recovering the STM-1/OC-3 data stream mapped at the far end.
Each de-mapper has an associated PLL for regenerating the far end incoming clock frequency, based on the information received from the de-justification mechanism. Client Signal Fail information is also extracted and reported to the controller block (see Figure 4).
BIP-8 parity (CBIP) is computed over each individual received channel and compared to the received BIP-8. Error counting is performed and the result is reported to the controller block as a umber of errored seconds.
Under failure conditions, an output client AIS (CAIS) signal is inserted on the outgoing client port.

The alarms leading to assertion of client AIS are:

- Line SFP absent
- Loss of signal on incoming 1.25G optical line
- Loss 10B/8B synchronization on incoming 1.25G incoming signal
- Incoming CSF detected on individual channel
- De-justification buffer overload on individual channels

When CAIS is asserted, all client ports SFP optical output are shut down. The CAIS mechanism is described on Figure 5.
The following information is provided to the controller on a per port basis:

- CSF received
- CBIP errored seconds counting
- CAIS asserted
- De-justification buffer overload

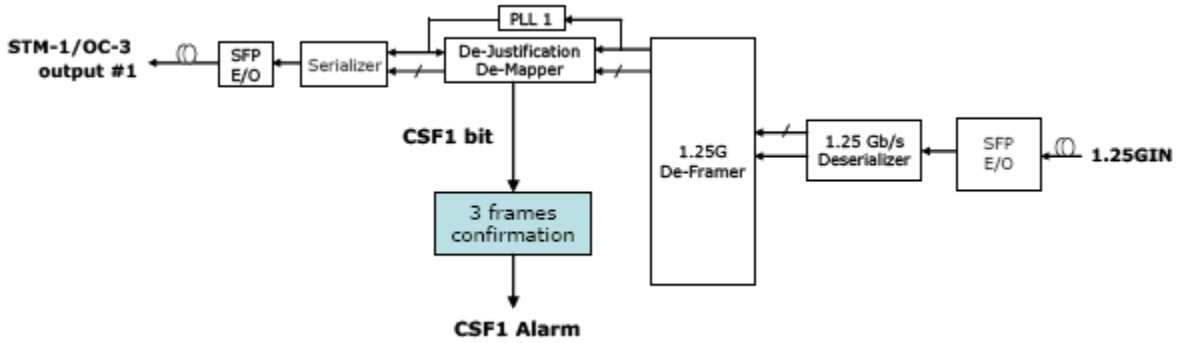

Figure 4: Downstream CSF detection mechanism.

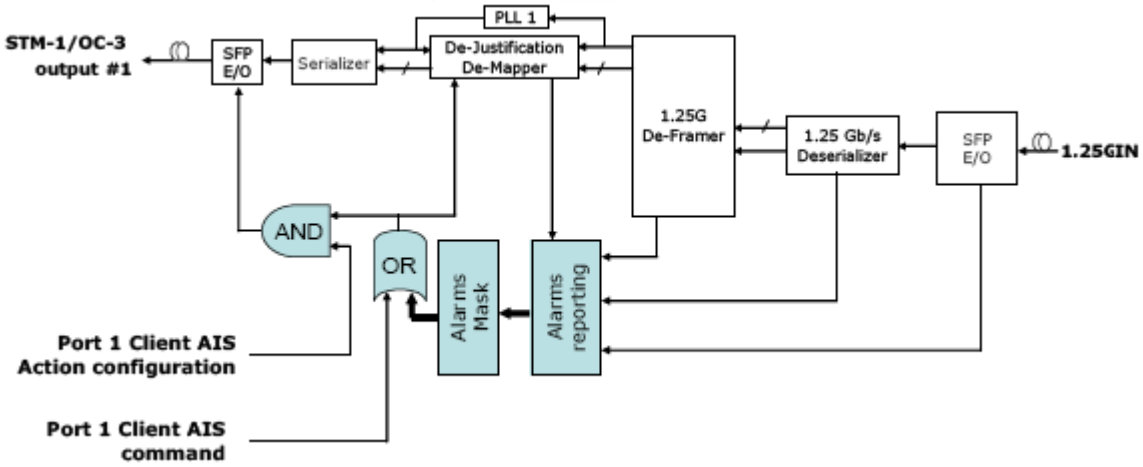

Figure 5: Downstream CAIS mechanism.

Output port interfacing

Each channel is serialized and converted to an optical signal by SFP modules.
The following information is provided to the controller on a per port basis:

- Optical transmitter failure
- Digital diagnostic monitoring information

The following configuration information is received from the controller block on a per port basis:

- Optical output shut-down

Maintenance Loop backs

Client loop back

As a test feature, an individual client loop back can be performed for maintenance operations. The client signal received on an input port is looped back on the corresponding outgoing client port. The description of the data path in case of client loop back is found on:

- Figure 6 for SU STM1
- Figure 7 for SU STM4

Line loop back

As a test feature, a line loop back can be performed for maintenance operation, allowing looping back the received 1.25 Gb/s signal on the upstream section. The clock and data path in case of line loop back is described on:

- Figure 8 for SU STM1
- Figure 9 for SU STM4

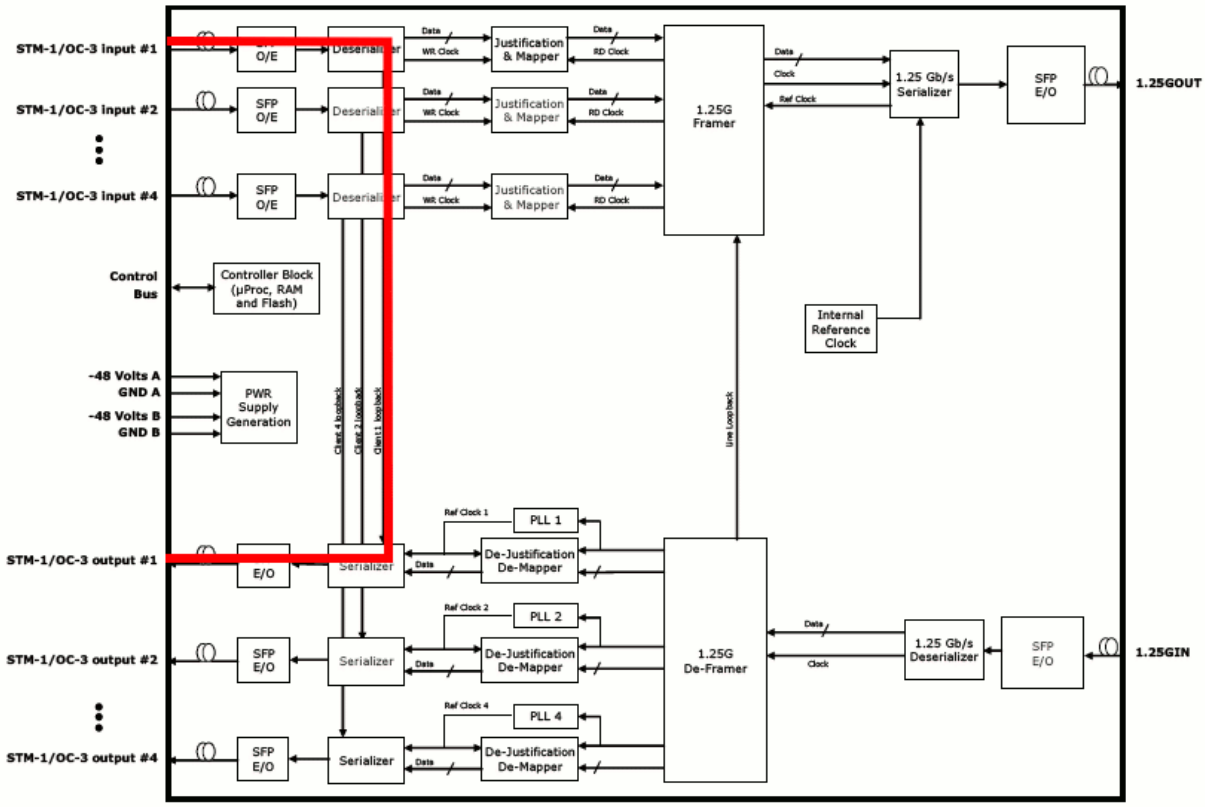

Figure 6: Signal data path in client loop-back operation – SU STM1.

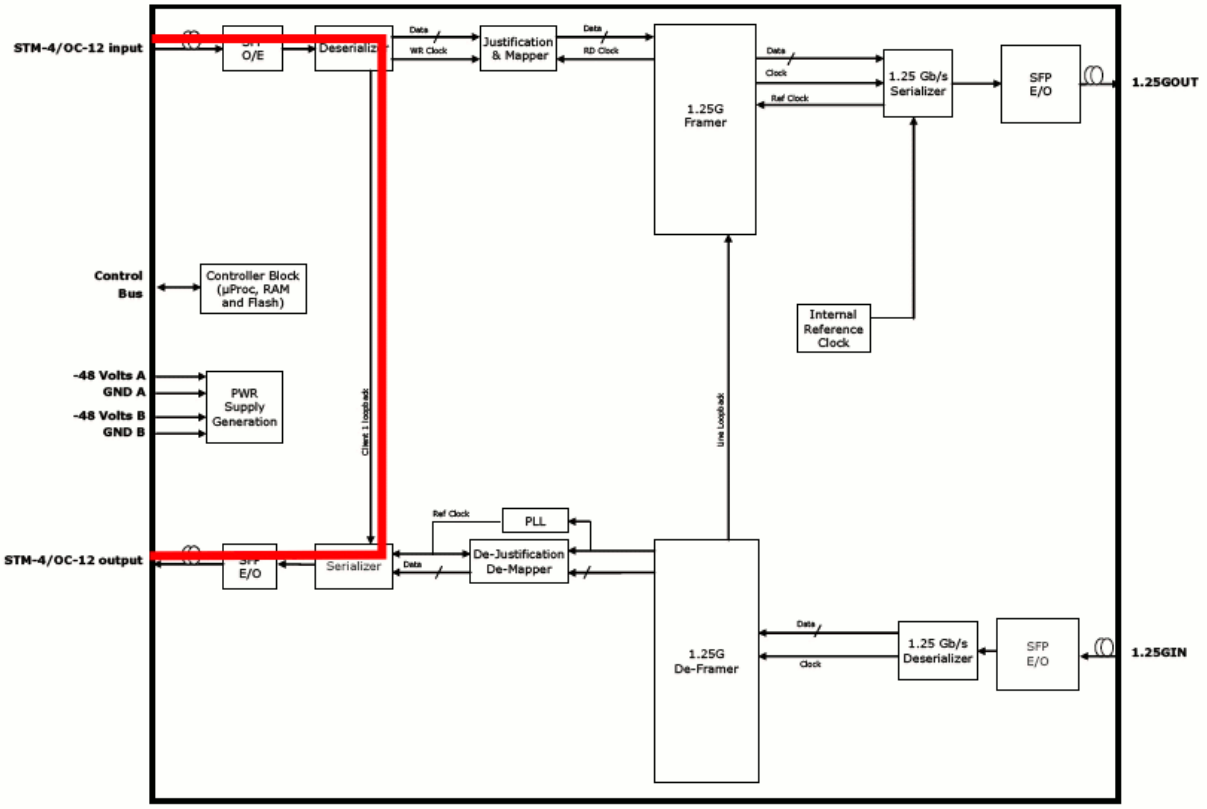

Figure 7: Signal data path in client loop-back operation – SU STM4.

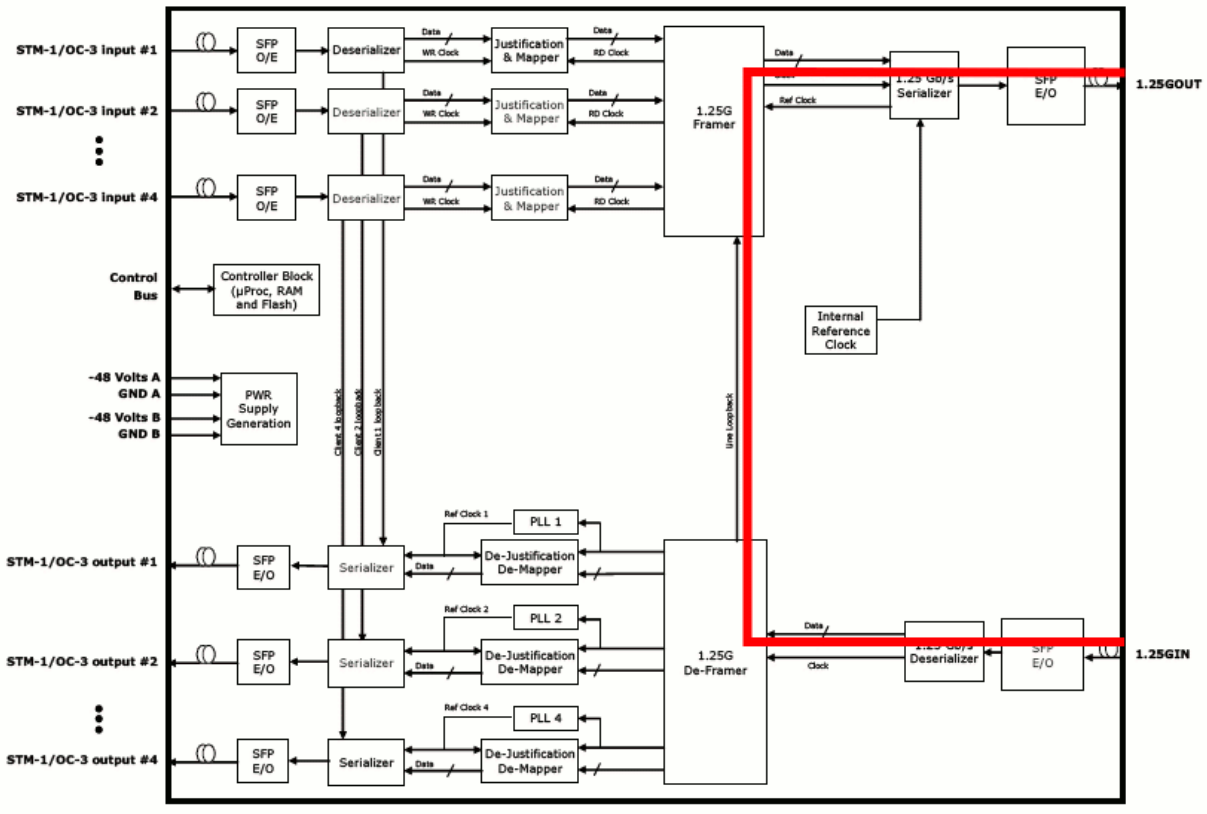

Figure 8: Signal data path in line loop-back operation – SU STM1.

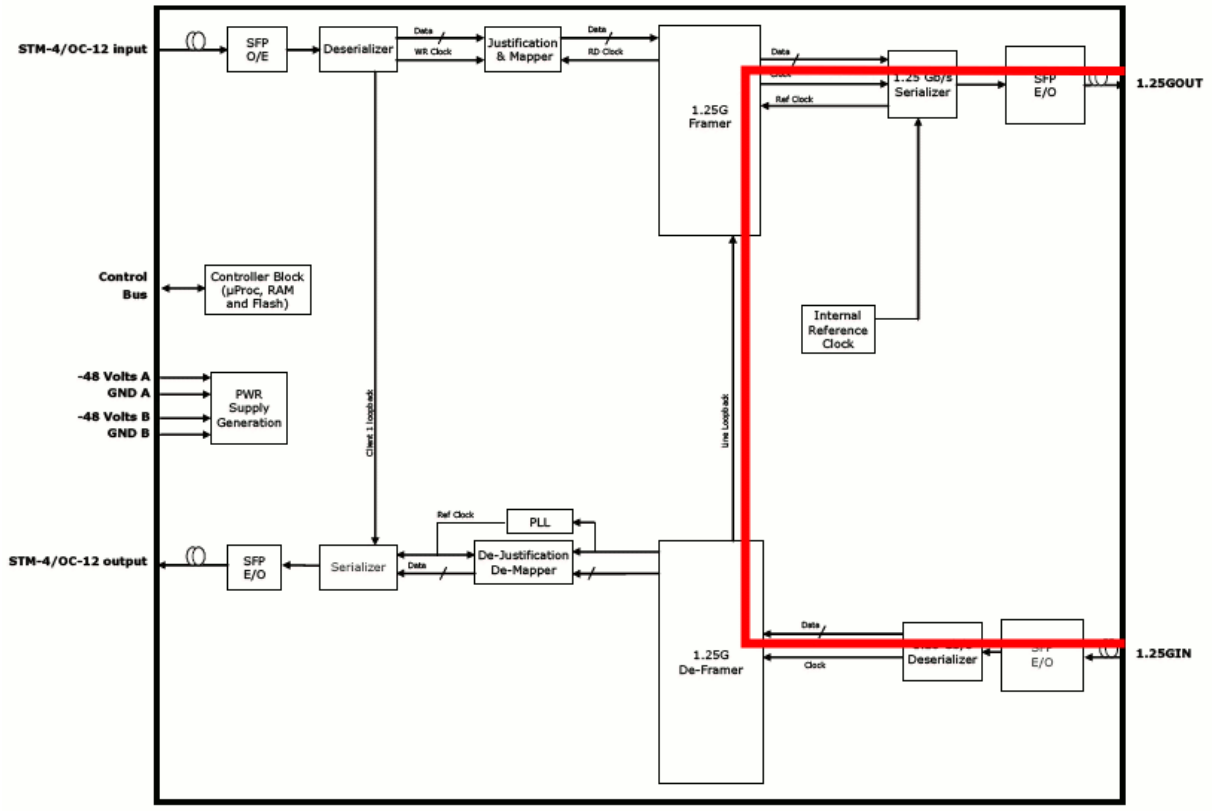

Figure 9: Signal data path in line loop-back operation – SU STM4.

Clock Generation Unit

UpStream Clock Generation Unit

The UpStream Clock generation unit generates all internal clock signals required by the upstream part of the MS430614M. The reference clock is internal to the MS430614M and has a stability of +/- 20 ppm.

Controller Block

The controller block is composed of a microprocessor associated with Flash and RAM memories. The controller block collects information from different functional blocks and configures the HW according to a configuration file received. The raw information (alarms, monitoring, inventory) generated by the HW are processed by the microprocessor and delivered to the Chassis Management Board (MGNT) as high level consolidated data.

Out of Service and In Service states

Client port

An individual command is accessible to set a single client port Out of Service. When a client port is Out of Service, an Out of Service information is sent over the line interface to inform the far end client port that the local client port is Out of Service. So each client port provides the following additional information:

- Local OS: The local client port is Out of Service
- Distant OS: The far end client port is Out of Service

An Out of Service client port has the following behaviour:

- The SFP Laser is be shut down
- All the alarms of this client port are masked (except Local OS and Distant OS).
- All the counters of this client port are disabled (the invalid bit is set).
- All the SFP measurements of this client port are disabled (the value is set to 0).

When the client port is In Service, all the disabled features previously named are enabled again. The alarms are unmasked and the Out of Service information is not sent anymore over the line interface.

Line port

An individual command is accessible to set the line port Out of Service Linked to the Out of Service state, the line port has the following additional information:

- Local OS: The local line port is Out of Service.

An Out of Service line port has the following behaviour:

- The SFP Laser is shut down
- All the alarms of the line port are masked (except Local OS)
- All the counters of the line port are disabled (the invalid bit is set)
- All the SFP measures of the line port are disabled (the value is set to 0)

When the line port is In Service, all the disabled features previously named are enabled again and the alarms are unmasked.

MS430614M

A command is accessible to set the complete MS430614M Out of Service. In that case, all the client ports and the line port are set Out of Service as described in sections Client port and Line port.

Power Supplies

The power supply block generates from the received external -48 volts, the different internal supplies needed.

Interface Specifications

Line and Client interfaces are provided by SFP transceivers. The optical characteristics are therefore given in the data sheet of the SFPs plugged into the MS430614M module.

Front Panel Layout

The MS430614M occupies one slots in the Chassis.

MS430614M – SU STM1

Line and Clients are SFP cages capable of hosting standard SFP modules.

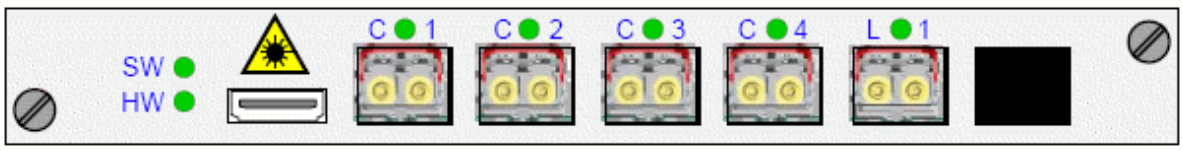

Figure 10: MS430614M – SU STM1 front panel layout.

MS430614M – SU STM4

Line and Clients are SFP cages capable of hosting standard SFP modules.

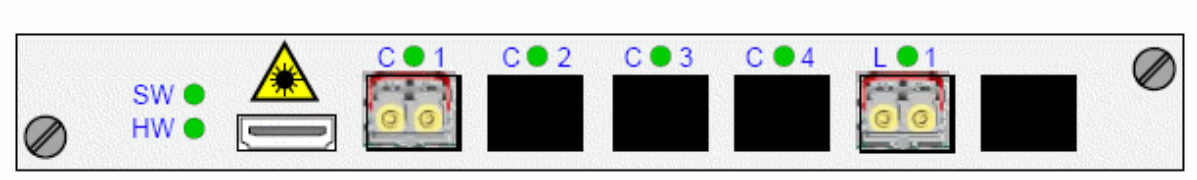

Figure 11 MS430614M – SU STM1 front panel layout

Appendixes

Laser Class

Laser Class	Risks	General Requirements
1	Considered safe to eye and Skin under all reasonably foreseeable conditions of operation.	Protective housing: may be required.

MS430614M Leds description

LED	Status	Condition
SW	Green On	Normal
	Green Flashing	Downloading
	Red On	Init
	Red Flashing	Reboot
	Orange Flashing	MS modules s/w non operational
HW	Green On	Normal
	Red On	Init./Reboot
Access	Green	Normal
	Red	Line fault

Technical Specifications

Type	4 port TDM Multiplexer	
LED displays	*SW*	Software loading
	HW	Hardware ready
	Los	Signal lost
	Fail	Transmission failure
Power consumption	12 W typical with SU STM1	
	14 W typical with SU STM4	
Operating temperature	0°C to 50°C	
Storage temperature	-20°C to 85°C	

Order Information

Art. No.	Description	Connectors
MS430614M	TDM Unit 4x FE/ 4x ESCON/ 4x STM1/ 1x STM4, SFP Slots (not included)	