

STM 1/STM 4

Introduction

The main subsystems of the MACP-STM-1-MUX equipment are defined according to the overall system functions. These functions are distributed among multiple hardware blocks, crossing boundaries of a single card or system. Accordingly, the MACP-STM-1-MUX equipment consists of four basic functional sections:

- Traffic path circuitry (including the aggregate line interfaces and the tributary interfaces)
- Control and Communication subsystem
- Timing and Synchronization subsystem
- Distributed Power Feed subsystem

Functional Description

The functional description of these subsystems is presented in this section, along with the principles underlying the system operation and additional design features.

Traffic Interfaces Functional Definition

MACP-STM-1-MUX equipment consists of a 1U Box assembly, which contains 21 2Mb/s tributary interfaces, three 34Mbps/45Mbps interfaces and 8 10/100 interfaces. In addition, the additional capacity provided by the MACP-STM-1-MUX equipment can provide dynamic allocation according to changing traffic demands. The aggregate line interfaces provide the access to the lines interconnecting the various MACP-STM-1-MUX

equipment locations. The interface operates at the SDH STM-1 (155.52Mb/s) rate. The optical aggregate interfaces are used when a fiber optical cable connects the MACP-STM-1- MUX equipment to another MACP-STM-1-MUX equipment located at a remote site. There are up to two pairs (transmitter / receiver) of aggregate line interfaces for the operation as an ADM in a dual-ring configuration (with or without aggregate protection). A total of twentyone 2Mb/s tributary interfaces (TU12) can be dropped and inserted at a given time at each node. Although the foremost application of the MACP-STM-1-MUX equipment is expected

to require unframed 2Mb/s interfaces, 34Mb/s, 45Mb/s and 10/100baseT (auto-sensing) Ethernet as well as other interfaces are also supported.

Control and Communication functions

The MACP-STM-1-MUX equipment is controlled and managed by a central processor, which communicates with the various system parts and with the outside world. The software contained in the system enables the easy upgrading of the software through remote downloading.

Timing and Synchronization Features

The system is synchronized during normal operating conditions to a selectable synchronization source. A voltage-controlled crystal oscillator is locked to this source and provides internal MACP-STM-1-MUX equipment timing as well as SDH line transmission timing. This source can be an external clock, tributary timing, or SDH line timing. The MACP-STM-1-MUX equipment is capable of a 4.6-ppm stable holdover mode when the external synchronization sources are unavailable. This is provided in redundant configuration.

Power Feed subsystem

The MACP-STM-1-MUX equipment works on external -48V DC. On board Power supply module converts this -48V into a low voltage DC that is further used on the card for deriving the required power.

Traffic Paths Data flow

The traffic path circuits provide the fabric through which the data for the tributary interfaces and the bypassing data are transported. The MACP-STM-1-MUX equipment supports ring and point-to-point applications, with

an Add/Drop Cross connect, Local Cross Connect and terminal capability at each node. The protection philosophy is different in each type of application, as will be described below. In general, however, a PDH signal connected to a tributary interface is adapted to the SDH format, mapped, added to the aggregate signal and transmitted to another system. On the receiving end, it is converted back to the internal format, dropped to the destination interface and converted to the appropriate format for that tributary interface.

Control and Communications

The main processor of the MACP-STM-1-MUX equipment is responsible for controlling the system and communicating with the local PC-based Element Management system. The MACP-STM-1-MUX provides two external interfaces, the physical connection of the Network Management (NM) at one node (the gateway node) and support for SNMPv2c interface to the telecommunications Management Network (TMN). There is also provision for retaining of all backup memory and allows remote software downloading of upgrades, via the communication interface.

Timing and Synchronization

The timing generation and synchronization subsystem provides a central timing source within the MACP-STM-1-MUX equipment. This timing is distributed to all elements on the traffic paths. In order to pass error-free digital signals between MACP-STM-1-MUX equipments or from MACP-STM-1-MUX equipment to another digital system such as the switch or a digital cross connect all systems must be synchronized. This synchronization is accomplished by frequency-locking the MACP-STM-1-MUX equipment-timing generator to a signal originating from a common timing source. Therefore, as one of the MACP-STM-1-MUX equipment within the network usually receives its timing from an external clock of higher stratum, other MACP-STM-1-MUX equipments derive clock from the received signal. The MACP-STM-1-MUX equipment provides a 4.6-ppm long-term free-running clock with multiple source clock selection capability.

System Configuration

The Customized STM1 module is managed by the SNMP management software. For detailed operation instructions for the Customized STM1 module management software, please refer to the NMS user guide. The following description is related to the operation of the Customized STM1 module multiplexer only second port of the Ethernet interface is used for management access. The RS232 interface can also be used for configuration settings. To have a details on the CLI Commands please refer the STM-1_CLI_MANUAL.

Features and Specifications

Physical		Description
Dimension		[HxWxD]: 20x268x303 mm
Power		-48V DC (-35 to -75V), 60 W(max)
Interfaces		<ul style="list-style-type: none"> • 2 Optical Interfaces at 155Mbps • 2 ESSI Link interfaces.
Operating Environment		Operating Temperature: 0°C to 50°C Relative Humidity: 95% non-condensing at 35°C.
Optical Interfaces		<ul style="list-style-type: none"> - One L-1.1 complaint interface as per G.957 - One S-1.1 complaint interface as per G.957 - Automatic Laser Shutoff functionality as per G.957 - Meets Jitter requirements as per G.813
Common		Description
Network Topology		Linear Ring
Protection		1 + 1 Multiplex Section Protection (MSP) Sub Network Connection Protection (SNC-P) VC-trail Path Protection
Network Timing		<ul style="list-style-type: none"> - Recovered Clock is supported - Internal Oscillator capable of Stratum-3 SEC - Synchronization of system as per G.813 - Supports SSM byte
Network Element Configurations		<ul style="list-style-type: none"> - Single/Dual terminal Multiplexer - Add/Drop Multiplexer - Regenerators - Cross connect
System Management		Description
Ethernet	2 x 10/100Base-Tx	- RJ-45 UTP Cat.5/5e, max length is up to 100m
	Flow Control	<ul style="list-style-type: none"> - Back pressure at half duplex - Flow control at full duplex
	Auto Negotiation	- 10/100 link detect automatically
	Auto MDI-X	- Support on both Straight & cross cable connection
	No of Ports	- 2 ports, one for Management and other for Cascading
Console		- Local Console Port: RS-232
Telnet		- Max. 4 sessions
SNMP Agent		- SNMP v1/v2c
OAM and Traps		Fault Management <ul style="list-style-type: none"> - Network side fault status - Remote fault status Configuration Management <ul style="list-style-type: none"> - Network modeling - Synchronization configuring - Diagnostic loop backs Performance monitoring as per G.784 <ul style="list-style-type: none"> - B1/B2/B3/Bip-2 Errors - Packet loss - Number of packet send - Number of packet received - Link bandwidth Port Trap <ul style="list-style-type: none"> - Link up - Link down
FTP		Image upgrade via FTP interface