



KEY Features

- | Multi-port 10Gb Carrier Ethernet switch: cost effective 10G transport networks compared to SDH/SONET MSPP 10G networks
- | 1U 19" rack with up to 24 x GbE ports and up to 4 x 10GbE ports, with user configurable line or client port configuration
- | Traffic flow and EVC classifications based on UNI Ports, IP subnet, MAC address, Ethernet Protocol type, DSCP/TOC/Drop Precedence, IP/TCP protocol, 802.1p and 802.1Q
- | SLA: CIR and PIR per flow/EVC with rates up to the port physical rate. The granularity is 512k/s with up to 1000 flow
- | QoS: traffics trTCM (RFC2607) policing, queuing and multiple scheduling schemes, and shaping with up to 8 CoS
- | Supports OAM 802.3ah, Y.1713, and 802.1ag
- | Support Fast Ring Protection EAPS or G.8032
- | Optional Built-in WDM tray for OADM or MUX/DEMUX, allowing instant capacity upgrade using a combined wavelength aggregation and L2 aggregation
- | Optional Built-in Forward Error Correction for 10G Transport
- | In-band and remote user management, Java GUI



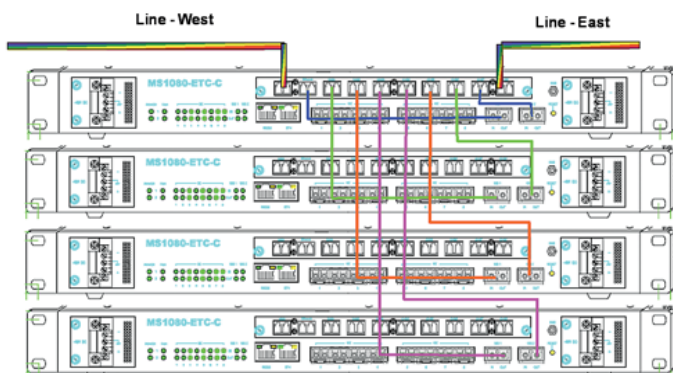
MTS1080 shelf

Benefits

Ethernet services are data networking services that allow you to connect LANs within and between metropolitan areas in a simple, cost-effective way. In contrast to DS1/DS3 private lines, frame relay, or ATM networking, they are:

- ◆ Simpler to manage because you can treat all your connected LANs as one large network, even across the country.
- ◆ Easier to set up because you only need a standard LAN connection plug.
- ◆ Lower in price because you no longer need to purchase expensive dedicated circuits and additional customer-owned transport equipment to connect sites.

Because Ethernet Services are so simple to maintain, you no longer need a large technical support staff to realize the benefits of a broadband LAN interconnection. And they can be provisioned quickly since no local loop connection is required.





MTS1080 is a next generation high density Carrier Ethernet switch with up to twenty four 1000BaseFx SFP (fiber optic port) switched ports and four 10GbE ports. The 10G ports are implemented using XFP modules. Single pair of fiber transmission is possible by using XFPs with DWDM technology.

APS for Ring Protection

With this system, 1GbE port based circuit could be provisioned from end to end with guaranteed bandwidth and QoS by using network circuits OAM&P and VLAN tunneling. In addition, Ethernet ring topologies can be established with protection mechanism using either EAPS (per RFC3619), or G.8032. EAPS or G.8032 is similar to the Spanning Tree Protocol (STP) but offers the advantage of recovering link failures in significantly less time (<50 ms) than STP (several seconds) or Rapid Spanning Tree (<1 second). In addition, EAPS or G.8032 permits ring based operation without xSTP. This circuit based transport network is significantly more bandwidth- and cost-effective than corresponding SDH/SONET MSPP systems.

QoS

Carrier Ethernet service also defines attributes such as the Bandwidth profile, which includes:

- a Committed Information Rate (CIR),
- Excess Information Rate (EIR), (or a PIR Peak Rate, which is the sum of the CIR and EIR)
- Committed/Excess Burst Size (CBS/EBS).

MTS1080 offers to service providers the capability to deliver bandwidth services with defined priority.

Conformance	Color	Service Frame Delivery
CIR		Service Frames green and delivered per the performance objectives specified in the SLA/SLS.
EIR		Service Frames are yellow and may be delivered but with no performance assurances.
None		Service Frames are red and dropped.

QinQ

Due to VLAN tagging (acc. to 802.1Q) this system is able to transparently interconnect networks of different customers while maintaining complete isolation between their networks. Using the tunneling feature (QinQ), service providers can use a single VLAN to support customers who have multiple VLANs.

OAM

First and foremost, Carrier Ethernet is significantly enhanced by carrier-class OAM or Operations, Administration, and Maintenance. To provide highly reliable services to customers, service providers need a comprehensive and powerful set of monitoring and management capabilities. Several standards have been developed to serve this need:

- ITU standard Y.1731 and IEEE standard 802.1ag have been developed for end-to-end fault management and performance monitoring of Ethernet services and infrastructure.
- IEEE 802.3ah addresses similar concerns but for the link instead of for the end-to-end connection.



MGMT

MTS1080 extended management features offer customers a product that fulfills current standard network requirements. The system supports in-band remote management, and offers GUI based Network Management Software, CLI, and SNMP agent. The system supports port and circuit performance monitoring for both optics and Ethernet.



Technical Specifications

Interfaces

- 24 x 1000BaseFx fibre optic ports with SFP interfaces
- 2 or 4 x 10 GbE ports with XFP: short, long reach or DWDM
- Optional WDM MUX/DEMUX tray
- RS232 local craft interface
- Ethernet remote management port

L2 Switching

- Auto-negotiation for port speed and duplex mode Flow Control:
- IEEE 802.3x & Back-Pressure
- Spanning Tree Protocol:
 - IEEE 802.1D Spanning Tree Protocol (STP)
 - IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- VLANs:
 - 4K IEEE 802.1Q VLANs
 - Port-based VLAN
 - Q-in-Q 802.1ad
 - Add inner tag
 - Remove inner tag
 - Inner tag translation
- Link Aggregation:
 - Static Trunk
 - IEEE 802.3ad LACP
 - Load Balancing: SA,DA,SA+DA,SIP,DIP,SIP+, DIP
 - Trunk groups: 8

QoS

- 8 Priority Queues
- Two levels of hierarchical scheduling policing parameters: CIR, PIR, CBS, EBS
- Priority Queues Scheduling Scheme: SP, WRR, WDRR, SP+WRR/WDRR
- Rate Limiting: 1Mbps per step
- UNI port Egress Policing Per flow, EVC, UNI port
- Total number of flow: >1K

- Traffic classification and priority management based on:
 - IEEE 802.1p
 - IP Precedence/DSCP
 - TCP/UDP port number
 - IP Address
 - Mac Address
 - Ethernet Type
 - C-VLAN
 - RFC 2698 and MEF specs 10 marker (colors)

OAM

- 802.3ah
 - Remote Failure Indication
 - Self Discovery
 - Dying Gasp
 - Link Fault
 - Critical Event
 - Remote Loopback
 - Delay/delay variation
 - Frame loss test
 - User data packets loopback
 - User enable/disable loopback
 - Performance monitoring
 - Errored Symbols Seconds
 - Errored Frames Summary
- IEEE 802.1ag (CFM)
 - Path Discovery
 - Link trace Message and Reply (LTM, LTR)
 - Fault Detection
 - Continuity Check Messages (CCM)
 - Fault verification and isolation
 - Loopback Message and Reply (LBM, LBR)
 - Fault notification and recovery
 - Performance Monitoring
 - Ethernet Frame Loss Ratio (FLR)
 - Ethernet Frame Delay (FD)
 - Ethernet Frame Delay Variation (FDV)
- ITU Y.1731 AIS/RDI/LCK/TST

Automatic Protections

- EAPS (RFC3619)
 - Switchover time: <50ms
- G.8032
 - under 50ms for up to 16 nodes
 - Dual ring
 - Subtending rings
 - Multiple rings
 - CCM OAMPDU failure detection
- Failure detection
 - Loss of Light/Signal
 - Loss of Continuity (CCM)
 - Manually Initiated Switch
- In-service addition of nodes to the ring

Network Management

- Command Line Interface (CLI)
- Java based Graphic User Interface
- SNMP v1,v2
- SSHv2,Telnet
- Remote In-band Management
- FTP/TFTP
- Hitless software local and remote upgrade
- Alarm: traps and dry-contact
- Syslog
- RMON
 - RFC 2613 groups: SMONVlanstat, SMONPrioStat
 - RFC2819 groups: Ethernet history, Alarm, and Event;
 - RFC2819 groups: Ethernet statistics
- Reports for customer validation

SLA Statistics

- Ethernet Frame Loss Ratio (FLR)
- Ethernet Frame Delay (FD)
- Ethernet Frame Delay Variation (FDV)
- Errored Symbols Seconds
- Errored Frames Seconds
- Ethernet statistics
- Link status



Application Example A: 10G Ethernet Service Delivery

Using MTS1080 as an Edge Switch at customer premises, carriers can offer service level agreement based on different fee standards - Gold, Silver, Bronze, Normal. Packets labeled Gold have highest priority to pass, with no danger of losing frames even when there is over subscription (traffic jam). Normal (Standard) service is still based on availability - traffics would be dropped when there is over subscription.



Application Example B: Packet ADM over WDM or Sonet/SDH



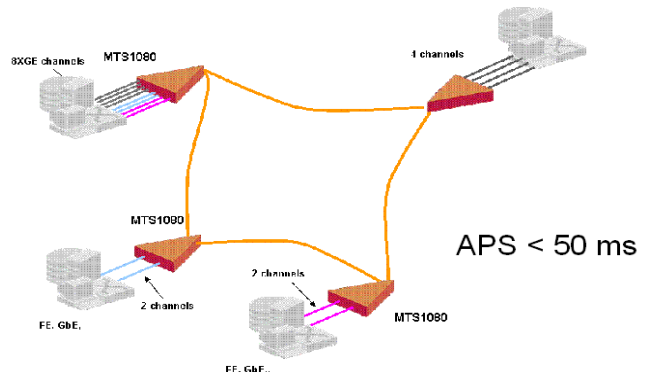
In Metro areas, carrier's networks are often in a ring topology since rings are easy to deploy and provide link failure protection. With MTS Series carrier Ethernet switch, adding Ethernet capacity and services is less expensive, and more flexible than adding additional SONET/SDH capacity. MTS1080 can allow packet ADM in conjunction with WDM equipment.

In this example, at WDM node A, several MTS1080 brings 138xGE on to WDM ring. GE circuits are aggregated on to 10G transport trunks. At various nodes, GE circuits are then dropped via wavelength de-multiplexing and 10G trunks.

This example shows a typical hybrid wavelength and L2 aggregation.

Application Example C: Point to Point or Ring Ethernet Circuit Transport Via L2 Switching

MTS Series carrier Ethernet switch can be used as simple transport device for Gigabit or Fast Ethernet traffics. Due to its Carrier Ethernet characteristics, client traffics are completely isolated thus providing client data security.





Technical Information

Fiber Optic Ports for Gigabit Ethernet	
Port Density	24
Data Rate	1000Base Fx
Wavelength or Distance	Choose SFP separately
Single Fiber Solution	Support Bi-Directional SFP
Fiber Optic Ports for 10 G Ethernet	
Port Density	2 or 4
Data Rate	10 GbE, with or without FEC
Wavelength or Distance	Choose XFP separately
Ethernet Features	
Bandwidth Limitation	tamper-proof in steps of 1 Mbps per port
Performance Monitoring	Yes
DHCP Client Support	Yes
QoS	802.1P, 8 Priority Queues
VLAN Support	Port, EVC or Flow based tagging and QinQ. Policing/Shaping/Scheduling
Supported MAC Addresses	4096
Link Protection (APS)	acc. RFC3619 (EAPS) or G. 8032
Transport Features	
Link Interface	11.1 G (G.709 OTU2) with FEC, or 10.3 G Native Ethernet
FEC Coding	G. 975 (RS 255, 239)
Optical MUX/DEMUX	Custom configured
Network Management	
Ethernet Port	Telnet/SSH
Local Craft	RS232 (VT100)
OAM	802.3ah, 802.1ag/Y.1731
User Interface	SNMPv.2, CLI, GUI
Secure Configuration	SSHv2 (Secure Shell) terminal
Operating Conditions	
Temperature	- 5 to + 55 °C
Humidity	5 to 85% non-condensing
Mechanical	
1U 19" Rackmount	44x 437 x 250 (H x W x D. mm)
Compliance	
NEBS	Level 3 GR-63
EMC	GR-1089
Safety	UL (# E318639); CE (EMC/EMI)
Power Consumption	
	<75W (23 BTU/H)

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Revision History

Date	Revision	Brief Description
9/19/2007	1.0	First release
1/10/2008	2.1	Add Application A,B,C and Feature
4/9/2008	2.3	Add OAM, QoS explanation
9/28/2008	2.4	Edit specifications and format

