

## Enhanced TT1™ Switch Fabric

### FEATURES

The ETT1™ Chipset provides a full 32-port crossbar-based switch fabric. Shelves of physically separated linecards can be attached to the switch fabric by fiber optic links running the Linecard-to-Switch (LCS™) protocol.

### CONFIGURATIONS

- 320 Gbit/s aggregate full-duplex bandwidth with a typical configuration of 32 ports of OC-192c or 10 Gbit/s Ethernet.
- Each port operates at a fixed rate of 25 million fixed-length cells per second. The user payload in each cell can be either 64 or 76 bytes. A 64 byte cell payload is equivalent to a 12.8 Gbit/s line rate.
- Each port can be configured as:
  - a) 1 channel of 25 million cells per second, appropriate for a single OC-192c stream or 10 Gbit/s Ethernet, or as
  - b) 4 channels of 6.25 million cells per second, appropriate for a quad OC-48c linecard.

### SERVICES

- All configurations support four strict priorities of best-effort traffic for both unicast and multicast data traffic.
- TDM service provides guaranteed bandwidth and zero delay variation with 10Mbit/s per channel resolution. Can provide Add-Drop type functionality or ATM CBR service.
- Highly efficient cell scheduling algorithm together with the use of Virtual Output Queues and Virtual Input Queues provides near-output-queued performance in conjunction with the fabric's internal speedup.
- Efficient support for multicast with cell replication performed within the switch core. Up to 4096 multicast groups per port.

### LINECARD SUPPORT

- Linecard-to-Switch (LCS) protocol supports a physical separation between switch core and linecards of up to 200 feet/70 m.
- LCS provides a simple credit-based flow mechanism to avoid cell loss due to buffer overrun.

### MANAGEMENT

- In-band management and control via Control Packets. These Control Packets are exchanged between the linecard and the switch core, and enable the linecards to communicate directly with the CPU that controls the switch fabric.
- Out-of-band (OOB) management and control via a dedicated CPU interface. Every ETT1 device has an OOB interface that provides a CPU-based control and diagnostics interface. A single CPU can control every ETT1 device in a full fabric.

### FAULT TOLERANCE

- Optional redundancy of all shared components for fault tolerance. A fully redundant fabric is capable of sustaining single errors within any *replicated* device without losing or re-ordering any cells.
- Hot-swap support for live insertion/removal of boards from an active system.

### ADDITIONAL SPECIFICATIONS

- Provides a standard five signal P1149.1 JTAG test port for boundary scan test purposes.
- 2.5V and 1.5V rails. CMOS I/Os are 3.3V tolerant (except JTAG I/Os)

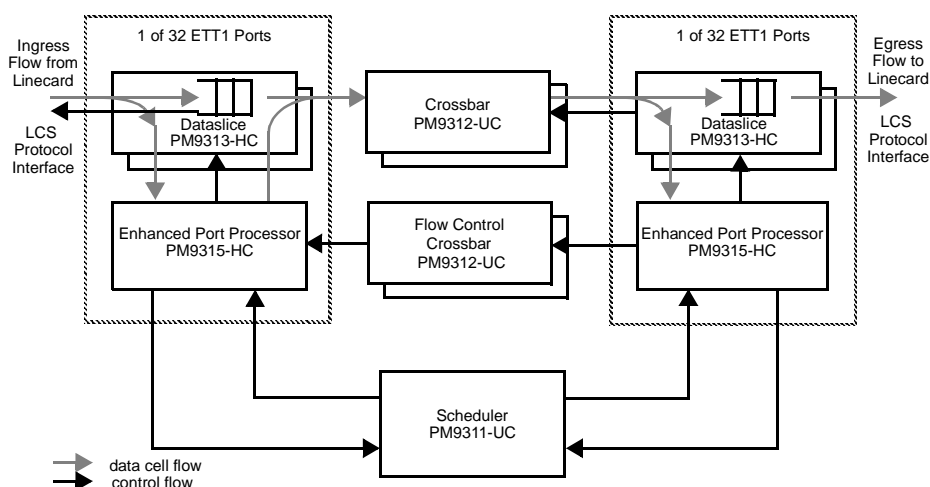
- PM9311-UC and PM9312-UC are in a 1088 ceramic column grid array (CCGA) package. PM9313-HC is a 474 ceramic ball grid array (CBGA). PM9315-HC is a 624 ceramic ball grid array (CBGA).

### DEVICE CONFIGURATION

The following illustration shows how the ETT1 devices are configured to create a complete fabric. Many instances of each device may be needed in a fabric. Shown are two fabric ports; each port would be connected to its own linecard(s). While every fabric port is full-duplex, the illustration only shows the ingress stream for the left port and the egress stream for the port on the right.

The linecard sends cells to the ingress queues within the Dataslice devices. The EPP observes their arrival and issues requests to the Scheduler device. At some later time, the Scheduler will issue a grant back to the EPP. On receipt of the grant, the EPP instructs the Dataslice to send the cell at the head of the relevant ingress queue to the Crossbar. The cell passes through the Crossbar and is stored in the appropriate queue at the egress Dataslices. The egress EPP then instructs the Dataslices to send the cell to the destination linecard.

### ETT1™ DEVICE CONFIGURATION



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### SYSTEM CONFIGURATION

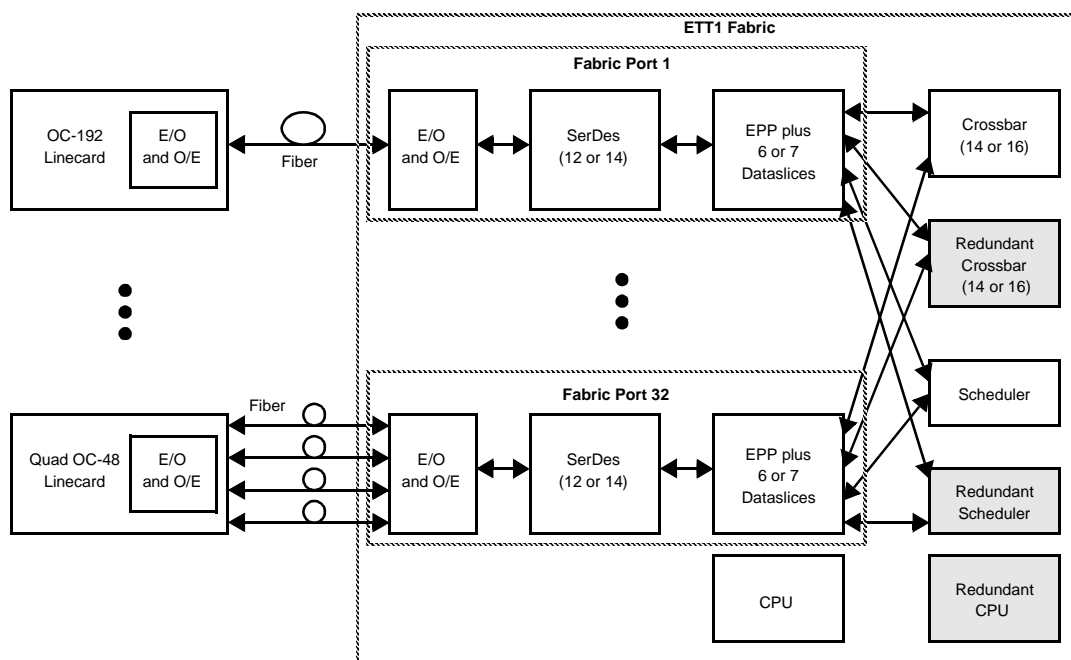
The following illustration shows a complete switch, with 32 linecards connecting to the 32 port fabric. As shown, fiber links are used to interconnect the distant (up to 200 feet) linecards to the fabric.

Alternatively, linecard silicon can interface directly to the ETT1 devices, if sufficient board space, power, thermal regulation, etc., is available.

### APPLICATIONS

- ATM switches with 32 ports of OC-192c, or up to 128 ports of OC-48c, or combinations thereof.
- SONET Add/Drop Muxes.
- IP switches with 32 ports of 10Gbit/s.
- Any combination of the above.

### SYSTEM CONFIGURATION



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