

# Tellabs® 8600 Managed Edge System 24-Port E1/T1 Multiservice Interface Module

## Overview

The Tellabs® 8600 Managed Edge System consists of a range of modular IP/MPLS-based network elements and an integrated network and service management system.

The 24-Port E1/T1 Multiservice Interface Module (IFM) is used with Tellabs 8600 system elements, including the Tellabs® 8660 Edge Switch, Tellabs® 8630 Access Switch and Tellabs® 8620 Access Switch. The module is mounted on the Interface Module Concentrator (IFC) of the Tellabs 8660/8630 switches or in the Tellabs 8620 switch chassis.

The module provides access circuits for IP routing, IP VPNs and ATM, Ethernet, Frame Relay, PPP, HDLC or TDM pseudowires (PWE3). The module can also be used in ATM, Frame Relay, Ethernet and TDM switching applications at E1/T1 or 64-kbps (DS0) level.

## Applications

Increasing volumes of packet traffic in access networks brings continuous challenges to the existing TDM, Frame Relay and ATM access networks. TDM networks are well suited to 64-kbps and E1/T1 transport for services requiring real-time quality. However, TDM networks are not optimal for packet transport, since the bandwidth is dedicated to a user whether it is used or not. Frame Relay and ATM provide statistical multiplexing for packet traffic, but neither of them is future-proof as the focus of the telecommunications industry moves to IP, Ethernet and MPLS. The Tellabs 8600 system is an IP/MPLS platform that can bring higher bandwidths and better cost-efficiency to the access networks. The Tellabs 8600 system enables new services and network convergence while utilizing the existing infrastructure in a most effective manner.

The 24-Port E1/T1 Multiservice IFM enables aggregation and transport of IP, ATM, Frame Relay, Ethernet, PPP, HDLC and TDM traffic coming from existing TDM or data elements used for mobile or wireline service delivery. The E1/T1 interfaces or  $n \times 64$ -kbps (DS0) sub-interfaces of the IFM can be configured for Layer 2 tunneling or IP routing. The user traffic is either switched locally at the Tellabs 8600 system element or transported over an MPLS network by means of a pseudowire.

This module provides enormous flexibility thanks to the great variety of protocols supported in a single physical interface. Protocols are independently software-configurable for each interface.

In the mobile transport network, the 24-Port E1/T1 interface is typically used in Radio Access Network (RAN) hub nodes to aggregate 2G (GSM) TDM and 3G (UMTS) ATM traffic. ATM traffic is either mapped to MPLS, pseudowires enabling MPLS network use for 3G RAN transport, or cross-connected locally between the ATM interfaces of the Tellabs 8600 system network element. Aggregation of ATM cells from E1/T1 to STM-1/OC-3 ATM interface provides savings in network bandwidth and in the physical interfaces of the RNC. The E1/T1 interface supports ATM IMA functionality, which enables larger logical pipes between the 3G Node-Bs and the Tellabs 8600 system. In 2G mobile networks, the



IFM can interface with both the GSM base stations and the BSC. TDM timeslots can be cross-connected at 64-kbps (DS0) granularity on the Tellabs 8600 system platform. In CDMA2000 and WCDMA R5 networks, Tellabs 8600 system elements can perform IP routing for packets arriving on E1/T1 or Ethernet interfaces.

The management control channels (DCN) are typically carried over IP. The Tellabs 8600 system can route DCN channels between an Ethernet interface and in-band channels on ATM VCs.

The Tellabs 8600 system elements can also interface with the IP/MPLS network using either Ethernet or Packet over SDH/SONET (POS) interfaces. This enables MPLS network applications such as IP VPNs and Pseudo Wires.

Frame Relay and PPP are used as data-link-layer protocols in both wireline and mobile networks. For example, the E1/T1 interfaces of the BSC carrying GPRS data via Frame Relay can be connected to the Tellabs 8600 system. The payload on top of Frame Relay and PPP is typically IP or Ethernet. The Tellabs 8600 system can terminate both Frame Relay and PPP for IP routing or Ethernet tunneling over MPLS (pseudowire). Also the system supports multilink versions of PPP and Frame Relay (ML-PPP, ML-FR), which enable bundling of multiple E1/T1 interfaces into a larger logical pipe.

In other applications, the interface can route IP traffic carried on ATM, PPP, Frame Relay, Ethernet or MPLS. The routing can be based on the global routing table or customer-specific VRFs providing an IP VPN service. Alternatively, it is possible to tunnel TDM, Ethernet, PPP, HDLC, Frame Relay and ATM traffic coming through a 24-port E1/T1 Multiservice IFM to an MPLS network. The interface can be used for traffic aggregation from the Tellabs® 8100 Managed Access System and the Tellabs® 6300 Managed Transport System, where the whole management process can be taken care of via the Tellabs® 8000 Network Manager's tools.

## Product description

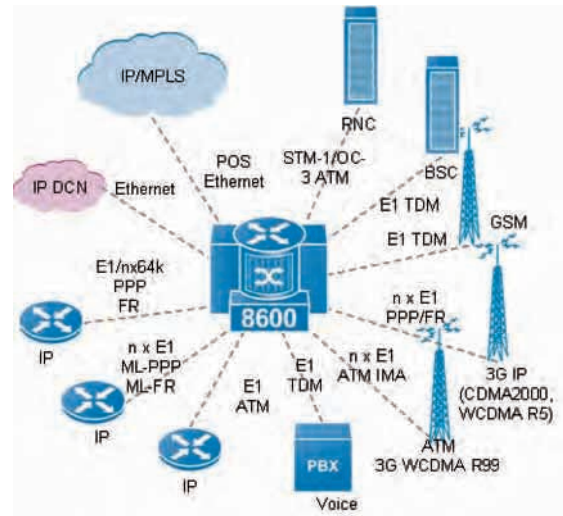
The 24-Port E1/T1 Multiservice IFM supports E1/T1-level granularity for ATM and 64-kbps (DSO) granularity for PPP, Frame Relay, HDLC and TDM circuits.

Each E1/T1 may be configured for ATM, FR/PPP/HDLC or TDM mode. Frame Relay, PPP, HDLC and TDM modes support also 64-kbps circuits. ATM, Frame Relay and PPP circuits can be either terminated for IP routing or tunneled to MPLS pseudowire.

The IFM supports both ATM and DiffServ-based Quality of Service (QoS) features. The interface supports CBR, VBR, UBR+ or UBR service categories with per-ATM VC queuing. Connection admission control (CAC) ensures that resources are properly reserved for the CBR service category while overbooking is utilized for delay-tolerant services. The E1/T1 interface supports unchannelized 2048- or 1544-kbps mode with byte structure per G.704. The ATM bandwidth of the E1/T1 interface is 1920 kbps (30 timeslots) and of the T1 interface is 1536 kbps (24 timeslots). ATM IMA enables grouping of multiple E1s or T1s into a single logical n-x-1920/1536-kbps pipe. Also the IFM supports multilink PPP and Frame Relay (ML-PPP, ML-FR).

The interface supports ATM, Frame Relay, PPP, HDLC, Ethernet and TDM pseudowires based on IETF specifications. ATM encapsulation to MPLS is according to n-to-1 cell mode, and both ATM VPs and VCs can be mapped to pseudowires. The pseudowire labels can be distributed with targeted LDP or assigned statically. The setup of a PSN tunnel for the pseudowires can be signaled with RSVP-TE or LDP.

ATM VP and VC cross-connection is possible from a pseudowire to an ATM interface or between two ATM interfaces. For example, ATM VP/VC cross-connection can be configured between E1/T1 and STM-1/OC-3 (VC-4/STS-3c) or E1/T1 and channelized STM-1/OC-3 (VC-12/VT1.5). Both E1/T1 and channelized STM-1/OC-3 support IMA, so larger-than-2-Mbps ATM VPs or VCs can be cross-connected.



## Network management

As part of the Tellabs 8600 system, the 24-port E1/T1 Multiservice IFM is fully managed with the Tellabs® 8000 Network Manager. All interface-, service- and connection-level parameters are configured remotely through the Tellabs 8000 network manager's GUI-based tools. This is the primary and easiest way to configure the unit and the network.

The Tellabs 8000 manager also provides centralized fault and performance monitoring, as well as in-built testing capabilities.

Alternatively, CLI can be used for setting up the parameters for the module. SNMP is supported for monitoring purposes – e.g., for fault and performance management for other systems.

The Tellabs 8000 manager takes care of maintaining full consistency between the network elements and the database.

## Physical interface

- 24 balanced E1 interfaces, G.703 or 24 balanced T1 interfaces, T1.403
- E1/T1 cabling via four Sofix connectors
- Line termination impedance of 120 Ω for E1 and 100 Ω for T1
- E1 surge requirements K.41 (500-V differential)
- T1 surge requirements GR-1089-CORE (800-V differential)
- E1/T1 interface that may be synchronous to the node clock or loop timed
- E1/T1 interface capable of providing the node timing source

## Encapsulations

- ATM
- FR\*
- VLAN/Eth/FR (RFC 2427)
- VLAN/Eth/PPP\*
- IPv4/LLC/AAL5/ATM (RFC 2684 SNAP)
- IPv4/VCmux/AAL5/ATM (VCmux)\*
- IPv4/VLAN/Eth/AAL5/ATM (RFC 2684 SNAP and VCmux)\*
- IPv4/PPP (RFC 1662)
- IPv4/FR (X.36 Annex D, RFC 2427, FRF.3.2)
- IPv4/VLAN/Eth/FR (RFC 2427)
- IPv6/AAL5/ATM (RFC 2684 SNAP or VCmux)\*
- IPv6/PPP (RFC 2472)\*
- IPv6/FR (X.36 Annex D, RFC 2427, FRF.3.2)\*
- IPv6/VLAN/Eth/FR (RFC 2427)\*

## Functionality

- IP VPN (RFC 2547bis)
- IP routing (IP over PPP, FR or ATM)
- ATM VC/VP cross-connections
- ATM over E1, af-phy-0064.000
- ATM over DS1, af-phy-0016.000

- ATM IMA v1.0, v1.1, af-phy-0086.001, 24 ATM IMA groups, 1–24 x E1/T1 per group
- ML-PPP
- ML-FR\*
- 64-kbps (DS0) granularity for FR, HDLC\*, PPP and TDM
- ATM pseudowires, draft-ietf-pwe3-atm-encap (n-to-1 mode, cell concatenation)
- Ethernet pseudowires, draft-ietf-pwe3-ethernet-encap
- Frame Relay pseudowires, draft-ietf-pwe3-frame-relay\*
- PPP/HDLC pseudowires, draft-ietf-pwe3-hdlc-ppp-encap-mpls\*
- E1/T1 TDM pseudowires, draft-ietf-pwe3-satop
- n x 64-kbps (DS0) TDM pseudowires, draft-ietf-pwe3-cesopns

## QoS

### DiffServ

- Strict Priority and weighted fair queuing (WFQ) scheduling
- DiffServ traffic policing with two-rate three-color marker (RFC 2698)
- RED and WRED queue management
- Traffic shaping per VLAN
- DiffServ aware MPLS Traffic Engineering (E-LSP and L LSP)
- Traffic classification based on ingress port, 802.1Q (VLAN), 802.1P (PRI) MPLS EXP, L-LSP, DSCP or L3/L4 header fields
- RSVP-TE CAC with overbooking option

### ATM

- CBR, rt-VBR, nrt-VBR, UBR+ and UBR service categories
- ATM Forum Traffic Management 4.1
- VP/VC shaping
- VP/VC policing\*
- ATM interface CAC (sum of ATM VPs)
- CAC for CBR, VBR, UBR+ and UBR

- CAC overbooking option
- QoS mappings based on ingress port\*, ATM VPI or VCI

## Power consumption

- 11 W

## Environment

- Storage: ETS 300 019-1-1:2003-04 Class 1.1, temperature: –5° C to 45° C
- Transportation: ETS 300 019-1-2:2003-04 Class 2.3, temperature: –40° C to 70° C
- Normal operating conditions: ETS 300 019-1-3:2003-04 Class 3.2 (non-condensing), temperature: –5° C to 45° C, relative humidity: 5% to 95%
- NEBS Level 3

## Regulatory

- Safety: EN 60950-1:2001
- EMC: EN 300 386:2000 and EN 300 386:2001
- RTTE Directive 1999/5/EC
- NEBS Level 3

## Availability

This is a general-availability product

\*For future release

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