

# Tellabs® 8600 Managed Edge System

## 1-Port Channelized STM-1/OC-3 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 1-Port Channelized STM-1/OC-3 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 Pseudo Wires (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 volume 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 the rollout of new services and network convergence while utilizing the existing infrastructure in a most effective manner.

The 1-Port Channelized STM-1/OC-3 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 VC-12/VT1.5 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 sub-interface.

In the mobile transport network, the channelized STM-1/OC-3 interface is typically used in Radio Access Network (RAN) hub nodes to aggregate 2G (GSM) TDM and 3G (UMTS) ATM traffic. ATM cells are aggregated from channelized STM-1/OC-3 in the Tellabs 8600 system elements and transported to the RNC over an unchannelized STM 1/OC 3 ATM, STM-1/OC-3 POS or Ethernet uplink. The channelized interface supports ATM IMA functionality as well as ATM VC/VP switching to optimize the interface usage in RNCs. In 2G mobile networks, the channelized STM-1/OC-3 can



interface for both the TDM network and the BSC since most such networks support a channelized interface. TDM timeslots can be cross-connected at a granularity of 64 kbps (DS0) at the Tellabs 8600 system unit. In CDMA2000 and WCDMA R5 networks, the Tellabs 8600 system elements can perform IP routing for packets arriving on VC-12/VT1.5 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 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 mobile and wireline 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 (Pseudo Wire). 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 channelized STM-1/OC-3 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 1-Port channelized STM-1/OC-3 Multiservice IFM has E1/T1-level granularity for ATM and 64 kbps (DS0) granularity for PPP, Frame Relay, HDLC and TDM circuits.

The IFM provides advanced aggregation of E1/T1 circuits carried over the SDH/SONET network. In SDH configuration mode, the module is capable of supporting channelization into 63 independent VC-12 containers carrying E1. Each VC-12 may be configured for ATM, FR/PPP/HDLC or TDM mode. Frame Relay, PPP, HDLC and TDM modes support also 64-kbps (DS0) circuits. ATM, Frame Relay and PPP circuits can be either terminated for IP routing or tunneled to MPLS pseudowire. In SONET configuration mode, the module is capable of supporting channelization into 84 independent VT1.5 channels carrying T1. Each T1 or DS0 channel may be configured similarly to the SDH version.

The interface supports ATM, Frame Relay, PPP, HDLC, Ethernet and TDM Pseudo Wires 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 Pseudo Wires. The Pseudo Wire labels can be distributed with targeted LDP or assigned statically. The setup of a PSN tunnel for the Pseudo Wires can be signaled with RSVP-TE or LDP.

The IFM supports ATM IMA, multilink PPP or Frame Relay (ML-PPP, ML-FR), as well as both ATM and DiffServ-based Quality of Service (QoS) features.

1+1 MSP protection can be used between STM-1/OC-3 interfaces to provide link-level protection between the network elements. The working and protecting links are located in different IFCs, providing protection against the effects of line card failures.

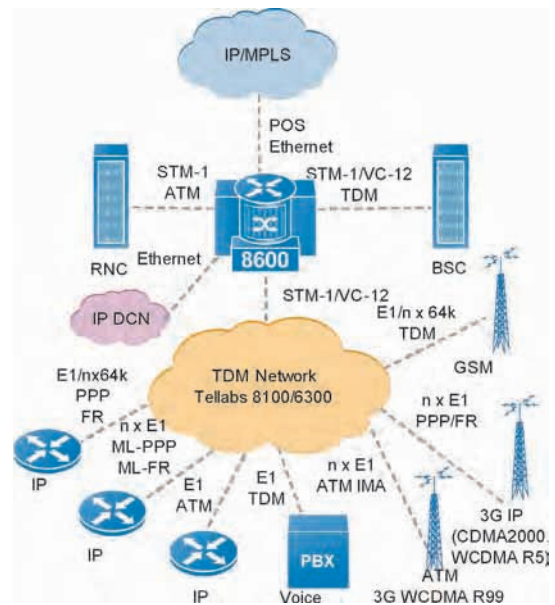
## Network management

As part of the Tellabs 8600 system, the channelized STM-1/OC-3 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 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

### ETSI

- One STM-1 G.957 physical interface
- Replaceable SFP modules with multiple reaches and types including electrical interface
- 1+1 MSP protection
- G.707 multiplexing
- 63 asynchronous adaptations of E1 to VC-12
- G.704 framed E1 or unframed E1 (2048 kbps)

### ANSI

- One OC-3 T1.105 physical interface
- Replaceable SFP modules with multiple reaches and types including electrical interface
- 1+1 APS protection
- 84 asynchronous adaptations DS1 to VT1.5
- Framed and unframed DS1

## Encapsulations

- ATM
- FR\*
- VLAN/Eth/FR (RFC 2427)
- VLAN/Eth/PPP\*
- MPLS/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)
- IPv4/MPLS/PPP
- 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)\*
- IPv6/MPLS/PPP\*

## Functionality

- IP VPN (RFC 2547bis)
- IP routing (IP over PPP, FR or ATM)
- ATM VC/VP cross-connections
- ATM IMA, 63/84 IMA groups, 1–31 E1s/T1s per group
- ML-PPP
- ML-FR\*
- 64-kbps (DSO) granularity for FR, HDLC\*, PPP and TDM circuits
- 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 (DSO) TDM pseudowires, draft-ietf-pwe3-cesopsn

## 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 UBR/CBR/VBR
- CAC overbooking option
- QoS mappings based on ingress port\*, ATM VPI or VCI

## Power consumption

- 13 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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