Nokia 1850 Transport Service Switch 5C
Release 6.1

The Nokia 1850 Transport Service Switch 5C (TSS-5C) is a compact Packet Optical Transport (POT) switch and Ethernet access demarcation device that is ideally suited for mobile backhaul and business Ethernet services. High-availability, mission-critical Ethernet and E1/DS1/STM-1 services are supported by a comprehensive set of Packet Transport Network (PTN) and Carrier Ethernet features. The 1850 TSS-5C extends Multiprotocol Label Switching – Transport Profile (MPLS-TP) capability to the customer premises and complies with Metro Ethernet Forum (MEF) standards.

Resiliency and reliability for packet and TDM traffic are assured by multiple network path and link protection mechanisms supported by hardware-based data plane operations, administration and maintenance (OA&M). End-to-end OA&M greatly simplifies the task of meeting strict Service Level Agreements (SLAs). The challenge of delivering timing to 2G/3G/4G base stations is met by the availability of multiple synchronization options.

Designed for outside plant deployment, the 1850 TSS-5C is an excellent converged platform for collecting packet and TDM mobile backhaul traffic at cell sites. It provides a growth path for exponentially increasing IP traffic.

The 1850 TSS-5C is equally well equipped to be deployed as a network termination unit for demarcation, media conversion, and distance extension applications as part of a Carrier Ethernet service offering. Its compact 1RU chassis fits in any wiring closet.

The Nokia 1850 TSS-5C is an integral part of the Nokia 1850 TSS portfolio for POT networks and is fully managed by the Nokia 1350 Optical Management System (OMS).
Features

- Compact 1RU chassis
- 9 Gb/s switching fabric
- Ethernet: Fast Ethernet (FE) and Gigabit Ethernet (GE) interfaces (electrical and optical)
- STM-1 and E1/DS1 interfaces
- Microwave card for integration with the Nokia Microwave Packet Radio (9500 MPR)
- MPLS-TP
- Metro Ethernet Forum (MEF) certified with high reliability and OA&M support
- Circuit emulation over Ethernet with MPLS PWE3
- E-line, E-LAN, and E-Tree services
- Tunnel protection mechanisms
- Multiple synchronization options
- Temperature hardened for outside plant deployment

Benefits

- Enables economies of scale using a single platform for mobile backhaul/transport and Carrier Ethernet services
- Maintains high margin revenue streams from priority traffic with advanced traffic management and QoS features
- Accelerates network transformation from TDM to packet architectures
- Reduces CAPEX by eliminating the need for overlay networks and multiple equipment types
- Reduces OPEX by simplifying operations, training, and network management requirements

Technical specifications

System hardware

- 9 Gb/s switching fabric
- 4 x FE/GE interfaces (small form-factor pluggable [SFP])
- 12 x FE interfaces (electrical)
- Two slots for optional interface modules (hot-swappable)
- Management LAN, console, Management Data Input/Output (MDIO), and station clock ports or external synchronization interfaces
- Power supply (DC or AC)
- Fan tray (hot-swappable)

Nokia 1850 TSS-5C service interface modules

Multiservice modules

- 1 x STM-1 channelized CES (SFP)
- 16 x E1 (75A) CES
- 1 x GE (SFP)

Fast Ethernet modules

- Electrical: 8 x FE (10/100BASE-T)
- Optical: 8 x FE (SFP)

DS1/E1 modules

- 16 x DS1 (100A)/E1 (120A) CES
- 16 x E1 (75A) CES

Synchronization

- Synchronous Ethernet (Sync-E) with Synchronization Status Message (SSM)
- IEEE 1588v2 ordinary, boundary, and transparent clocks
IEEE 1588v2 Time of Day (ToD) and 1PPS I/O ports
Sync I/O ports: 2MHz, E1
IEEE 1588v2 User Datagram Protocol (UDP)/IP encapsulation
Best Master Clock Algorithm (BMCA)

Protection
1:1 bidirectional linear tunnel protection (MPLS-TP)
Configurable reversion modes for ITU-T G.8131 (1:1, 1:N) protection
Dual-homing tunnel protection
IEEE 802.1AX link aggregation
MPLS-TP ring protection switching

Ethernet functionality
32,000-Media Access Control (MAC) table
MEF line E-line, E-LAN and E-tree services
Deep VLAN classification
Jumbo frames
Auto-negotiation, flow control and MDIX
Open Shortest Path First (OSPF) Protocol management (MDs)
Port laser shutdown
Port mirroring: ingress/egress
L2 control protocol filtering/tunneling
L2 Access Control Lists (ACLs)
Multiple classification options
  - Port
  - VID
  - Port Control Protocol (PCP)
  - MAC destination address/source address (DA/SA)
  - IPv4 and IPv6 differentiated service control points (DSCPs)
8 QoS classes
Strict priority, weighted round robin (WRR) scheduling
Tail-drop
Ingress two-rate three-color metering/policing
RFC 2698/MEF 10.1
Class-based queuing
Egress shaping per port/queue
Anti-Denial of Service attack functionality
MPLS label push/pop/swap operations, label edge router (LER) or label switch router (LSR)

Security
Bound MAC table size per service with watermark
MAC ACL extended criteria (IPv4 and IPv6)
Configurable MAC aging and MAC flushing
IEEE 802.1x port-based network access control
Intrusion alarm

PWE3/TDM CES functionality
Related IEEE RFCs: 4553, 4446, 4197, 3985 and 3916
E1/DS1 pseudowires: Structured Agnostic TDM over Packet (SAToP)
1+1 MSP for STM-1 interface
E1/logical E1/STM-1/VC12 port loop-back
TDM CES timing modes
  - TDM loop line
  - E-line (Sync-E or adaptive or differential packet timing)
  - External
  - Free-running
ITU-T G.705 Plesiochronous Digital Hierarchy (PDH) alarms and performance monitoring (PM) counters for E1 physical ports
OA&M

Ethernet OA&M
- IEEE 802.3ah (Ethernet in the First Mile [EFM])
- ITU-T Y.1731/IEEE802.1ag/MEF Ethernet service OA&M
  - CC
  - Loop-back
  - Loop trace
  - Alarm indication signal (AIS)
  - CSF
- ITU-T Y.1731 proactive (one- and two-way ETH-DM)
- ITU-T Y.1731 on-demand one- and two-way ETH-DM, Synthetic Loss Management (SLM)
- MEF S-OA&M
- Port/Ethernet virtual connection (EVC) loop-back
- IEEE 802.3ah link OA&M
- Performance monitoring: Port counters, TCA, Remote Network Monitoring (RMON) ETF RFC 2819, flow counters, per EVC and Tunnel Availability and SLA counters (ITU-T Y.1563)
- Link pass through (LPT) and link loss carry forward (LLCF)
- IEEE 802.1ah Dying Gasp

MPLS-TP OA&M
- ITU-T G.8113.1 MPLS-TP Section proactive (CCM and Remote defect indication [RDI])
- ITU-T G.8113.1 MPLS-TP Tunnel proactive
  - CCM
  - Automatic protection switching (APS)
  - AIS
  - RDI
  - Synth. Loss management (LM)
- Two-way delay measurement
- ITU-T G.8113.1 MPLS-TP Tunnel OA&M On Demand
  - Loop-back on MEP
  - Maintenance domain Intermediary Point (MIP)
  - One- and two-way delay measurement

Management
- Nokia 1350 OMS
- Web browser interface: Zero-installation craft (ZIC)
- Command line interface (CLI)
- TL1, SNMP v2/v3
- Secure Shell (SSH) and Secure Socket Layer (SSL)
- Remote software download via Secure
- Shell File Transfer Protocol (SFTP)
- Ethernet in-band management
- IP routing (iIS-IS) over in-band management channels
- RADIUS authentication
- DCN auto setup

Physical specifications

Dimensions and weight
- Height: 43.6mm (1.73in) – 1 RU
- Width: 442mm (17.40in)
- Depth: 213.2mm (8.35in)
- Weight: max. 4.4kg (9.7lb)
- Wall mount and rack mount kits (19in, 23in, ETSI)

Power
- DC: Redundant -48/-60V DC or +24/-48V DC
- Single AC: 90-264V AC
- Current drain: 3A max. at +24V DC; 1A max at 90V AC
- Power consumption: 45W typical, 80W maximum (without microwave)
Environmental

- Model M4O12FEB compliant to GR-3108 Class 2
  - Operating temperature: -40°C to +65°C (-40°F to +149°F)
  - Humidity: 5% to 85%, non-condensing
- Model M4O12FEK compliant to ETSI 300 019 Class 3.2
  - Operating temperature: -5°C to +45°C (+23°F to +113°F)
  - Humidity: 5% to 95%, non-condensing

Regulatory compliance

- NEBS Level 3 Zone 4, GR-63
- CE certification: EN 300 386
- IEC 60825-1 and IEC 60825-2
- EN 60950-1
- EN 55022 Class A: Radiated and conducted emissions
- EN 300 019 Storage, Class 1.2; Transportation, Class 2.3; Operational, Class 3.2
- ITU-T K.21
- CE 2.0 certification