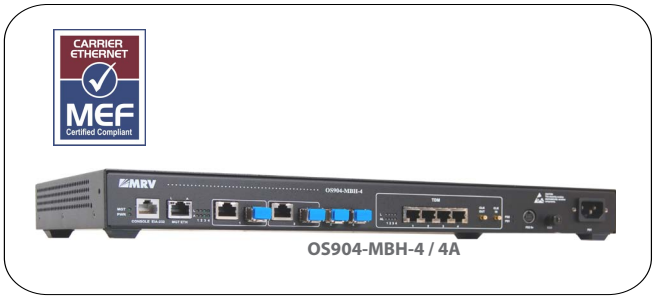
MRV Optical Communications Systems®

EMPOWERING THE OPTICAL EDGE

Datasheet

OptiSwitch® 904-MBH - 4 / 904-MBH - 4A

Mobile Backhaul Ethernet Solution with Circuit Emulation Services (CES) Support



Overview

The OS904-MBH-4 is a compact Carrier Ethernet cell-site demarcation device that supports both Circuit Emulation Services (CES) as well as clock synchronization over packet switched networks (PSNs). As part of the MBH (Mobile Backhaul) series of products, the OS904-MBH-4 enables cellular operators to migrate their legacy TDM based network to a packet-switched network (PSN) while maintaining the traditional TDM-quality synchronization of their cellular base transceiver stations (BTS).

As a CES supporting device, the OS904-MBH-4 enables the transmission of E1/T1 traffic over a PSN using industry standards (CESoPSN, SAToP and MEF 8). In addition to the well known Adaptive Clock CES mechanism, the solution can function as an Ethernet Equipment Clock (EEC) in a Synchronized Ethernet domain and improves its clocking accuracy by locking to superior network clocks such as a Primary Reference Clock (PRC) or SDH Equipment Clock (SEC). To maintain the ITU G.8264 standard behavior during a holdover period, the OS904-MBH-4 uses an integrated Stratum 3 TCXO oscillator. The device also supports IEEE1588v2 slave functionality* as an alternative synchronization mechanism without replacing current intermediate nodes that do not support SyncE.

Product highlights

- One and the same platform to enable clock synchronized Carrier Ethernet E-Line, E-LAN, E-Tree, EPL services
- Hierarchical QoS for premium SLAs
- End-to-end Service OAM to monitor SLA
  - Y.1731 PM - latency, jitter and loss
  - Y.1563 MEF 10.2 service availability and resiliency measurement**
  - Nano/sec precision measurements
  - RFC 2544 and IP SLA
  - Y.1564 for service turn-up**
- Mobile Backhaul compliance to specifications
  - MEF-22 Implementation Agreement
  - MPLS forum Framework 20.0.0
- All UNI/E-NNI interfaces support precision timing per synchronous Ethernet ITU-T G.8621
- Adaptive Clocking mechanism incorporated in the Circuit Emulation Services solution

Physical Layer Synchronous Ethernet features

- Compliant to ITU-T standards:
  - G.8261 – Timing & synchronization aspects of packet networks
  - G.8262 – Timing characteristics of Eth' equipment slave clock
  - G.8264 – SSM (Synchronization Status Message)
  - G.736, G742, G.813, G.823, G.824
- Input clock priority can be set manually; switchover can occur according to SSM
- Phase transient protection and phase build-out on locked-to reference and on reference switching
- Precision holdover accuracy based on internal Stratum-3 TCXO/OCXO

Precision Time Protocol features

- Compliant to IEEE1588v2 PTP – Telecom Profile
- IEEE1588v2 PTP Slave mode function*

Circuit Emulation features

- CES 4 x E1/T1
- Circuit Emulation over Ethernet/IP networks
- Unstructured & Structured** G.703 & G.704 compliance
- Adaptive Jitter buffer - G.823 & G824 compliance

As a Synchronized Ethernet supporting device the OS904-MBH-4 is an excellent choice for Greenfield installation as it can be located in any part of the Synchronization chain while protecting the investment in any new network infrastructure. High-quality timing synchronization and CES are extremely important in 2G GSM, 2.5G GPRS, 3G UMTS and 4G LTE/WiMAX mobile networks for a successful call signal hand-off between cellular base stations and for transferring structured or unstructured E1/T1 circuits over newly deployed Ethernet devices.

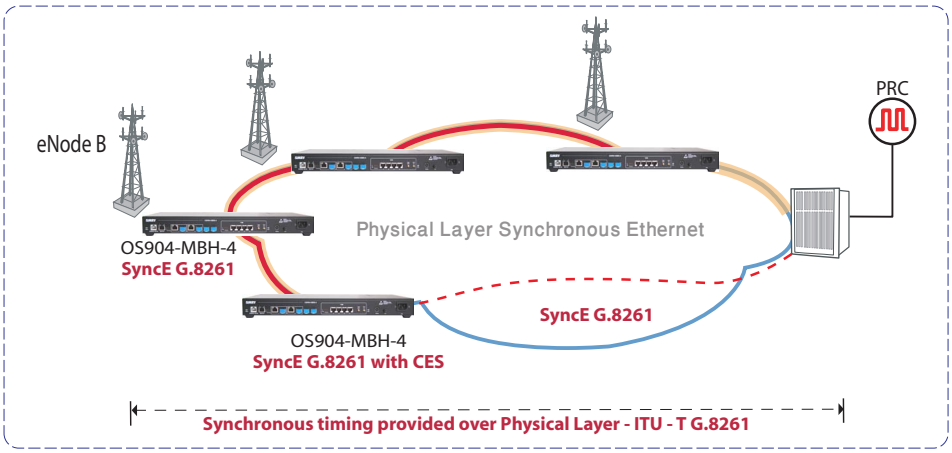
As part of the OptiSwitch®900 series, the OS904-MBH-4 uses the well known Master-OS® software that offers Carrier Ethernet capabilities and enables end-to-end visibility and SLA at each cell site. All timing & synchronization and connectivity services can be monitored remotely with end-to-end Ethernet OAM tools per to IEEE802.1ag CFM, ITU-T Y.1731 PM and RF2544 wire speed throughput analysis.

** IEEE1588v2 funtionality (frequency only) is supported in OS904-MBH-4A*

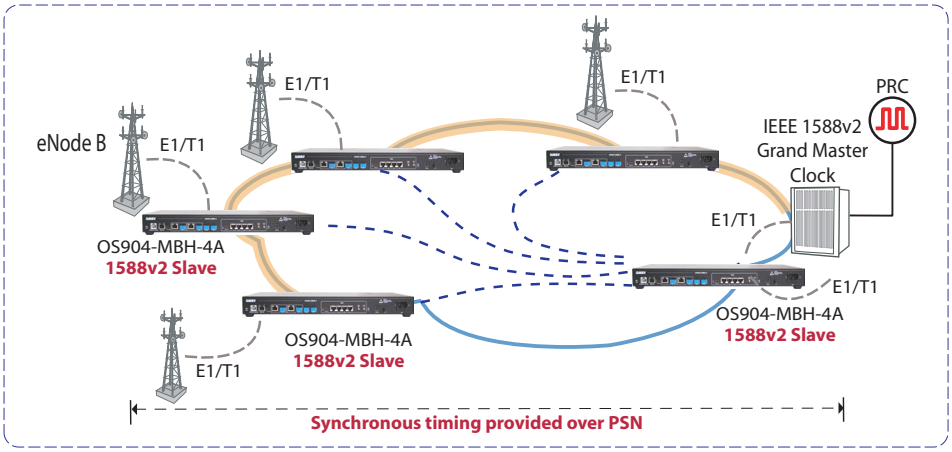
*** future software release*

Applications

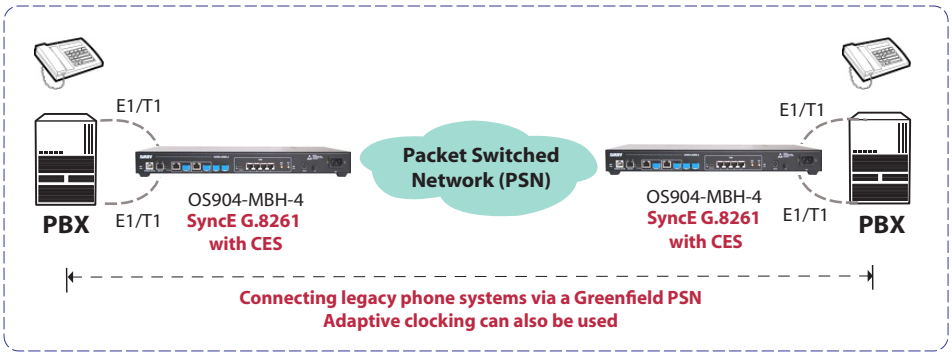
CES over PSN for Cell Side Demarcation using SyncE Clocking



CES over PSN for Cell Site Demarcation using PTP (1588v2) Clocking



CES over PSN for PBXs Interconnection using Adaptive Clocking



Service Specifications

Timing & Synchronization

- ITU-T G.8261, G.8262, G.8264 , ITU -T G.703
- ITU-T G.736, G742, G.813, G.823, G.824
- IEEE1588v2 PTP– Telecom Profile
- PTP IEEE1588v2 Slave mode function (frequency)*

MEF Services

- UNI Type 1 and Type 2 - MEF21
- External-NNI & Internal-NNI
- EPL, E-Line, E-Tree & E-LAN per MEF9
- EPL, E-Line, E-Tree & E-LAN Traffic Mgm. per MEF14
- OAM Implementation Agreement (IA) per MEF17
- Mobile backhaul MEF 22 specification compliant
- All interfaces can be configured as UNI / E-NNI

Packet Switching Services

- IEEE802.1Q and IEEE802.1ad provider bridges
  - 4K active VLANs / EVCs
  - Selective Q-in-Q stacking per ACL criteria
  - Customer VLAN switching over Service VLAN tunnel
  - Inner classification on double tagged frames
  - Configurable Ethertype values per port, VLAN
  - Private VLAN
  - 16,000 MAC addresses learn table
- Transparent cross-connect mode (no MAC learning)
  - Per System, per port or per EVC non-learning mode
- Learning table limit per VLAN/port
- Layer 2 control protocols tunneling / filtering
- UNI protected ports / Layer 1 filtering

Fiber ring and Link protection Services

- Sub 50ms recovery in ring and dual–homed topologies
- IEEE MSTP IEEE802.1s
- ITU-T G.8032 /Y.1344 Ethernet Ring Protection Switching
- Link Aggregation (LAG n+1) – static and LACP
  - Load balancing based on L2-3-4 headers
- Link level 1:1 Loss of Signal (LOS) protection
- CFM (OAM) messages for fault detection and link fallback
- Bi-directional Link Fault Reflection
- Link flap protection and damping
- Unidirectional Link Detection

Traffic Management

- Inbound & Outbound traffic management per flow/EVC
- In-service circuit parameters changes (hitless ACL)
- Rate limit per flow or aggregate
  - Granular CIR/EIR rates up to 1GigE
- Classification by any L2-3-4 criteria and combinations
  - Physical port, MAC, Ethertype, double tagged VLAN, IP/TCP/UDP
- IEEE 802.1p (VPT), DiffServ (IPv4 & IPv6 TC)
- Marking/remarking profiles between layers
  - 802.1p, DSCP & MPLS EXP
- 8 hardware queues per port & configurable SL
- Per flow SLA metrics
  - per UNI, CoS, EVC, control protocols

Availability

- Dual image & rollback processes
- Modular control plane - Master- OS™

Security

- Wire-speed ACLs on L2-3-4 headers
  - Up to 1K rules
  - Ingress and Egress ACLs
  - Multiple actions in single ACL
- MAC filters and MAC limit per port/per VLAN
- UNI Broadcast/Multicast/Unicast rate control
- Flood limit of OAM frames
- ARP rate control
- DHCP Option 60 & 82
- ACL for management sessions from NOC
- View-based Access Control Model (Vacum)

Management & Diagnostics Tools

- Industry Standard CLI
- Out-of-band management – EIA-232 console
- Out-of-band Ethernet management – Dedicated ETH port
- Telnet, SSH v2, SNMPv3, RMON (4 groups)
- Port mirroring - ingress & egress traffic to analyzer port / VLAN
- Remote service/flow mirroring per ACL – Sniffer VLAN
- Ping, Trace route, DNS lookup, TCP dump (built-in sniffer)
- Management ACL for trusted connections (TELNET/SSH/SNMP)
- Hierarchical Administration policy
- RADIUS / TACACS+ AAA for management sessions
- Configuration load/save via FTP, Secure Copy (SCP)
- NTP – Network Time Protocol
- Internal / Remote Syslog
- Scripting tool for macro configurations & maintenance
- Action scheduler for automated rules (time/day/cycle)
- IPv6 management

Standard Operation, Administration & Maintenance

- End-to-end Service OAM IEEE802.1ag
  - Connectivity Fault Management per service MEP/MIP
  - In-service EVC loopbacks, Linktrace & continuity check
- End-to-end Performance Measurement ITU-T Y.1731
- End-to-end IP SLA measurement
  - Jitter, Latency & Loss per service with nanosec accuracy
- Y.1563 MEF 10.2 service availability and resiliency measurement**
- RFC2544 internal tester for wire-speed throughput measurement
- Y.1564 service turn-up
- EFM Link OAM IEEE802.3ah
  - discovery, port-loopback, and dying gasp
- Optical signal level monitoring (SFP SFF-8472)
- Copper cable diagnostics (TDR) on RJ45 ETH ports
- Remote failure notification / reflection
  - Enables bi-directional link integrity detection (fault reflection)
- TWAMP reflector (RFC 5357)
- 3rd party OAM probe for
  - VoIP (Nextragen)
  - Data (Prosilent)

Multicast and IP Services

- DHCP server/client/relay for remote auto configuration
- Wire-speed multicast replication
- IGMP v1,v2 snooping , proxy and fast leave
- Multicast VLAN Registration (MVR) protocol
- Multicast Routing PIM-SM**
- Wire-speed IPv4 / IPv6* packet routing
  - RIP, OSPF, IS-IS, BGP-4, VRRP

Layer 2.5 Services (optional Master-OS™ SW)

- Ethernet over MPLS pseudowire with Traffic Engineering
- H-VPLS dual-homed spoke MTU-s (LER)

Technical Specifications

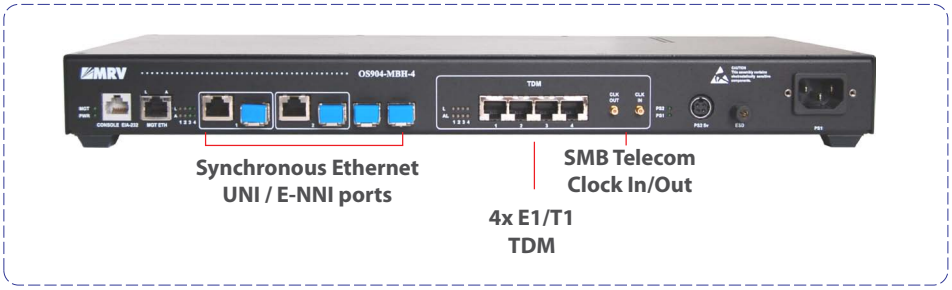
Standards compliance	UL-1950; FCC part 15 Class A; 2004/108/EC, 2006/95/EC RoHS compliant,EN60950-1:2006/A1:2010					
Environment	Operating Temp: -20˚to 65˚C (-4˚ to 149˚F) Storage Temp: -25˚to 70˚C (-13˚to 158˚F) - ETSI EN300-019 class 3.1					
Humidity	85% maximum , non-condensing					
MTBF	255493 Hr @ 25˚C/77˚F					
Performance	Non-blocking wire speed on all ports					
Power Specifications	AC Input Voltage Line frequencies 50-60Hz	DC Input Voltage	Power Consumption			
			OS904-MBH-4		OS904-MBH-4A	
			Min	Max	Min	Max
	100 – 240VAC	-36VDC – 60VDC	13W	22W	16W	28W
Physical dimensions WxDxH	443 x 204 x 43.65 mm					
Weight	1.85 kg (3.53lb)					

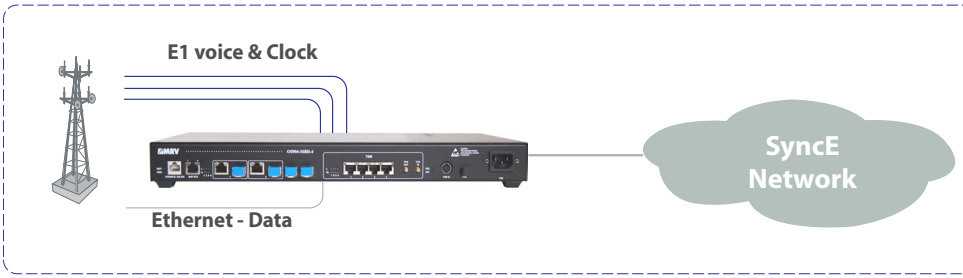
Synchronization interfaces

The OptiSwitch®900-MBH-4 incorporates the following synchronization inputs/output interfaces

Interface type	Interface definition	Impedance	Frecuency	Connector Type	Direction
Sync Ethernet	G-703-13	75 Ohm	2048 KHz		Input and Output
		75 Ohm	1544 KHz	SMB	Input and Output
Internal oscillator	Stratun 3 TCXO†				
Adaptive Clocking	Comply with ITU-T G.8261				
SyncE UNI / E-NNI Ethernet Interfaces	2 x Tri-mode RJ45 10/100/1000T or SFP (100FX/1000FX) + 2 SFP (100FX/1000FX)			RJ45 / SFP	Input and Output

† Stratun 3 OCXO for OS904-MBH-4A





Order Info

OS904-MBH-4	Mobile Backhaul Demarcation platform – CES support for 4 x E1/T1 ports + SyncE - 2 Tri-mode (RJ4510/100/1000Base-T or 100FX/1000FX SFP) ports, 2 x 100FX/1000FX SFP ports , AC (90-240VAC) power supply
OS904-MBH-4/D	Mobile Backhaul Demarcation platform – CES support for 4 x E1/T1 ports + SyncE - 2 Tri-mode (RJ45 10/100/1000Base-T or 100FX/1000FX SFP) ports, 2 x 100FX/1000FX SFP ports , DC power supply (-24vDC - 72vDC)
OS904-MBH-4A	Mobile Backhaul Demarcation platform – CES support for 4 x E1/T1 ports + SyncE+1588v2 - 2 Tri-mode (RJ45 10/100/1000Base-T or 100FX/1000FX SFP) ports, 2 x 100FX/1000FX SFP ports.
OS904-MBH-4A/D	Mobile Backhaul Demarcation platform – CES support for 4 x E1/T1 ports + SyncE+1588v2 - 2 Tri-mode (RJ45 10/100/1000Base-T or 100FX/1000FX SFP) ports, 2 x 100FX/1000FX SFP ports , DC power supply (-24vDC - 72vDC)