OptiSwitch® 904-MBH-4 & 904-MBH-4A Product Announcement

Product: OptiSwitch® 904-MBH-4 & OptiSwitch® 904-MBH-4A
Effective Date: December 19th, 2011

MRV Communications is pleased to announce the OptiSwitch® 904-MBH-4 & 904-MBH-4A, new Circuit Emulation Services (CES) and Timing & Synchronization supporting devices designed specifically to meet the stringent requirements of the mobile Ethernet backhaul market and enable wholesalers and mobile operators to migrate their current TDM based backhaul networks to Ethernet as outlined in MEF 22 Implementation Agreement (IA).

Based on MRV's field-proven OptiSwitch® 904 field-proven Intelligent Ethernet Demarcation device and OS904-MBH Timing & Synchronization Gateway solution, these new devices support Circuit Emulation Services (CES) with 4 x E1/T1 ports and industry timing & synchronization standards including Synchronous Ethernet and Precision Time Protocol (PTP – 1588v2)*. The use of these two standards enables operators to provide superior CES quality over the commonly used CES methodology (i.e. Adaptive Clocking Recovery - ACR).

As part of the OS900 series, the OS904-MBH-4 and 4A provide carriers with among the industry's most feature-rich devices that incorporate a wide range of hardware-based OAM tools and comprehensive protocol stack. Additionally, to further deliver an even better CAPEX and OPEX savings, these devices incorporate a fixed module that combines TDM over Ethernet along with Timing and Synchronization, thus delivering a compact and multi-functional Intelligent Ethernet Demarcation solution as outlined in MEF 22 IA.

Like the OS904, the OS904-MBH-4 and 4A have 2 x GigE Combo ports (tri-mode 100FX/1000FX SFP or RJ45 10/100/1000Base-T) and 2 x 100FX/1000FX SFP. Based on the dedicated OAM engine, these devices support 4 on demand concurrent performance-monitoring tests or 100 on-going SLA measurement based on SOAM-PM bins and measurement interval methodology**. In addition, the OS904-MBH-4 and 4A include a fixed module with 4 x E1/T1 CES ports combined with clk-in and clk-out SMBs for Synchronous Ethernet enabled mobile backhaul solution.

* In the OS904-MBH-4A model
** In future OAM FPGA version

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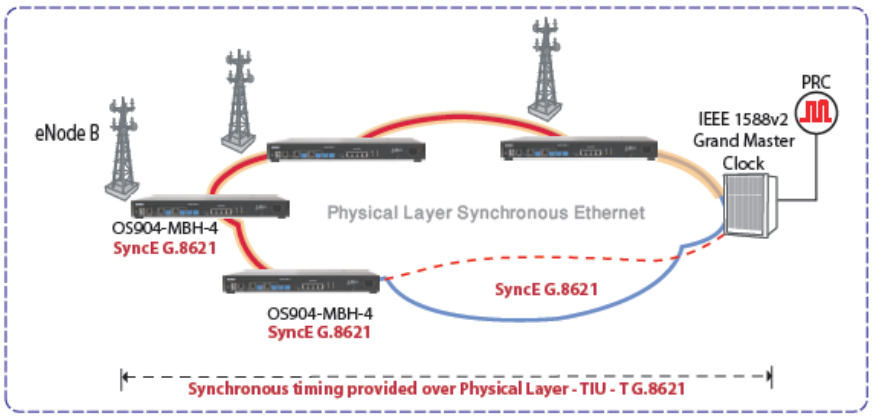
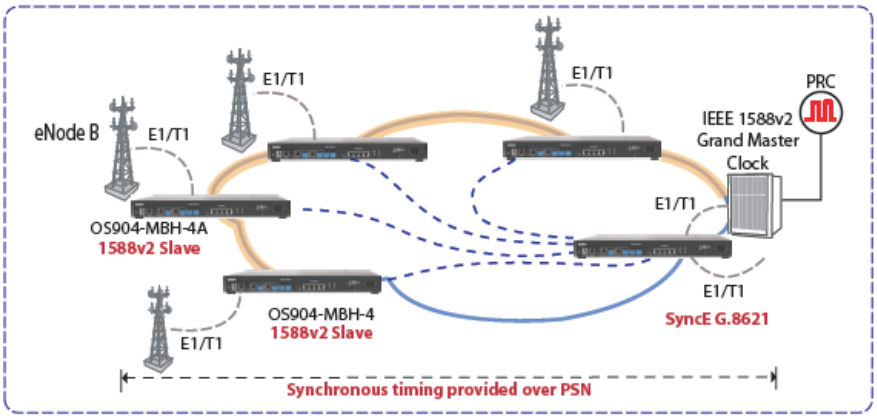
OptiSwitch® 904-MBH-4 applications

The OS904-MBH-4 targets the following applications and deployment scenarios:

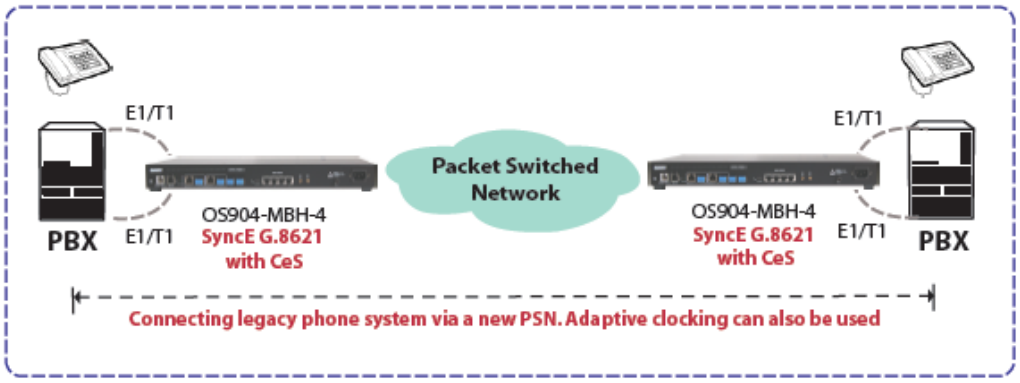
1. Cell site Demarcation device for a Synchronous Ethernet enabled mobile backhaul



2. Cell site Circuit Emulation Services (CES) supporting device for a 1588v2 based network



3. Circuit Emulation Services (CES) supporting device for legacy voice services from PBX to PBX over PSTN



Feature Highlights

The OS904-mbh-4 and 4A offer carriers the following benefits:

- MRV Unified Master-OS® control plane for Metro Ethernet services
  - Simplifies operation and management integration with 3rd party OSS
- Wide range of Optical Layer 1 & Layer 2 VPN Services
  - EPL X-connect, E-Line, E-Tree, and E-LAN
  - Point-to-point, point-to-multipoint, and multipoint-to-multipoint
- Flexible UNI/NNI interfaces – 100/1000FX and 10GE
  - Same device for all Access & Tier 1 Aggregation scenarios
  - Support for jumbo frames on all ports
- Advanced traffic management with line rate performance
  - Classification, policing, metering, marking per-flow QoS
  - Low-latency and precise service rates
  - Dual-rate 3 - color mechanism
  - Hierarchical QoS support
  - Shaping per flow
- Unmatched flexibility of Ethernet Virtual Circuits
  - Selective Q-in-Q and inner/outer VLAN translation
- Field proven and full hardware-based OAM functionality with sub micro second accuracy
  - Industry 5 known Service KPI: FD, FDV, FLR, Availability and Resiliency based on IEEE 802.1ag, ITU-T Y.1731, ITU-T Y.1563 and MEF 10.2 & 10.2.1*
  - Ethernet Link OAM (IEEE 802.3ah)
  - IP based OAM IP-SLA and TWAMP reflector based on IETF RFC 5357*
- Service turn-up based on IETF RFC2544 & ITU-T Y.1564* with built-in tester that provides wire speed throughput measurements and preinstalled service measurement enabling service providers to cut CAPEX and OPEX expenditures by replacing expensive testing equipment in-order to monitor SLAs signed with 3rd party carriers
- Multiple protection mechanism for mission critical applications
  - Packet rings, mesh, 1:1 (LOS), and n+1 (LAG)
  - Sub 50ms recovery based on MSTP or ERPS (G.8032) standards
- MPLS L2 VPN LER spoke functionality for dual-homing MPLS scenario
  - MPLS-OAM ping & trace based on IETF RFC 4379
- End-to-End Service Provisioning using the state-of-the-art NMS, the Pro-Vision™ Service Provisioning and Management platform
- Mobile backhaul specification compliance - MEF-22 Implementation Agreement
- All UNI/E-NNI interfaces support precision timing
- Synchronous Ethernet (G.8262 and G.8264) support
- Precision Time Protocol IEEE1588v2 – Slave Functionality (frequency only) **
- Multiple in/out synchronization signals including T1/E1, PPS & telecom standard frequencies

* Service Availability based on Y.1563, Service Resiliency based on MEF 10.2.1. , Y.1564 service turn-up and TWAMP reflector all will be supported in future versions

** In the OS904-MBH-4A model

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Ordering Information

Order Code	Description
OS904-MBH-4	Mobile Backhaul Demarcation platform - 2 Tri-Mode 100FX/1000FX SFP or RJ45 10/100/1000BaseT and 2 100FX/1000FX –SyncE ports + clk in / out SMBs + 4 E1/T1 ports for Circuit Emulation Services. AC power supply (90 - 240VAC). 19'' rack mounts included.
OS904-MBH-4/D	Mobile Backhaul Demarcation platform - 2 Tri-Mode 100FX/1000FX SFP or RJ45 10/100/1000BaseT and 2 100FX/1000FX –SyncE ports + clk in / out SMBs + 4 E1/T1 ports for Circuit Emulation Services. DC multi range power supply (24VDC – 72VDC). 19'' rack mounts included.
OS904-MBH-4A	Mobile Backhaul Demarcation platform - 2 Tri-Mode 100FX/1000FX SFP or RJ45 10/100/1000BaseT and 2 100FX/1000FX –SyncE ports + clk in / out SMBs + IEEE 1588v2 slave frequency support + 4 E1/T1 ports for Circuit Emulation Services. AC power supply (90 - 240VAC). 19'' rack mounts included.
OS904-MBH-4A/D	Mobile Backhaul Demarcation platform - 2 Tri-Mode 100FX/1000FX SFP or RJ45 10/100/1000BaseT and 2 100FX/1000FX –SyncE ports + clk in / out SMBs + IEEE 1588v2 slave frequency support + 4 E1/T1 ports for Circuit Emulation Services. DC multi range power supply (24VDC – 72VDC). 19'' rack mounts included.

Frequently Asked Questions

Why is the legacy TDM-based mobile backhaul infrastructure inadequate for carries and wholesale service providers' needs?

Answer:
The increased usage of data & video traffic in the mobile domain exceeds the capacity of today's cellular networks which are built primarily for voice services. The need to increase the available bandwidth between the cell towers and the base station controllers (BSC/RNC) has become a necessity for cellular operators and wholesale service providers alike. Accommodating this huge bandwidth demand with legacy TDM lines is inefficient and not scalable both economically and technically. It is widely accepted that Ethernet has the economics, flexibility combined with bandwidth scale and granularity capabilities to replace E1/T1 technology in these NGN mobile backhaul networks.

What steps carriers and wholesale service providers should take when transitioning from TDM to Ethernet based backhaul?

Answer:
The transition is outlined in MEF 22 IA and includes 3 phases:

A) Building a parallel Ethernet backhaul to offload the data traffic
B) Transferring the TDM traffic, usually used for voice, over the Ethernet network via Circuit Emulation Services (CES)
C) Moving to an all-IP network, passing voice over Ethernet backhaul using VoIP protocols and addressing the timing and synchronization challenges by deploying new Ethernet-based synchronization solution (see below).

Carriers and wholesale service providers can also transition to an all-IP network by skipping the 2nd phase mentioned above or initially build an all-IP network or segments of their networks without going through these transitional steps. The OS904-MBH-4 is mostly suited for the 2nd step as outlined in the MEF 22 IA as well as for other applications that require transmission of TDM traffic over Ethernet.

How can one transfer TDM traffic (E1/T1) over Carrier Ethernet infrastructure?

Answer:
The known industry solution for passing E1/T1 frames over Ethernet is called Circuit Emulation Services (CES). The Metro Ethernet Forum (MEF) 8 and 18 standards define the methods and techniques to implement this technology. They actually describe different protocols for encapsulating TDM traffic over Ethernet and the method to measure the accuracy of these protocols.

MRV OS904-MBH-4 supports the vast majority of these protocols and provides superior accuracy by using state-of-the-art technologies to further improve the legacy CES solutions deployed by most vendors (see below).

Which CES protocols does the OS904-MBH-4 support?

Answer:
The OS904-MBH-4 supports currently the same protocols supported in the legacy MRV's CES modules used in the OS910-M, OS9124-410G and OS940M:

1. SAToP: Unstructured TDM over PSN (Packet Switch Network) with a 62 bytes header which includes Ethernet, IP, UDP, and RTP headers and the *SATOP* control word.
   The standard is well defined in IETF RFC 4553
2. CESoPSN: Structured TDM over PSN (Packet Switch Network) with a 62 bytes header which includes Ethernet, IP, UDP, and RTP headers and the CESoPSN control word.
   The standard is well defined in IETF RFC 5086
3. CESoETH: Unstructured & Structured formats of TDM over Ethernet with 22 bytes header that includes Ethernet header, an emulation circuit definition (ECID), and a CESoETH control word.
   The standard is well defined in MEF 8.
4. TDMoIP: Based on RFC 5087, a structure-aware method may operate over several types of PSN, including UDP over IPv4 or IPv6, MPLS, Layer 2 Tunneling Protocol version 3 (L2TPv3) over IP, and pure Ethernet.

For further information on these protocols and current software version limitation please refer to the latest published device user manual.

What are the differences between the OS904-MBH-4 and OS910-M with the incorporated EM9-CES-4E1T1c modules?

Answer:
We identify several major differences between the OS910-M with legacy CES solution and the OS904-MBH-4 new proposition:

1. The legacy CES module uses the industry acceptable technology for CES called **Adaptive Clocking Recovery (ACR)**. This is mainly an algorithm-based mechanism that enables the receiving device to recover the original TDM frames from the encapsulated TDM over Ethernet packets. The recovered TDM frames are delivered to the attached TDM device with a frequency that is close enough to the one used in the far-end transmitting entity. The OS904-MBH-4 further enhances this capability with new state-of-the-art synchronization mechanisms that vastly improve the CES functionality and maintain the same frequency between the far ends of the Packet Switched Network (PSN) - this is implemented Synchronous Ethernet and Precision Time Protocol (PTP), i.e. IEEEE1588v2.
2. By incorporating industry acceptable synchronization mechanisms (i.e. Sync-E & 1588v2), the OS904-MBH-4 provides a better fit to the requirements of today's mobile backhaul market as it enables carriers to provide an adequate synchronization solution to their cell BTS/NodeB towers. Additionally, wholesalers can use these tools to sell Timing and Synchronization as a service.
3. As the OS904-MBH-4 is based on MRV's field-proven OS904 it incorporates the hardware-based OAM tools and thus provides enhanced Carrier Ethernet capabilities when compared with the legacy OS910-M.
4. The OS904-MBH-4 and 4A are hardened devices and support an operating temperature range of -20^{O}C to 65^{O}C. The OS910-M is a standard OptiSwitch® device and supports a temperature rage up to 50^{O}C.
5. The OS904-MBH-4 and 4A support up to 64 CES sessions whereas the OS910-M support up to 32 CES sessions.

For further FAQs on timing and synchronization solution and mobile backhaul networks we refer the readers to previous Infograms we have published and especially the one that was delivered upon releasing of the OS904-MBH early this year.
For more technical details about timing and synchronization mechanisms in the OS904-MBH-4 we refer the readers to the webinar held on OS904-MBH-4 timing and synchronization modes

If you have any questions, please contact your sales representative or MRV Customer Support at 800-435-7997.

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