VB-804

Carrier Ethernet Demarcation Device – Flexible Core

Flexible core demarcation point for SLA based Ethernet business services and mobile backhaul

- Carrier-class Ethernet demarcation device with full support for Synchronous Ethernet (ITU-T G.8262) and cellular backhaul synchronization applications, including 1588 2008 clock recovery and end-to-end transparent clock
- MEF-compliant, services with CIR/EIR traffic profiles and hierarchical traffic management
- Robust bandwidth control mechanism and Service Level Agreement (SLA) monitoring per Ethernet flow starting at customer premises
- Complete Ethernet OAM solution based on IEEE 802.3-2005 (formerly 802.3ah), IEEE 802.1ag D8, and ITU-T Y.1731 for Opex reductions
- Built-in RFC 2544 generator and analyzer

The VB-804 Carrier Ethernet demarcation device combines cell-site gateway with Ethernet demarcation functionalities to provide end-to-end service control and performance management across packet backhaul. The VB-804 Carrier Ethernet demarcation device delivers SLA-based business services to the customer premises over native Ethernet access. The device transports up to five Gbps of user throughput while ensuring SDH/SONET-like performance and Five Nines reliability.

VB-804 can deliver IP VPN, VoIP, and dedicated Internet access over the same physical link as a Layer-2 LAN-to-LAN service, all with differentiated quality of service and end-to-end monitoring. VB-804 offers a synchronization and timing over packet feature set that utilizes standard technologies to ensure highly accurate clock recovery and distribution over both the physical and packet layers.
SFP/UTP COMBO PORTS
All VB-804 units are equipped with SFP/UTP combo Ethernet ports that accommodate a wide range of Fast Ethernet and Gigabit Ethernet SFP transceivers, allowing service providers to seamlessly connect customers located at different distances from the device.

FLEXIBLE TRAFFIC MAPPING
Traffic is mapped to the Ethernet flows (EVCs) using very flexible classification criteria that can be combined, for example:
- VLAN + VLAN priority
- VLAN + IP precedence
- VLAN + DSCP
- Ether Type
- IP/MAC source/destination address
- UDP port
- Untagged.

HIERARCHICAL SCHEDULING AND SHAPING PER FLOW
Every flow per EVC or EVC.cos has its own queues and scheduler. VB-804 supports up to 192 flows, and up to 30 queue blocks per network port.

COLOR-AWARE P-BIT RE-MARKING
The VLAN priority bit in Ethernet frames can be modified at network ingress according to the ‘color’ of the frame. This allows service consistency and QoS continuity across color-aware (Drop Eligible-enabled) as well as color-unaware networks.

QoS
Different service types require different levels of QoS to be provided end to end. QoS can be defined per subscriber as well as per service. QoS has three aspects: rate limitation, traffic shaping, and traffic prioritization.
Traffic policing is applied per flow or group of flows, and operates according to the dual token bucket mechanism based on user configurable CIR + CBS and EIR + EBS.
Traffic can be limited to the line rate or the data rate.
For prioritizing user traffic, VB-804 maps user traffic to up to eight separate queues per service. Each can be configured as strict priority queues or weighted fair queues (WFQ).
The queues handle traffic with different service demands, such as real time traffic, premium data, or best effort data.
The device uses the WRED policy to ensure that in case of congestion, green packets are not dropped (yellow packets may be dropped).

MANAGED QOS IN NEXT-GENERATION RADIO ACCESS NETWORKS
VB-804 delivers managed quality of service in next-generation radio access networks (RANs), allowing mobile operators to enhance their 3.5G/4G service performance by combining Ethernet aggregation with OAM and SLA enforcement capabilities – starting at the eNodeB, HSDPA base station, or WiMAX cell site.

TYPICAL APPLICATIONS
VB-804 is used in the following MEF-defined applications:
- Mobile demarcation device – VB-804 is installed at the operator tower and controller sites equipped with an Ethernet port, connecting the NodeB or eNodeB to the packet network, providing sophisticated traffic management and service assurance capabilities, including proactive service monitoring and fault identification throughout the entire network (see Figure 1)
- Ethernet demarcation device – VB-804 separates the service provider network, the access provider network, and the customer network, providing proactive service monitoring and easy fault localization throughout the entire network. (see Figure 2)
- IP Node B backhauling – VB-804 acts as a transport demarcation device, connecting the base station to the packet network.
- Ethernet Private Line (EPL) – Site-to-site connectivity over dedicated bandwidth without service multiplexing
- Ethernet Virtual Private Line (EVPL) – Site-to-site connectivity over shared bandwidth with service multiplexing.
VB-804 delivers simultaneous use of multiple timing and synchronization technologies, to reconcile different methodologies used in various network segments, eliminating the need for costly upgrades:

- Synchronous Ethernet (SyncE) master and slave clock support per ITU-T G.8261-G.8264, with primary/secondary clock redundancy
- 1588v2 Precision Time Protocol slave and transparent clock with hardware-based timestamping
- 1 PPS, E1/T1, and 2MHz signal frequency extracted from SyncE, E1/T1, or 1588v2 slave.

Powerful clock transfer capabilities allow backhaul providers to ensure SDH/SONET-level performance, including frequency accuracy of 16 ppb (parts per billion) or better, without investing in dedicated hardware.

### CELLULAR BACKHAUL SYNCHRONIZATION

### ETHERNET OAM

Featuring ultra fast, hardware-powered processing, VB-804 performs OAM and PM measurements in line rate with maximum precision, offering the following powerful benefits:

- Immediate detection of loss of continuity (LOC), ensuring under 50ms protection switching
- Highly accurate frame loss measurements with live traffic testing
- Flow-level monitoring, enabling simultaneous processing of hundreds of OAM sessions
- Loopback testing at line rate.

VB-804 provides these types of Ethernet OAM:

- Single-segment (link) OAM according to IEEE 802.3-2005 (formerly 802.3ah) for remote management and fault indication in active and passive mode, including remote loopback, dying gasp, and MIB parameter retrieval.
- End-to-end connectivity OAM based on IEEE 802.1ag-D8 that enables Ethernet service providers to monitor their services proactively and guarantee that customers receive the contracted SLA
- End-to-end service and performance monitoring based on ITU-T Y.1731. Fault monitoring and end-to-end performance measurement include frame delay, frame delay variation, frame loss and availability.

### RFC-2544

The device provides a built-in RFC-2544 wirespeed traffic generator and analyzer for unidirectional and bidirectional testing of throughput, latency and frame loss. The tests are done over any Layer-2, based on standard OAM messages.

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Figure 1. Mobile Demarcation Device
NETWORK INTERFACE RESILIENCY
Flow-based resiliency on uplinks is provided, as well as G.8031 – Ethernet linear protection on the network ports. VB-804 implements EPS Ethernet Path protection according to ITU-T G.8031. The device can protect one or multiple EVCs in the network via standard APS messages and via OAM ETH AIS/LOC criteria, ensuring protection switching under 50 msec. The protected EVC can run over one uplink or dual uplinks per customer requirement.

The protection is available for the following topologies:
- End-to-end EPS path protection for one or multiple EVCs transported over MPLS/VPLS access network
- Opposite standard PE supporting G.8031 EPS.

Additionally, the following protection methods are provided via port-based resiliency on the network ports:
- Link aggregation (LAG) based on 802.3ad
- Dual homing (1:1), allowing VB-804 to be connected to two different upstream devices.

FAULT PROPAGATION
The unit provides a user-configurable fault propagation mechanism in the network-to-user or user-to-network direction. When a link failure is detected or OAM failure received, VB-804 can shut down the affected port or forward the OAM failure message. The fault propagation mechanism enables routers and switches connected to both ends of the link to reroute the traffic to the redundancy path.

MANAGEMENT
The unit can be managed using the following ports and applications:
- Local management via an ASCII terminal connected to the RS-232 port
- Remote inband management via user or network ports routed via separate VLANs, Telnet, or a third-party OSS system
- Out-of-band management via a dedicated management port

TRAP SYNCHRONIZATION
Traps are sent with sequence IDs to network manager groups, to enable the managers to detect when traps are lost and request the traps be sent again.
SECURITY
The following security protocols are provided by VB-804 to ensure client server communication privacy and correct user authentication:
- SNMPv3
- RADIUS (client authentication)
- TACACS+
- SSH for Secure Shell communication session.

LICENSING
Pay-us-when-your-customers-pay-you business model:
- Save Opex by using cost-optimized demarcation device at customer site with throughput up to 100Mbps, increasing capacity by software license to up to 1000Mbps when capacity is growing
- Buy additional number of EVCs per software license.

INTEGRATED SMART SFP SUPPORT
Integrated management of smart SFPs provides E1/T1/E3/T3 STM1 or OC3 Eth over PDH or SDH legacy networks.

LAYER-2/ LAYER-3 LOOPBACK WITH MAC AND IP ADDRESS SWAPPING
As services and networks become more complex, tracking service and network faults is very important for conforming to the SLA. Therefore it is vital that the service provider can perform network loopbacks to easily track failures. Layer-2 and/or layer-3 network integrity can be tested by a non-disruptive loopback performed per flow, with swapping of MAC address and optionally IP address. When the loopback is activated, VB-804 exchanges the source and destination MAC/IP addresses of the incoming packets. This loopback passes through Ethernet bridges (MAC address) and routers (IP address).

DYING GASP
VB-804 reports power failures to defined network management stations by sending an IEEE 802.3-2005 message and trap, thus enabling the unit to properly disconnect from the network with notification of the reason for the service problem.

L2CP HANDLING
VB-804 can be configured to pass through Layer-2 control frames (including other vendors’ L2CP frames) across the network, to peer supported protocols (IEEE 802.3-2005 and LACP), or to discard the L2CP frames.

JUMBO FRAMES AND EGRESS MTU
The unit supports large frames of up to 12 Kbytes.

COMPACT SIZE
The unit is supplied in a compact 8.5-inch 1U high enclosure.

DHCP
IP address, IP mask, and default gateway can be automatically obtained using DHCP.

COMMAND LINE INTERFACE
Databases and scripts of commonly used commands can be easily created and applied to multiple units using command line interface.
VB-804 provides up to six Ethernet network and user ports.

**NETWORK INTERFACE**

**Number of Ports**
Up to 2 (redundancy)

**Type**
SFP/UTP combo port:  
- Fiber optic:  
  - Fast Ethernet (100BaseFx, 100BaseLX10, 100BaseBx10, 100BaseT), SFP-based  
  - Gigabit Ethernet (1000BaseSx, 1000BaseLX10, 1000BaseBx10, 1000BaseT), SFP-based  
- Copper: 10/100/1000BaseT (built-in)

**Connector**
SFP slot or RJ-45

**SFP Transceivers**
For full details, see the SFP Transceivers data sheet available from Vibicom

**Note**: It is strongly recommended to order this device with original Vibicom SFPs installed. This will ensure that prior to shipping, Vibicom has performed comprehensive functional quality tests on the entire assembled unit, including the SFP devices. Vibicom cannot guarantee full compliance to product specifications for units using non-Vibicom SFPs.

**USER INTERFACE**

**Number of Ports**
Up to 5 (port 2 can function as network or user)

**Type**
See network interface specifications

**Connector**
SFP slot or RJ-45

**SFP Transceivers**
For full details, see the SFP Transceivers data sheet available from Vibicom

**EXTERNAL CLOCK PORT**
The SYE ordering option provides SyncE on all Ethernet ports, as well as master/slave and external clock (RJ-45), via E1/T1 2Mhz.

The PTP ordering option provides the following external timing interfaces:
- External input or output via:
  - Optional dedicated E1/T1 2.048 MHz port  
    - (G.703), RJ-45 connector  
    - RS-422, DB-9 or BNC connector  
    - 1PPS signal for IP-NodeB

**MANAGEMENT PORTS**

**Out-of-Band Ethernet Management Port**
Type: 10/100BaseT  
Connector: RJ-45

**Control Port**
Interface: V.24/RS-232 DCE  
Connector: 9-pin D-type, female  
Format: Asynchronous  
Data rate: 9.6, 19.2, or 115.2 kbps

**GENERAL**

**Max. Frame Size**
12,288 bytes

**Certifications**
MEF 9, MEF 14: EPL and EVPL

**Compliance**
MEF 6 (E-Line – EPL and EVPL), MEF 10  
IEEE 802.3, 802.3u, 802.1q, 802.1p, 802.3ad, 802.3-2005, 802.1ag-D8  
ITU-T G.8031, Y.1731, RFC-2544
**Indicators**

PWR (green): On – VB-804 is powered up
TST/ALM (red):
  - On – One of the Ethernet links is down
  - Blinking – Diagnostic loopback is active
LINK/ACT ETH (green):
  - On – Ethernet link OK
  - Blinking – Data is being transmitted and received on the Ethernet link
LINK/ACT EXT CLK (green):
  - On – Station clock port connected

**Physical**

Unit with single power supply:
- Height: 43.7 mm (1.7 in)
- Width: 215 mm (8.4 in)
- Depth: 300 mm (11.8 in)
- Weight: 2.4 kg (5.2 lb)

Unit with dual power supply:
- Height: 43.7 mm (1.7 in)
- Width: 440 mm (17.4 in)
- Depth: 240 mm (9.5 in)
- Weight: 3.1 kg (6.8 lb)

**Environment**

Temperature:
- VB-804: 0–50°C (32–122°F)
- VB-804/H: 8.4": -20 to 65°C (-4 to 149°F)
  17.4": -40 to 65°C (-40 to 149°F)

Humidity: Up to 90%, non-condensing

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**Table 1. OAM and SLA Tools**

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<td>IEEE 802.1ag CC</td>
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<td>IEEE 802.1ag LB, MAC Ping</td>
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<td>Fault Detection and Isolation</td>
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<td>Layer-2/3 loopback with MAC/IP swap per EVC/VLAN/Source Address</td>
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<tr>
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<td>ITU-T Y.1731: Packet Loss, PD, PDV, Per EVC.cos statistics, HW powered OAM</td>
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<pre><code>                       | RFC-2544 generator and analyzer                                    |
</code></pre>
**VB-804**

Carrier Ethernet Demarcation Device – Flexible Core

**Ordering**

VB-804/?/!/BT/B/ Carrier Ethernet Demarcation Device in 19” enclosure (swappable power supplies)

**Legend**

? Enclosure type (Default=Regular enclosure):

H Industrially-hardened enclosure

**Note:** The VB-804/H version requires industrially-hardened SFP transceivers.

! Power supply (swappable):

AC Single AC power supply

DC Single -48 DC power supply

24DC Single 24 DC power supply

ACR Dual AC power supply

DCR Dual -48 DC power supply

24DCR Dual 24 DC power supply

**BT** Enclosure size:

19 19” metal enclosure for single power supplies only (for dual power supplies, do not include this option)

B Number of user ports (Default=2 user ports):

4 4 user ports

Timing (Default=No hardware support for synchronization over packet):

SYE SyncE full support

PTP SyncE and 1588v2 clock recovery support

**VB-804/?/!/B/ Carrier Ethernet Demarcation Device in 8.5” enclosure (fixed power supply)**

**Legend**

? Enclosure type (Default=Regular enclosure):

H Industrially-hardened enclosure

**Note:** The VB-804/H version requires industrially-hardened SFP transceivers.

! Power supply (fixed):

AC Single AC power supply

DC Single -48 DC power supply

24DC Single 24 DC power supply

**RM-35/+**

Hardware kit for mounting one or two VB-804 units with 8.5” enclosure in a 19” rack

+ Rack mount kit (Default=Both kits):

P1 Kit for mounting one unit

P2 Kit for mounting two units

**WM-35**

Hardware kit for mounting one VB-804 unit with 8.5” enclosure on a wall

**CBL-DB9F-DB9M-STR**

Control port cable

**CBL-RJ45/2BNC/E1/X**

Adaptor cable for converting a balanced E1 interface to an unbalanced E1 interface, with an RJ-45 balanced connector and two unbalanced BNC coaxial connectors

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