Liberator™

Extending Carrier Ethernet Demarcation & Service Level Management Beyond CE 2.0 to Include Legacy Services
Introduction

Today’s market has an insatiable need for ever-increasing amounts of bandwidth, which has fueled the growth of Carrier Ethernet. Carrier Ethernet is the predominant network connectivity service for enterprise networking, cloud computing, backhaul of cell sites and broadband access services.

Liberator™ is a portfolio of Carrier Ethernet products that delivers a universal mix of services, which can be consolidated into a single service delivery device normally located at the enterprise site. Liberator™ enables carriers and service providers to continue to deliver key services such as Serial, TDM and ISDN using their Next Generation packet network, which may use Layer 2, Layer 3 or MPLS.

The portfolio encompasses a range of Network Interface Devices (NIDs) and Aggregation Chassis, all of which can be managed remotely and contain sophisticated service assurance tools. Some of the NIDs include support for Circuit Emulation, pseudowire services, feature class-leading clock recovery, and stability algorithms.
Features & Benefits

Integrated Carrier Ethernet with SIP Gateway
- Customers can continue to use their ISDN PBX; allowing calls to be made to other branch offices or to PSTN destinations
- Provide deterministic switched voice services over a low cost packet infrastructure with full breakout capability

Management via Industry Standard CLI, SNMP or Web GUI
- Easily integrate into the OSS environment
- Accelerate time to market/time to revenue

Integrated Carrier Ethernet with TDM Services
- Deliver modern SLA based Ethernet services and TDM/switched voice from a single Network Interface Device (NID)
- Protect revenue, improve profitability and maintain customer satisfaction

Serial Interfaces
- Support almost any legacy interface
- Increase customer loyalty

Best Clock Recovery
- TDM with SLA, similar to SDH services
- Ensure customer satisfaction and brand protection

MPLS-TP
- Combines with a traffic engineered core to provide edge-to-edge managed paths
- Universal fit for today and tomorrow

Liberator™ Applications

Liberator™ 2 Series

Liberator™ combines the benefits of CE 2.0 functions for Ethernet services, Serial, TDM and ISDN into a single customer premises equipment (CPE). In addition, integration into the carrier’s SIP server and SIP gateway allows number look-up and routing so that ISDN calls can break out to the PSTN or route across the carrier’s own packet network to another destination or end-point.

The Liberator™ 2 Series provides an evolutionary path for bridging any TDM service (voice, data, or video) to any IP, MPLS, or Ethernet network. Enterprises can therefore transport voice traffic over their Ethernet fiber network, eliminating the need to maintain an expensive parallel copper network.

Also, the Liberator™ 2 Series supplies clock-locked clear channel or structured E1/T1 circuits over Ethernet or IP networks. This product is designed specifically to meet the most important criteria for this technology area: highly accurate, stable, and reliable clock recovery over IP/Ethernet networks.

Ultimately, the Liberator™ 2 Series are managed NIDs providing advanced packet performance metering and service creation directly at the enterprise site. Liberator™ provides SLA-assurance and advanced fault management that is MEF CE 2.0 certified. IEEE 802.1ag Service OAM, ITU Y.1731 Performance Monitoring, and IEEE 802.3ah Link OAM are standard features.
Transition Networks’ LIB-3290 provides a standards-based demarcation point between two service providers and/or networks. The LIB-3290 serves as a neutral demarcation that allows both parties to measure, monitor and adjust service levels. This visibility enables service providers to preserve revenues by maintaining customer satisfaction and allows operational efficiencies by providing proactive visibility into network issues. In addition, the LIB-3290 is a CE (Carrier Ethernet) 2.0 compliant Network Interface Device (NID) that enables complete visibility, manageability and services gateway at critical points of communication networks. The LIB-3290 is a 6-port device and is available with:

- (2) RJ45 10/100/1000TX ports with an additional (4) SFP ports
- (4) RJ45 10/100/1000TX ports with an additional (2) SFP ports

**Applications:**

**Service Level Agreement (SLA) demarcation device**
- Demarcation point between two networks to monitor and measure service levels

**Services provisioning gateway**
- Gateway to enact Carrier Ethernet services such as bandwidth allocation and VPN

**Typical services which require a device such as the LIB-3290**
- Business Services
- Cloud Services
- Cell Site/Small Cell/DAS Backhaul

### MPLS & MPLS-TP

MPLS and MPLS-TP are compatible and interoperable label switch path (LSP) provisioning, link attachments, and tunneling. While sharing many common traits, each variant has its own applicability in today’s networks; MPLS is typically used in the core while MPLS-TP is primarily an access network technology. MPLS-TP is a subset (or profile) of MPLS (Multiprotocol Label Switching) and was designed for use in packet-based optical transport networks. The continuing development is a joint effort by the Internet Engineering Task Force (IETF) and the International Telecommunications Union (ITU-T).

MPLS-TP supports bi-directional LSPs, ring topologies, and OAM, allowing it to be deployed and operated in provider networks, similar to existing transport technologies. The additional features enable MPLS-TP to provide connection-oriented optical packet transport based on widely-deployed MPLS protocols with transport-grade performance and operation similar to existing transport networks and ensuring compatibility with IP/MPLS.

MPLS-TP does not implement IP/MPLS features that are unnecessary in a transport network. For instance, native IP line-rate forwarding and other features used to optimize IP routing over MPLS LSPs are normally handled by the Provider Edge (PE) device at the hand-off point.

The Transition Networks LIB-3290 and the LIB-2xxx support both MPLS-TP and Carrier Ethernet – allowing the service provider the choice of what is best for their network.
Liberator™ Applications Continued

MPLS & MPLS-TP Continued
The Liberator™ 2 and 3 Series products provide full Carrier Ethernet CE 2.0 services and are amongst the first “edge” NID devices to also natively support MPLS-TP. Whether it is best to utilize MPLS-TP or Carrier Ethernet depends on your existing network and the problem you are trying to solve. Important items to consider when selecting a technology include: quality of service, performance management, fault management, timing, protection, existing network technologies deployed, and cost (both CapEx and OpEx). MPLS-TP is ideally suited to transport ATM, TDM, or SONET as it is a deterministic/connection-oriented protocol, which allows label switching with primary and back-up links, and is not dependent on IP source/destination addresses.

Quality of Service:
Carrier Ethernet quality of service (QoS) supports the PCP field for prioritization marking, in addition to the S-tagged Ethernet with discard eligibility (DEI) marking. The MEF defines a token bucket algorithm to further enhance Carrier Ethernet QoS capabilities while the MPLS-TP traffic class functionality enables support for DiffServ prioritization.

Performance:
Both Ethernet and MPLS-TP have performance monitoring functions. Ethernet has comprehensive functionality with ITU-T Y.1731 OAM. MPLS-TP supports RFC 6374 - which defines the procedures for the measurement of packet loss, delay, and throughput in an MPLS network - and RFC 6375 - which applies these procedures to an MPLS-TP network.

Fault:
Ethernet contains a unique source address which allows trace back functionality that can be used in conjunction with ITU-T Y.1731 and EFM to provide comprehensive fault management capability. MPLS-TP uses bi-directional forwarding detection for continuity check (BFD for CC) and LSP ping for fault diagnosis.

Protection:
Both Ethernet and MPLS-TP support protection switching. Ethernet supports linear and ring protection via ITU-T G.8031 and ITU-T G.8032. MPLS-TP protection is provided via RFC 6378 for linear protection.

MPLS-TP provides a path forward, without the cost of full IP control planes by supporting traditional/required transport network functionalities like OAM, fault management, performance management, Automatic Protection Switching (APS), and ring topologies in next-generation network architecture. The design, based on requirements provided by service providers, ensures that MPLS-TP aligns with the carriers’ existing processes and procedures allowing the utilization of similar and familiar network configuration tools.

MPLS-TP allows carriers to design and implement predictable, connection oriented networks utilizing a single packet switching technology. This results in reduced transport network complexity and a more scalable, simple, and resilient network design which allows carriers to realize the inherent CAPEX and OPEX savings. As part of the Liberator™ solution, the Liberator™ 2 and 3 Series products enable the operator to get the functionality and familiarity of MPLS and/or the benefits of Carrier Ethernet in a simple to use edge device.
The Liberator™ 2 Series is a family of products that combines the functionality of a MEF 2.0 certified NID with Circuit Emulation Services. The entire portfolio can be managed remotely and contains built-in service assurance tools such as RFC 2544, ITU-T Y.1564, ITU-T Y.1731 and a Traffic Generator combined with loopback capability. Product is MEF CE 2.0 compatible, certification pending.

LIB-225

The LIB-225 is the first CPE supporting Serial, TDM, ISDN and Carrier Ethernet CE 2.0 services in a single product. Usually residing at a customer’s site, the LIB-225 will allow the customer’s legacy Serial, TDM and ISDN applications to work seamlessly across a Next Generation Network. This enables customers to maximize the value from their legacy investments and to control migration to Carrier Ethernet when the timing is right for them.

As a fully functional MEF CE 2.0 compatible NID, the LIB-225 enables provisioning of new revenue-earning Ethernet services at any time. The NID has 5 ports, two of which are usually deployed as WAN interfaces providing either a resilient ring (ITU-T G.8032) architecture or a linear parallel path (ITU-T G.8031). The SFP/fiber interfaces typically operate at 1 Gbps but can support 2.5 Gbps.

The LIB-225 also supplies a single, clock-locked, clear-channel or structured E1/T1 and an X.21, V.35, RS232 or RS530 serial circuit over Ethernet or IP networks, supporting both asynchronous and synchronous serial services. This product can also deliver transparent, switched PRI-ISDN synchronous data services across asynchronous packet networks. As an option, the LIB-225 can be ordered with a BRI interface.

ISDN over IP is supported through the LIB-225 by either integrating directly with a service provider’s SIP server/gateway, thus providing a PSTN equivalent service, or with units deployed in pairs as a bookend solution (one at each end of the circuit). The 5 Ethernet ports can be configured as either network (NNI) or client (UNI) ports and can support all the standard Carrier Ethernet 2.0 services and features you would expect.

LIB-2MN

The Liberator™ Mini chassis is a 1RU sized chassis which can support single or dual AC or DC power supplies and will allow, through the use of a single add-in card, legacy Serial, TDM, ISDN and Analog applications to work seamlessly across a Next Generation Network. It offers 6 MEF CE 2.0 Ethernet ports which can be configured as either network (NNI) or client (UNI) and supports all standard Carrier Ethernet services and features you would expect.

Add-in card options enable the Liberator™ Mini to support a number of different configurations:
- 1 x ISDN PRI
- 8 or 16 clock-locked, clear-channel or structured E1/T1 lines
- 4 ISDN PRI & 8 x ISDN BRI
- 1 x Serial, 1 x E1/T1, 1 x PRI (or BRI)
- 1 x Serial, 1 x E1/T1, 1 x FXS/FXO, 1 x E&M, 1 x mix & 1 x speaker for PTT
- 8 x FXS/FXO & E&M Analog ports

LIB-2MD

The LIB-225 is the first CPE supporting Serial, TDM, ISDN and Carrier Ethernet CE 2.0 services in a single product. Usually residing at a customer’s site, the LIB-225 will allow the customer’s legacy Serial, TDM and ISDN applications to work seamlessly across a Next Generation Network. This enables customers to maximize the value from their legacy investments and to control migration to Carrier Ethernet when the timing is right for them.

As a fully functional MEF CE 2.0 compatible NID, the LIB-225 enables provisioning of new revenue-earning Ethernet services at any time. The NID has 5 ports, two of which are usually deployed as WAN interfaces providing either a resilient ring (ITU-T G.8032) architecture or a linear parallel path (ITU-T G.8031). The SFP/fiber interfaces typically operate at 1 Gbps but can support 2.5 Gbps.

The LIB-225 also supplies a single, clock-locked, clear-channel or structured E1/T1 and an X.21, V.35, RS232 or RS530 serial circuit over Ethernet or IP networks, supporting both asynchronous and synchronous serial services. This product can also deliver transparent, switched PRI-ISDN synchronous data services across asynchronous packet networks. As an option, the LIB-225 can be ordered with a BRI interface.

ISDN over IP is supported through the LIB-225 by either integrating directly with a service provider’s SIP server/gateway, thus providing a PSTN equivalent service, or with units deployed in pairs as a bookend solution (one at each end of the circuit). The 5 Ethernet ports can be configured as either network (NNI) or client (UNI) ports and can support all the standard Carrier Ethernet 2.0 services and features you would expect.

LIB-225

The Liberator™ Midi chassis is a 2RU chassis which can support single or dual AC or DC power and will allow legacy Serial, TDM, ISDN and Analog applications to work seamlessly across a Next Generation Network. It also offers 5 MEF CE 2.0 Ethernet ports, which can be configured as either network (NNI) or client (UNI) and supports all standard Carrier Ethernet services and features you would expect, as well as up to 2 add-in cards.

The add-in cards listed below can be deployed in a mix-and-match configuration:
- 8 or 16 clock-locked, clear-channel or structured E1/T1 lines
- 8 or 16 transparent, switched ISDN PRI
- 8 or 16 X.21, V.35, RS232 or RS530 serial circuits over Ethernet or IP networks
- 8 or 16 FXS/FXO & E&M Analog ports

*Analog cards will be a future enhancement.
Liberator™ 3 & 4 Series Network Interface Devices

The Liberator™ 3 Series is a family of remotely managed NIDs which contains a built-in traffic generator.

**LIB-3290: 1GE Carrier Ethernet NID**
Transition Networks’ LIB-3290 NID is optimized for business Ethernet and mobile backhaul deployments, providing advanced packet performance metering and service creation directly at customer premises and cell sites.

The LIB-3290 is a multi-service Carrier Ethernet NID that provides SLA assurance and advanced fault management that is MEF CE 2.0 certified and supports:
- IEEE 802.1ag Service OAM, ITU Y.1731 Performance Monitoring and IEEE 802.3ah Link OAM
- Service activation and testing via embedded RFC-2544 / ITU-T Y.1564 functionality
- MPLS-TP

The LIB-3290 also supports advanced features such as IPv6 and IPv4, VLANs, QoS, bandwidth allocation, sub-50ms ring protection, jumbo frames and numerous security features you would expect.

**LIB-4140: 10GE Carrier Ethernet NID**
Transition Networks’ LIB-4140 10GE network interface device is designed to support a wide range of MEF-based Carrier Ethernet services for Mobile Backhaul, Business Ethernet, Cloud Assurance and Carrier Exchange E-Access Services.

The LIB-4140 is a multi-service 10GE Carrier Ethernet NID that provides SLA assurance and advanced fault management that is MEF CE 2.0 certified and supports:
- IEEE 802.1ag Service OAM, ITU-Y.1731 Performance Monitoring and IEEE 802.3ah Link OAM
- Service activation and testing via embedded RFC-2544 / ITU-T Y.1564 functionality
- Sync-E and hardware based Precision Time Protocol IEEE 1588v2 with clock off-set reporting and monitoring, between master and remote, with nanosecond accuracy

The LIB-4140 also supports advanced features such as IPv6 and IPv4, VLANs, QoS, bandwidth allocation, sub-50ms ring protection, jumbo frames and numerous security features you would expect.

Liberator™ 4 Series Aggregation Products

**Carrier Ethernet Access / Aggregation Switches**
With the goal of enabling new service generating revenue, Transition Networks’ LIB-4224 aggregation switch supports a wide range of MEF-based Carrier Ethernet services for Mobile Backhaul, Business Ethernet, Cloud Assurance, and Carrier Exchange E-Access Services.

**LIB-4224**
The LIB-4224 provides (24) 100/1000 Mbps port and (4) 1GE uplinks

The LIB-4224 provides SLA assurance and advanced fault management that is MEF CE 2.0 certified and supports:
- IEEE 802.1ag Service OAM, ITU Y.1731 Performance Monitoring and IEEE 802.3ah Link OAM
- Service activation and testing via embedded RFC-2544 / ITU-T Y.1564 functionality
- Sync-E and hardware based Precision Time Protocol IEEE 1588v2 with clock off-set reporting and monitoring, between master and remote, with nanosecond accuracy

The LIB-4224 also supports advanced features such as IPv6 and IPv4, VLANs, QoS, bandwidth allocation, sub-50ms ring protection, jumbo frames and numerous security features you would expect.
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Global Presence

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