

## XTM SERIES

## EMXP II

## Access and Aggregation in Packet-Optical Networks

The EMXP II packet-optical transport switch is a powerful part of the Infinera XTM Series. Its seamless integration of Layer 1 transport and Layer 2 Metro Ethernet functionality enables cost-efficient aggregation of Ethernet services over flexible coarse wavelength-division multiplexing (CWDM) and dense wavelength-division multiplexing (DWDM) networks.

## Ethernet Aggregation

Infinera's EMXP II units are specially designed to optimize Ethernet aggregation. They provide a Layer 2 optimized access and aggregation architecture using selective integration of Layer 2 and multi-protocol label switching (MPLS) functions. Together with the powerful 10G and 100G units of the EMXP IIe range, they form a comprehensive packet-optical transport solution.

## CE 2.0-certified

The EMXP II units provide powerful UNI and E-NNI interfaces, enabling port-based or fully service-multiplexed E-Line, E-LAN, E-Tree or E-Access services, compliant with the Metro Ethernet Forum's Carrier Ethernet 2.0 (CE 2.0) services. The multiple class of service (CoS) aspect of CE 2.0 simplifies the handling of differentiated traffic within the network. The E-Access service provides well-defined interconnection between networks and allows service providers to build scalable and cost-optimized Ethernet services across multiple networks.

The EMXP II offers a strong classification and policy engine to better manage extended and flexible service and quality of service (QoS) classifications. The EMXP units also support multiple bandwidth



EMXP10 II and EMXP22 II Packet-Optical Transport Switches Are Ideal for Access and Aggregation in Packet-Optical Networks.

## Key benefits:

- Compact and cost-efficient access and aggregation of FE/GbE and 10 GbE local area network (LAN) services
- MEF CE 2.0-certified on all MEF services, including E-Line, E-LAN, E-Tree and E-Access
- Ultra low latency and zero jitter
- Perfect interoperability with high-capacity EMXP IIe range
- Flexible network resilience options through G.8032 Ethernet ring protection, link aggregation and MPLS-TP linear protection
- Efficient video distribution enabled by source-specific IP multicast
- Synchronous Ethernet for high-quality network synchronization
- Tunable optics on line side for maximum flexibility
- Provides seamless Layer 1 and Layer 2 integration with Ethernet services into flexible CWDM and DWDM networks
- Low power design ensures low total cost of ownership

profiles, which allow service providers to offer services with bandwidth regulated to any speed.



## Hitless Software Upgrade

The EMXP II units are designed for in-service upgrades, which allows easy introduction of new features in the network. Customer traffic is completely hitless when carrier Ethernet services are upgraded, and the upgrades are done independently of service window scheduling. This significantly reduces the work involved in introducing new releases compared to many other Ethernet switching products.

## Operation Administration and Management

The Ethernet services provided by the EMXP II are constantly monitored for interruption and performance with Ethernet service operation administration and management (OAM), and the MPLS paths are monitored with bidirectional forward direction (BFD). The units support in-service surveillance for connectivity and measurement that is standards-based and fully interoperable.

## Quality of Service

The EMXP II units provide a flexible toolkit of traffic management features. The toolkit includes features such as strict and weighted scheduling, bandwidth profiles and shaping of bandwidth. Traffic can be classified either per port (for EPL, EP-LAN and EP-Tree services) or it can be classified per VLAN for service-multiplexed services (EVPL and EVP-LAN).

## Resiliency

The EMXP II units offer various methods to provide resiliency. The simplest method is to utilize IEEE 802.3ad link aggregation group (LAG). Normal LAG as well as N+1 and N+N protection LAG are supported. Furthermore, a LAG can be distributed over two separate EMXP II units that coordinate information to present a single LAG to the connected system. This is called multi-chassis LAG because the two units can be installed within the same or separate chassis.

If the units in the EMXP family are deployed in a ring topology, then ITU-T G.8032v1 and v2 Ethernet ring protection switching also becomes an option. 8032v2 supports multiple logical rings for the flexibility to use different VLANs in different rings, and allows dual interconnect points between rings to eliminate single points of failure. Ring protection can also be used in combination with LAG so that the capacity of the ring can be easily scaled. It is even possible to add/remove links without service interruption.

For Ethernet transported over MPLS-TP pseudowires, the protection function uses pre-defined back-up paths that will ensure service continuity if the primary path fails. One of the benefits with MPLS is that it is possible to provide protection over any type of topology, including ring, full mesh or partial mesh, without involving a control plane.

## Source-specific Multicast for Video Distribution

The EMXP II units offer IGMPv3 and source-specific multicast (SSM), features that are unique in transport networks. These features allow the distribution of video traffic to be highly optimized and efficient as a destination only receives the traffic intended for it.

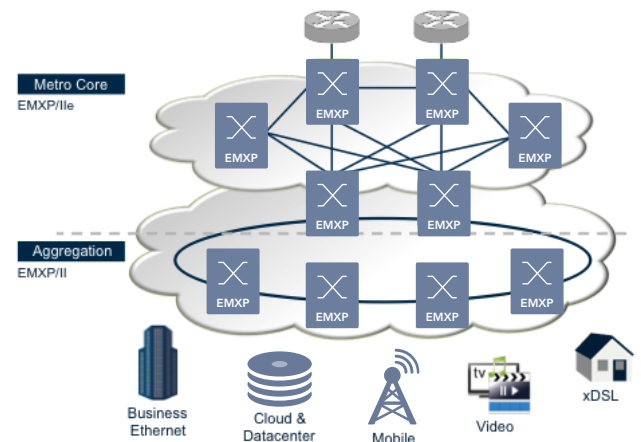
## Ultra Low Latency in Time-critical Applications

Each of the EMXP II units have industry-leading 2 microseconds latency and zero jitter for all packet sizes and regardless of traffic load. This makes the units ideally suited to Ethernet applications where latency and jitter are important, such as services for financial institutions, video distribution and LTE backhaul.

## Low Power Design

A fully equipped 10 port EMXP II consumes a maximum of 30 W, and a fully equipped 22 port EMXP II consumes a maximum of 45 W, which again is industry-leading for this class of product.

See the following table for more detailed power consumption figures. Low power consumption in combination with a small footprint reduces operational costs and enables more capacity to be handled at sites with restrictions on power consumption, cooling and space.



**Fig 1.** EMXP II Provides Ethernet Access and Aggregation for a Wide Range of Services in Native Packet-Optical Networks.

**Specifications** (Valid for EMXP10, EMXP22):

Interfaces	EMXP10: 10 x GbE + 2 x 10G EMXP22: 22 x GbE + 2 x 10G	10G interfaces (XFP): <ul style="list-style-type: none"> <li>• Uncolored multi-mode and single-mode</li> <li>• CWDM up to eight channels, DWDM up to 40 channels or tunable XFP up to 80 channels</li> </ul> GE/FE interfaces (SFP): <ul style="list-style-type: none"> <li>• Uncolored multi-mode and single-mode, single-strand fiber solution</li> <li>• CWDM up to 16 channels or DWDM up to 40 channels</li> <li>• Electrical 10/100/1000BASE-T</li> </ul>
Resilience	IEEE 802.3ad Link Aggregation with LACP. Normal LAG, N+1 and N+N protection LAG, multi-chassis LAG MPLS over LAG including RFC6391 flow label ITU-T G.8032 Ethernet Ring Protection v1 and v2 Ethernet Ring over LAG and in-service adding/removing links MPLS-TP Linear Protection with Protection State Coordination (PSC) RFC6378	
Ethernet Services	CE 2.0-certified services E-Line (EPL and EVPL), E-LAN (EP-LAN and EVP-LAN), E-Tree (EP-Tree and EVP-Tree) and E-Access (Access EPL and Access EVPL) MEF CE1.0 9+14 Certification	
Quality of Service	Policing using bandwidth profiles Flexible traffic classification, e.g. based on DSCP, CoS, port and inner/outer VLAN Eight strict priority queues / WRR queues, WFQ. Min and max shaping. WRED	
Latency	1.9 $\mu$ s delay for all packet sizes using RFC1242 store and forward metric Frame delay variation below 0.05 $\mu$ s	
Performance Monitoring & OAM	IEEE 802.1ag Continuity Check and Loopback, Port Mirroring MPLS G-ACh channel for OAM RFC5586 BFD for MPLS Label Switched Paths (LSPs) RFC5884 Management VLAN for in-band management Port isolation using Private VLAN technique Link Layer Discovery Protocol (LLDP)	
Synchronous Ethernet and Timing	ITU-T G.8262 Synchronous Ethernet Equipment Clocks (EEC) ITU-T G.8264 Ethernet Synchronization Messaging Channel (ESMC) ITU-T G.781 Synchronization Status Messages (SSM)	
Source Specific Multicast	RFC4607 Source-specific Multicast for IP RFC4541 IGMP Snooping RFC1112 IGMPv1, RFC2236 IGMPv2 and RFC3376 IGMPv3	
L2 Switching	Selectable learning enabled per VLAN, 4,094 VLAN IDs, 32K MAC-addresses Storm Control IEEE 802.1ad Q-in-Q SVLAN Flexible VLAN tag handling: push, pop, swap, pop-swap Super jumbo frames up to 10248 Bytes	
MPLS	LER and LSR operation 512 LSPs, 512 pseudowires MPLS Transport Profile RFC5960	
Power Consumption (Including Optics)	Max 30 W for EMXP10, max 45 W for EMXP22	

Specifications and Features Are Subject to Change

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