PM5440 DIGI-120G
High-Capacity 12x10G/3x40G/100G Multi-Service OTN Processor

Summary

The PM5440 DIGI-120G represents Microchip's 3rd generation Metro OTN processing solution for Wavelength Division Multiplexing (WDM) Platforms, Reconfigurable Optical Add-Drop Multiplexers (ROADMs) and Packet Optical Transport Platforms (P-OTP/PE-OTNs). This device is a high-capacity, channelized, single-chip OTN processor that provides unprecedented scalability and feature-integration to enable Metro OTN switching and transport deployments. The DIGI-120G enables power and cost efficient 12x10G/3x40G/100G line cards for OTN switching systems and Transponder/Muxponder/ADM cards with integrated ODU0/ODUflex support for OTN transport systems.

The DIGI-120G provides a rich set of framing, mapping, multiplexing and switching resources for a variety of rates and protocols including OTN, SONET/SDH, Ethernet and Fiber Channel. It can be leveraged easily across multiple applications and multiple equipment platform types to reduce OEM development cost and accelerate time to market.

Key Technologies and Features

Integrated ODU0/ODUflex Framing, Mapping and Switching

- Supports ODU0/ODUflex channels to enable efficient scaling and transport of packet bandwidth without affecting service

Industry-leading 9.45dB Gain Swizzle Enhanced FEC

- High performance and low latency Forward Error Correction (FEC) algorithm delivers 9.45dB of coding gain for 40G and 100G OTN links

OIF Compliant OTN-Over-Packet Fabric Protocol

- Enables OEMs to deliver high-capacity OTN/Hybrid/Packet switching line cards using off-the-shelf or proprietary switch fabric solutions

Carrier Ethernet Transport

- Onboard Ethernet MACs provide support for Timing over Packet (IEEE 1588v2/PTP), Synchronous Ethernet (SyncE) and Ethernet Link OAM (IEEE 802.3ah) on every port

Highlights

Unprecedented Service Delivery and Network Deployment Flexibility

- Supports the widest range of multi-service client mappings into OTN
- Delivers industry-leading 9.45dB "Swizzle" 40G/100G EFEC Multi-stage OTN multiplexing enables compatibility and interoperability between network nodes
- Enables full SNCP-based protection switching for ring, point-to-point or meshed network topologies

Lowers Service Provider CAPEX and OPEX for Metro 100G Deployments

- Universal line card solution simplifies service provider network deployment and inventory management

Optimized Power and Footprint for OEMs

- Connects directly to a wide range of 10G, 40G and 100G optical module types including XFP, SFP+ (limiting), QSFP and 40G/100G MSAs
- Generates all client protocols and device interface rates from internal PLLs with a single external reference clock
- Delivers a single-chip "platform" solution for multiple line card applications across multiple system platforms
- Provides glueless interconnect to many off-the-shelf NPs and switch fabrics

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Line/Client Interfaces

Multi-rate SERDES for configrable interface types to 10G, 40G or 100G optical modules

Any-Service configurable to support:

- 10G: OTU2, 10GE LAN, FC-800, FC-1200, 5G/10G GDPS, CPRI up to 9.8G, OC-192/STM-64
- 40G: OTU3, 40GE, OC-768/STM-256
- 100G: OTU4, 100GE

Comprehensive per-port ingress and egress client performance monitoring

Forward Error Correction (FEC)

- Industry compatible ITU-T 10G and 40G FECs
- Industry-leading "Swizzle" EFEC with 9.45dB coding gain for OTU3 and OTU4

OTN Subsystem

- OTU4, OTU3, OTU2, ODU4, ODU3, ODU2,ODU1, ODU0 and ODUflex processing
- Up to two stages of ODTUjk multiplexing
- Channelized to support ODU0/ODUflex
- Integrated hardware support for hitless adjustment of ODUflex
- Fully flexible OTU, ODU and OPU overhead insertion (OH) and extraction over an optional dedicated OH interface
- ODUk Tandem Connection Monitoring (TCM)
- Integrated on-chip ODUk switch

OTN Mapping Subsystem

Maps a variety of client protocols over OTN:

- AMP, BMP, GMP, and GFP-F, as per G.709
- ODUflex(CBR) and ODUflex(GFP)
- 10GE mapping into OTN, compliant with ITU
- Flexible packet mapping of Ethernet, IP, and MPLS from Interlaken into ODUk channels
- OTN Phase Signaling Algorithm (OPSA) for rate encoding and adaptation of transparent client data streams over OTN

Ethernet Subsystem

- Integrated IEEE 802.3 compatible physical coding sub-layer (PCS) and media access controllers (MAC)
- Supports frame sizes of 64 bytes to 9.6 Kbytes.
- Comprehensive per-port Ethernet statistics and performance monitoring
- Transmit and receive of IEEE 802.3ah Link OAM, LACP and management VLAN messages
- Firmware-based, hardware assisted G.8261 Synchronous Ethernet (SyncE) and IEEE 1588v2 PTP Timing over packet support
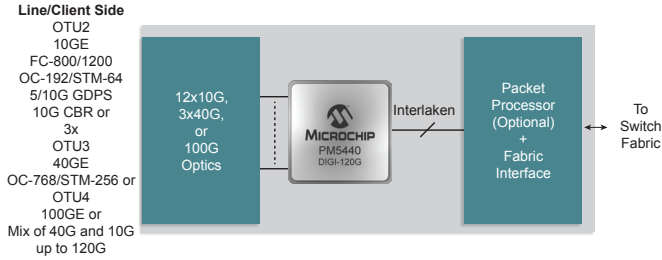
Interlaken System Interfaces

- Configurable Interlaken up to 24 lanes
- Configurable multi-rate, multi-reach SERDES supporting 3.125 Gbps to 12.5 Gbps
- Each Interlaken can be configured to support ODUk traffic only, data packet traffic only, or simultaneous mixed ODUk and data packet traffic
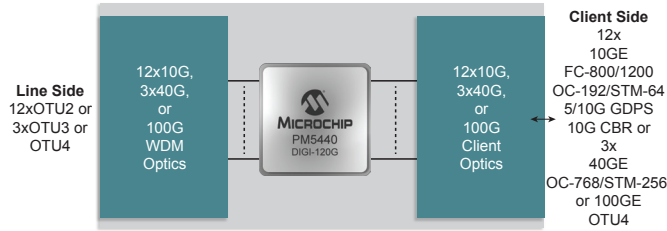- Supports OIF compatible OTN-Over-Packet Fabric Protocol (OPF)

Support Interfaces

- PCIe for microprocessor access
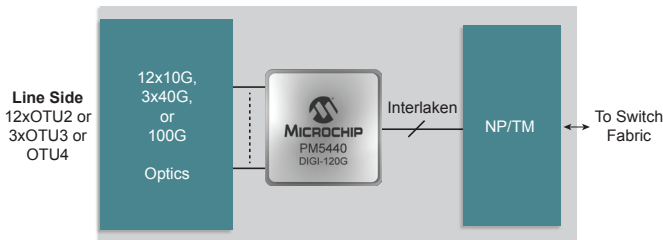- 155.52 MHz reference clock interface

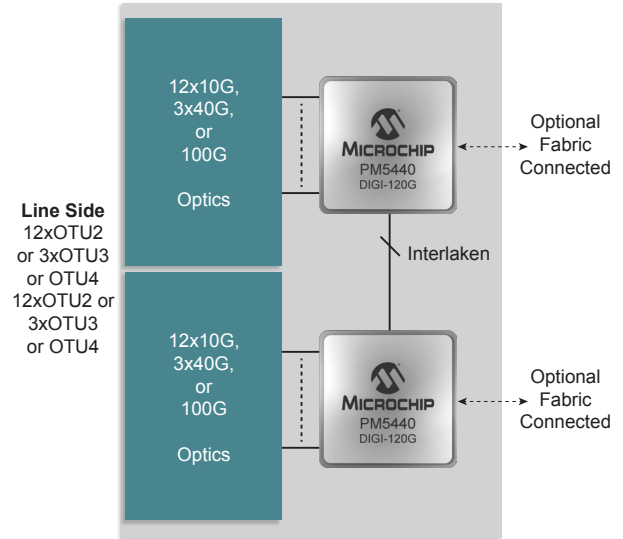**MICROCHIP**

12x10G/3x40G/100G Line/Client/ Hybrid Card with Optional L2+

Line/Client Side
OTU2
10GE
FC-800/1200
OC-192/STM-64
5/10G GDPS
10G CBR or
3x
OTU3
40GE
OC-768/STM-256 or
OTU4
100GE or
Mix of 40G and 10G
up to 120G

| 12x10G, 3x40G, or 100G Optics | PM5440 DIGI-120G | Interlaken | Packet Processor (Optional) + Fabric Interface | To Switch Fabric |

12x10G/3x40G/100G Muxponder/ Transponder Card

Line Side
12xOTU2 or
3xOTU3 or
OTU4

| 12x10G, 3x40G, or 100G WDM Optics | PM5440 DIGI-120G | 12x10G, 3x40G, or 100G Client Optics |

Client Side
12x
10GE
FC-800/1200
OC-192/STM-64
5/10G GDPS
10G CBR or
3x
40GE
OC-768/STM-256
or 100GE
OTU4

Channelized OTN Line Card for Routers

Line Side
12xOTU2 or
3xOTU3 or
OTU4

| 12x10G, 3x40G, or 100G Optics | PM5440 DIGI-120G | Interlaken | NP/TM | To Switch Fabric |

Ported 120G/240G ODU0/flex Cross-Connect

Line Side
12xOTU2
or 3xOTU3
or OTU4
12xOTU2 or
3xOTU3
or OTU4

| 12x10G, 3x40G, or 100G Optics | PM5440 DIGI-120G | Optional Fabric Connected |

Interlaken

| 12x10G, 3x40G, or 100G Optics | PM5440 DIGI-120G | Optional Fabric Connected |

Flexible Compact Metro Platform (Transponder, Muxponder, Regen, Add/ Drop Multiplexer)

Line Side
2xOTU4 pt-to-pt
or OTU4 Ring
(East and West)

| 100G WDM Optics | PM5440 DIGI-120G | Nx10G, 3x40G, or 100G Client Optics |

Interlaken

| 100G WDM Optics | PM5440 DIGI-120G | Nx10G, 3x40G, or 100G Client Optics |

Client Side
Up to 24x
10GE
FC-800/1200
OC-192/STM-64
5/10G GDPS
10G CBR
or Up to 6x
40GE
OC-768/STM-256 s
or Up to 2x
100GE
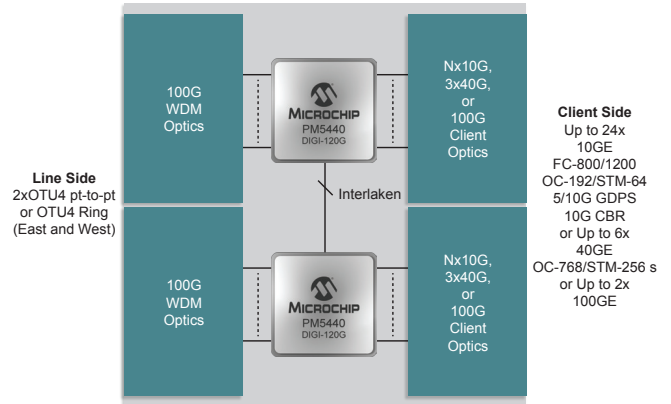
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