

PM5451 HyPHY-AXS

Multi-Service OTN Access Muxponder/Add-Drop Multiplexer

Summary

The PM5451 HyPHY-AXS is an OTN access platform on a chip that enables a new class of compact transport solutions for the Metro Access network. It is optimized for the backhaul of xPON OLTs, 3G/LTE mobile base stations and Enterprise Ethernet services over a unified Metro OTN infrastructure. By integrating multi-rate, multi-protocol client interfaces, Ethernet MACs with onboard support for PTP/SyncE and OTN framing, mapping and multiplexing, the HyPHY-AXS enables compact metro access platforms with the highest level of feature-integration at an optimal footprint, power and Bills-of-Material (BOM) cost.

The HyPHY-AXS supports a rich set of OTN framing, mapping and multiplexing resources for a variety of client protocols, including OTN, SONET/SDH, Ethernet, Fibre Channel, ESCON, FICON and multi-rate bit transparent services such as video. It provides a simple path towards extending designs to enable support for higher client port densities and fabric-connected applications using the PM5450 HyPHY 20Gflex OTN processor.

Optimal Features for Metro Access/Aggregation Applications

- Support for ODU0/ODUflex
- Support for Tri-FEC
- G.709 compliant GMP multiplexing
- Add-drop ODUK capabilities from OTU2 ring
- PTP over OTN support
- SyncE and 1588v2 support

Product Highlights

SFP Client Interfaces

- 8x multi-rate SERDES for direct connection to SFP optical transceivers, independently tunable from 16 Mbit/s to 5 Gbit/s
- Any-Service Any-Port configurable:
 - OTU1
 - OC-3/12/48 or STM-1/4/16
 - 100/1000 Mbps full-duplex Ethernet
 - Bit transparent clients, including, but not limited to, DVB-ASI, SD-SDI, HD-SDI, DV6000, ISC, ISCI and 2.5G/5G Infiniband
 - Fibre Channel FC-15, FC-25, FC-50, FC-100, FC-200, FC-400, FICON and ESCON
 - CPRI clients up to 4.9 Gbit/s

OTU2 Line Interfaces

- Dual integrated SERDES for direct connection to XFP modules

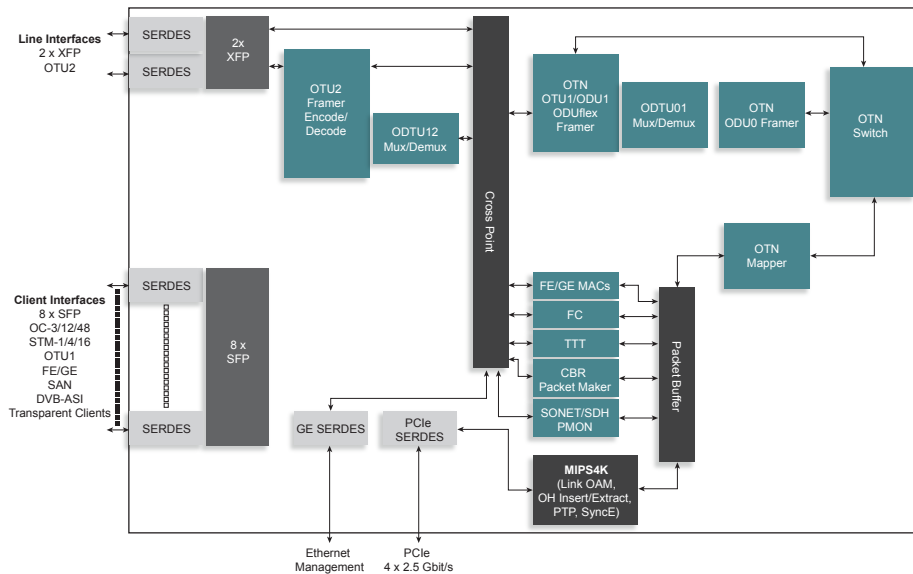
Fibre Channel Subsystem

- FICON, ESCON and Fibre Channel (FC-12, 25, 50, 100, 200, 400)
- Performs 8B/10B Physical Coding Sub-layer (PCS) on a per-link basis with loss of signal and transmission error monitoring
- Per-link rate adaptation to bridge between local and transmit link timing domains

Ethernet Subsystem

- Integrated IEEE 802.3 compliant Media Access Controllers (MAC)
- 4B/5B and 8B/10B physical coding sub-layer (PCS) on a per-link basis for FE and GE, respectively
- Lossless IEEE 802.3 local flow control; integrated packet buffers
- Comprehensive per-port Ethernet statistics
- Frame delineation and generation with configurable IPG, Preamble and CRC
- Transparent transmission of VLAN tagged Ethernet frames
- Frame sizes of 64 bytes to 9.6 Kbytes
- Dynamic programmable depth full-packet store-and-forward buffers for burst tolerance and rate adaptation

Block Diagram



Benefits

- Unprecedented flexibility of service delivery:
 - Supports per-port configurable OTN, SONET/SDH, Ethernet, SAN and bit transparent client services
 - Rich suite of client service mappings into OTN
 - Enables full SNCP-based protection switching for meshed network topologies
- Processor-based Carrier Ethernet:
 - Flexible implementation of Synchronous Ethernet, IEEE 1588 Precision Timing Protocol (PTP), and Ethernet Link OAM (IEEE 802.3ah)
- Optimized power and footprint for OEMs:
 - Direct connect to SFP and XFP modules for all rates with no external SERDES or PLL components required
 - All frequencies derived from a single 155.52 MHz reference clock
 - Single-chip solution for muxponders, ADMs, and optical access platforms
- OTN support in the Metro Access Network:
 - Enables greater reach through FEC and reduces the need for regeneration, resulting in Capex savings
 - Provides better management through a superior OAM framework
 - Leads to Opex savings in comparison to a L2-based solution
 - Transmit and receive of IEEE 802.3ah Link OAM, LACP and Management VLAN messages
 - Firmware-based (MIPS4K CPU), hardware assisted G.8261 Synchronous Ethernet and IEEE 1588v2 PTP Ethernet timing
 - On-chip central packet buffer

OTN Subsystem

- Compatible with ITU-T G.709, ITU-T G.798 and ITU-T G.975
- Supports ODU0 and ODUflex
- Flexible OTU, ODU and OPU overhead/data processing and frame alignment
- Transmit and receive facility and terminal loop back configurations
- One-stage or two-stage ODU multiplexing
- Support for GMP multiplexing
- Support for Tandem Connection Monitoring (TCM)
- O-E-O regeneration with adaptive clocking using Microchip's OTN Phase Signaling Algorithm (OPSA)

Forward Error Correction (FEC)

- Two instantiations of independently-configurable Tri-FEC for OTU2:
 - Interoperable G.709 RS (255, 239) FEC with 6.2 dB coding gain at 10- 15 BERout
 - Interoperable G.975.1 Annex I.4 Strong FEC (8.9 db gain at BERout = 10-15 @ 7% OH)
 - Interoperable G.975.1 Annex I.7 Strong FEC (8.4 db gain at BERout = 10-15 @ 7% OH)

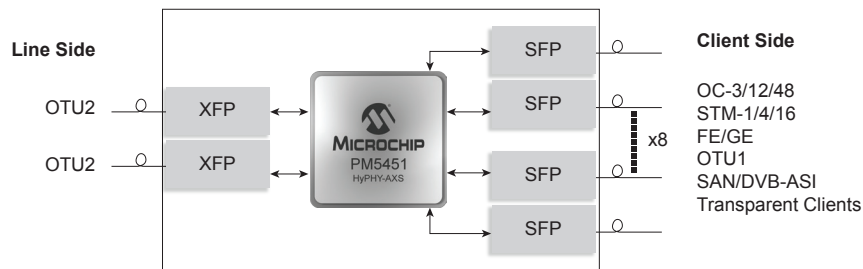
Client Mapping Into OTN

- Maps a wide variety of protocols into OTN
- Encapsulates packet streams into ITU-T G.7041 GFP-F or GFP-T
- OTN Client Mapping (20G maximum):
 - AMP, BMP, and GMP as per G.709
 - TTT mode for mapping clients such as GE into ODU0
 - ODUflex(CBR)
 - High-order (ODU1) virtual and contiguous concatenation performed according to G.709
 - Support for mapping/multiplexing sub-ODU1 client data into OTN
 - GFP with extension headers for multiplexing sub-ODU1 client data streams into ODUks
 - OPSA for rate encoding and adaptation of transparent client data streams over OTN

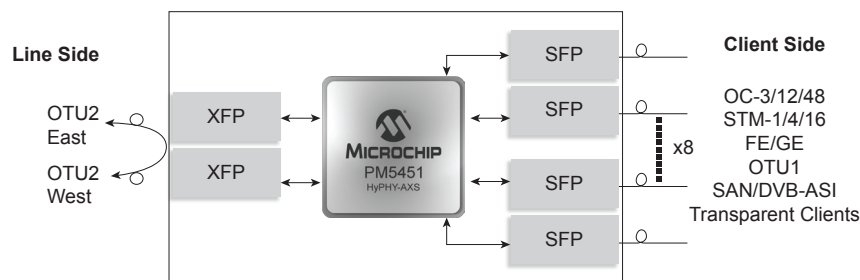
Applications

- Compact metro access platforms
- Universal Muxponder/ADM cards for OTPs and ROADMs

Muxponder Card



Add-Drop Multiplexer Card



For More Information

www.microsemi.com