OTN Mapping for P802.3bj and P802.3bm PMDs

P802.3bj comments 110, 111, 112
P802.3bm – negotiation scenarios for EEE compatible with OTN mapper

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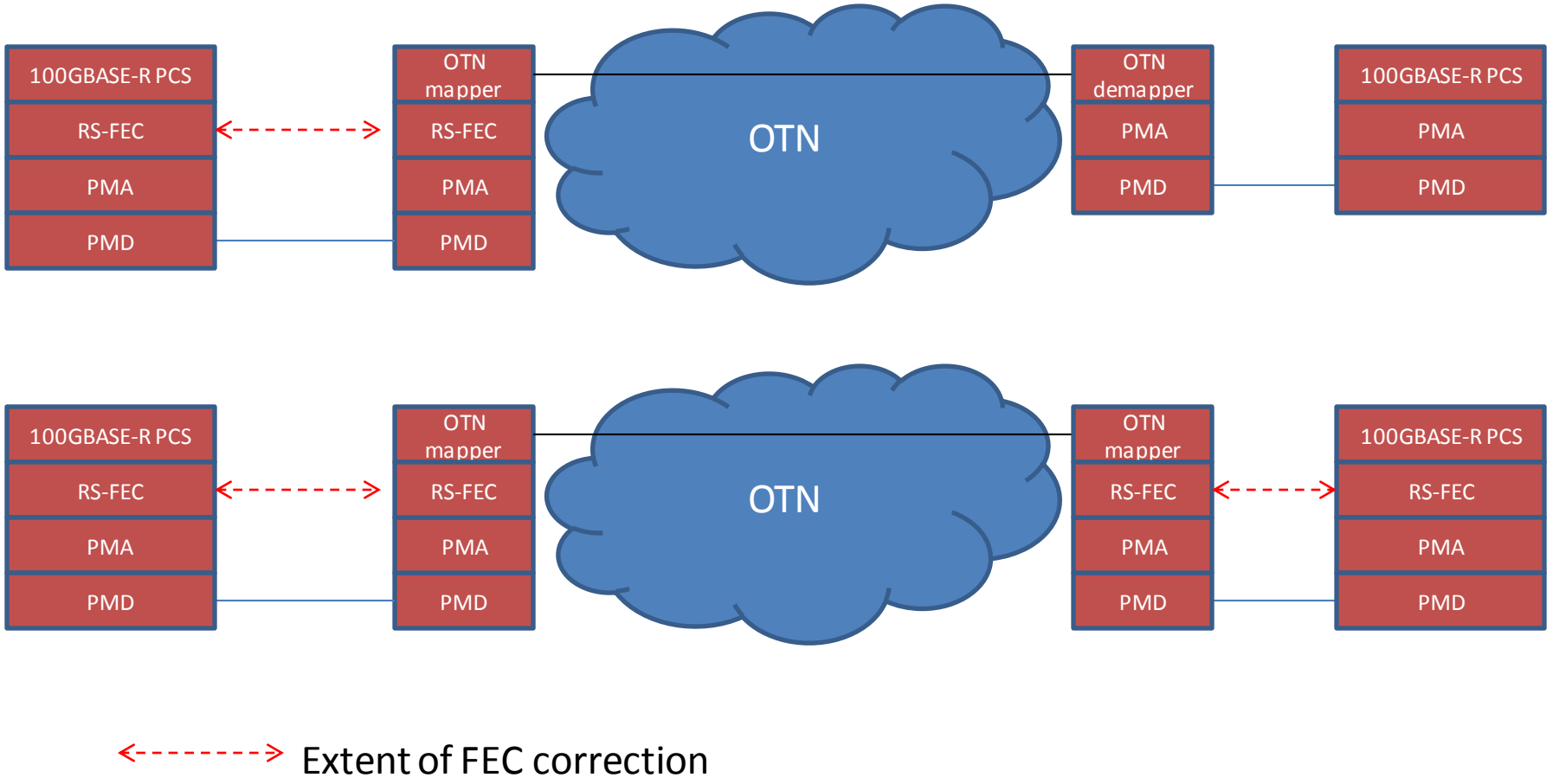
Topics

- Mapping of RS-FEC encoded PMDs
- EEE operation over OTN
- EEE Capability Negotiation

Mapping of RS-FEC enabled PMDs over OTN

- It is the PCS lanes that are mapped over OTN, allowing different Ethernet PHY types (of the same rate) to be used at the OTN ingress and the OTN egress
- PCS Lanes are deskewed and serialized in the mapper to avoid “double-link” skew accumulation
- Transparent OTN Mapping of any RS-FEC encoded PHY (so far 100GBASE-CR4/KR4/KP4/SR4) will require a clause 91 RS-FEC sublayer to be implemented in the OTN mapper/demapper
  - Do not require a single FEC decoder to correct accrued errors over cascaded link segments
  - Preserve ability to interconnect different Ethernet PHY types at the OTN ingress and egress (e.g., 100GBASE-LR4 interconnected to 100GBASE-SR4)

Example – Interconnection of FEC and non-FEC PMDs over OTN



OTN mapper for RS-FEC ecoded PMDs

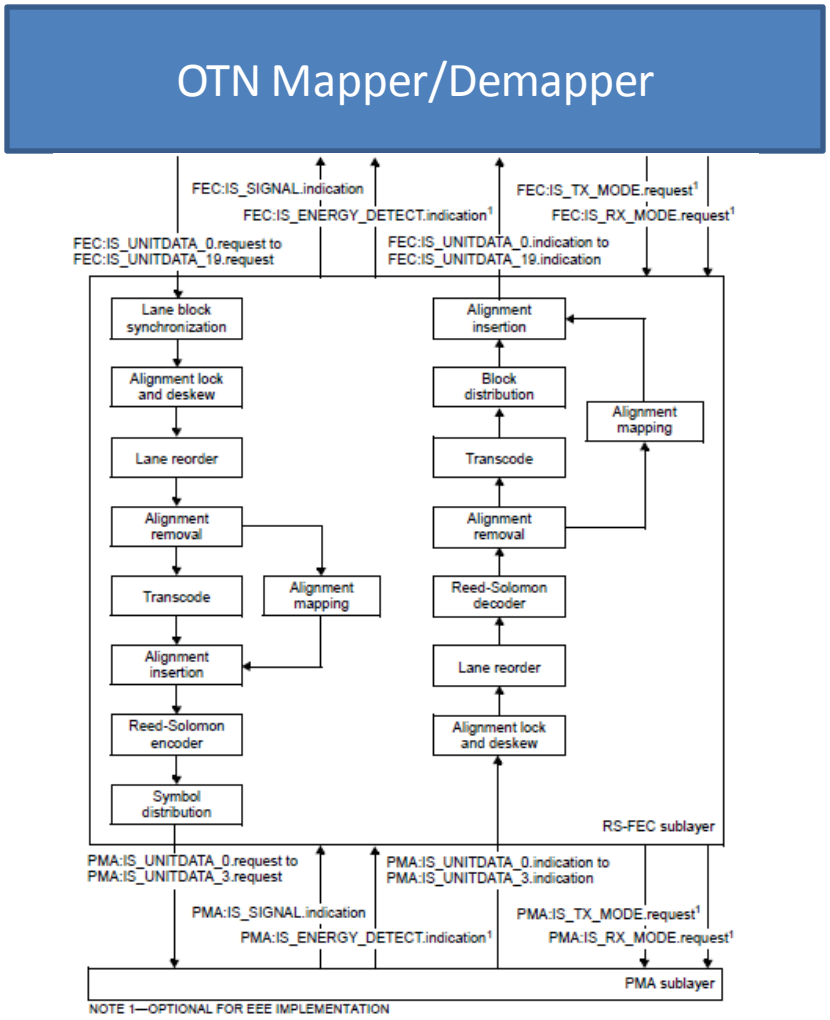
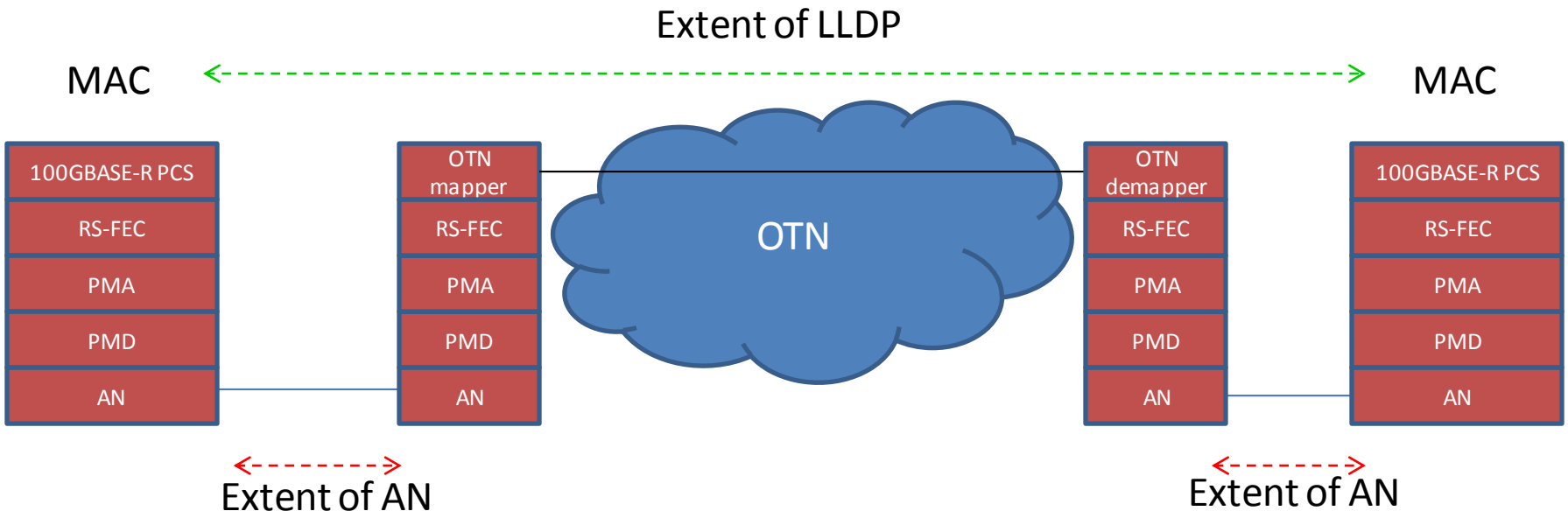


Figure 91–2—Functional block diagram

EEE Operation over OTN

- In the Phoenix meeting of P802.3bj, “Fast Wake” signaling was modified to be compatible with the OTN mapper for transparently mapped Ethernet signals.
- Since the OTN mapper allows interconnection of different PMD types, EEE capability negotiation should be able to discover common modes of operation even between different PMDs
- “Deep Sleep” capable PMDs should not negotiate to use this capability when mapped over OTN

Scope of Capability Exchange Mechanisms



- The MAC link partner and the PMD link partner may be different in the case of OTN transport
- FW capability can be negotiated with your MAC link partner only, since the FW LPI signal is mapped transparently over OTN
- Deep Sleep capability requires compatible capabilities both for MAC link partner and PMD link partner
- All PMDs supporting Deep Sleep are Electrical
- Electrical interfaces can exchange capabilities with their PMD link partner using Auto-Negotiation

Proposed additions to clause 73 Auto-negotiation

- The LPI_modes_supported bit (7.61.15) indicates whether a port supports deep sleep or fast-wake only.
- A copper interface port on an OTN network element will advertise bit 7.61.15 to 1 (fast wake only). A copper interface port on an Ethernet box will only advertise bit 7.61.15 as zero if it supports deep sleep operation.
- Deep sleep will not be used unless both PMD link partners and both MAC link partners (determined after Auto Negotiation by LLDP) support deep sleep

LLDP capability exchange for EEE

- Deep Sleep parameters for ≥40 Gb/s PHYs are exchanged between MAC link partners using the LLDP message with IEEE 802.3 subtype=5 (the normal EEE LLDP message). This message will never be sent by optical PHYs (which are never deep sleep capable). This message will only be sent by a deep sleep capable electrical PHY if auto-negotiation has determined that its PMD link partner is deep sleep capable.
- Fast Wake/Deep Sleep options between ≥40 Gb/s PHYs are agreed between MAC link partners using the LLDP message with IEEE 802.3 subtype=6. Future EEE capable optical PHYs, non Deep-Sleep capable electrical PHYs, and electrical PHYs whose AN link partner has indicated Fast-Wake only must always set Transmit FW and Receive FW to TRUE in this message
- Proposal – add paragraphs to clause 79 clarifying the use of subtype=5 and subtype=6 messages depending on the implemented capabilities, the PHY type, and the results of auto-negotiation

Suggested Paragraph #1

- Clause 79.3.5 (subtype=5)
  The EEE TLV is used to exchange information about EEE data link layer capabilities. This message is exchanged between EEE-capable PHYs operating at rates ≤10 Gb/s, or between EEE-capable PHYs operating at rates ≥40 Gb/s where both the PHY and its link partner are capable of Deep Sleep operation as determined by the PHY type and the results of auto-negotiation.

Suggested Paragraph #2

- Clause 79.3.6 (subtype=6)
  The EEE Fast Wake TLV is used to exchange information about the EEE Fast Wake capabilities. This TLV is only used by systems operating at links speeds >10 Gb/s. Transmit FW and Receive FW are set to TRUE unless the PHY and its link partner are capable of Deep Sleep operation as determined by the PHY type and the results of auto negotiation.