

# Supporting Material for Comment #21

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## Comment #21

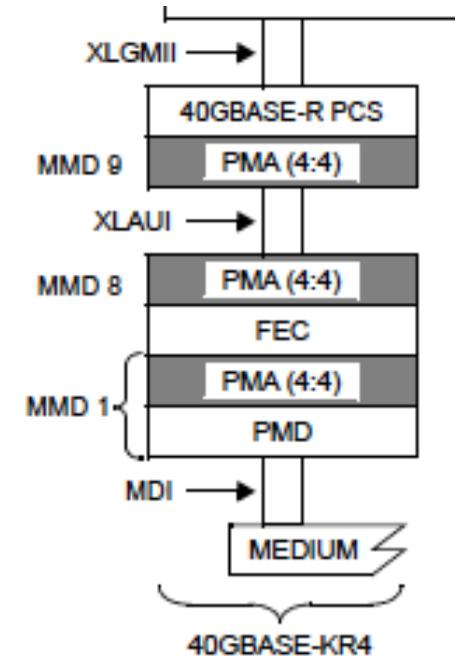
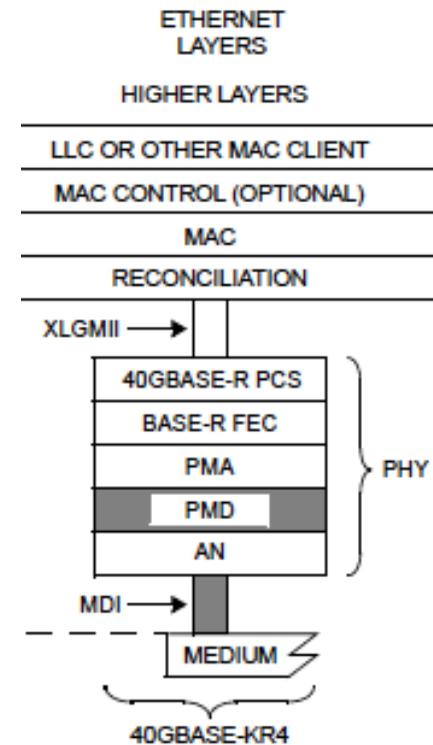
- PHY stackup is based upon the given PHY type. When layers within that stackup is optional to implement then the existence of that layer in the stackup maybe there or not. When the layer is mandatory to implement the layer is always there. If a layer is optional to use then a method to bypass it's function is provided for the cases when it's implemented but functionality is being skipped. CI74 (74.8.2) , CI108 (108.6.3), CI73 (73.6.10) all provide methods to "bypass" the functionality of the clause when not in use. CI91 and CI161 don't have this bypass function in the draft.

# PHY stackup

- Each PMD has a list of sub-layers it must include (mandatory) and which ones it can optionally include.
- The stackup is then based on “what” is there.
- Within each sub-layer that is present, functions may or may not be enabled.

Table 80–2—Nomenclature and clause correlation (40GBASE)

Nomenclature	Clause <sup>a</sup>																		
	28	73	74	78	81	82	83	83A	83B	84	85	86	86A	87	89	113			
	Auto-Negotiation	Auto-Negotiation	BASE-R FEC	EEE	RS	XLGMII	40GBASE-R PCS	40GBASE-R PMA	XLAUI	XLAUI	40GBASE-KR4 PMD	40GBASE-CR4 PMD	40GBASE-SR4 PMD	XLPP1	40GBASE-LR4 PMD	40GBASE-ER4 PMD	40GBASE-FR PMD	40GBASE-T PCS/PMA	
40GBASE-KR4		M	O	O	M	O	M	M	O		M								

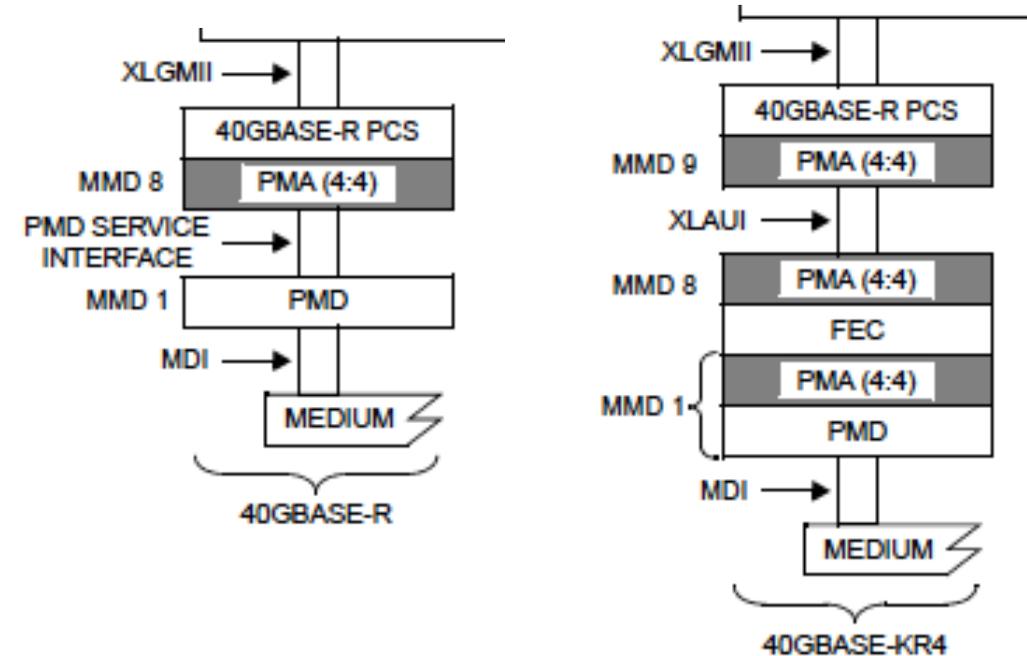


# 40G example

- FEC is optional to exist, so you can end up with two different stack ups.

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	Auto-Negotiation	Auto-Negotiation	BASE-R FEC	EEE	RS	XLGMII	40GBASE-R PCS	40GBASE-R PMA	XLAUI	XLAUI	40GBASE-KR4 PMD	40GBASE-CR4 PMD	40GBASE-SR4 PMD	XLPP1	40GBASE-LR4 PMD	40GBASE-ER4 PMD	40GBASE-FR PMD	40GBASE-T PCS/PMA	
40GBASE-KR4		M	O	O	M	O	M	M	O		M								



## 40G example continued

- FEC is optional to use, so you end up with a bypass sub-layer function for the times it exists but isn't used.

### 74.8.2 FEC Enable

The FEC sublayer shall have capability to enable or disable the FEC function. An MDIO interface or an equivalent management interface shall be provided to access the variable FEC\_Enable for the BASE-R PHY (refer to 45.2.1.102 register bit 1.171.0). When FEC\_Enable variable bit is set to a one, this enables the FEC for the BASE-R PHY. When the variable is set to zero, the FEC is disabled in the BASE-R PHY. This variable shall be set to zero upon execution of PHY reset. When the FEC function is disabled, the PHY shall have a mechanism to bypass the FEC Encode and Decode functions so as not to cause additional latency associated with encoding or decoding functions.

## Current state of standard

- Clause 74 has Bypass Sub-layer Function
- Clause 91 does not have a Bypass Sub-layer Function
- Clause 108 has Bypass Sub-layer Function
  
- The PHYs that use Cl74/108 have the option to bypass the FEC Sub-layer in cases when the FEC Sub-layer was advertised to exist (mandatorily for 25G and optionally for 10Gbps per lane PHYs) but the negotiated operating mode does not use that particular FEC sub-layer.
  
- Clause 91 does not currently have a Bypass the Sub-layer Function since all the PHYs that utilize it mandate that it exists and processes the data.
  - There are methods to bypass functions within the Sub-layer, but not the entire sub-layer

# 100Gck FEC usage

- We're now in the same scenario as 25G where we have two mandatory FEC Sub-layers but we only use one of them at a time.
- The submitted suggested remedy is that we need to add the Bypass Sub-layer function to Cl91 and Cl161 so that based upon which FEC is "used" the other can be bypassed.
- Next 4 slides include an updated suggested remedy. Updates include
  - Add a Bypass function to Clause 152
  - Rewording of Clause 45 register definition for the Clause 91 bypass mode bit

## Suggested Remedy changed for C161

- In Table 161-1 add mapping to register 1.200.5 as RS\_FEC\_Int\_enable. Add sub-clause describing this bit as "161.6.14 RS\_FEC\_Int\_enable"
- The RS-FEC-Int sublayer shall have the capability to enable or disable the FEC function. An MDIO interface or an equivalent management interface shall be provided to access the variable RS\_FEC\_Int\_Enable for the RS-FEC-Int sublayer. When RS\_FEC\_Int\_Enable variable is set to a one, the RS-FEC-Int sublayer performs the transmit function as specified in 161.5.2 and the receive function as specified in 161.5.3. When the variable is set to zero, the transmit and receive functions are disabled, and the RS-FEC-Int sublayer is bypassed, effectively connecting its service interface to the service interface of its underlying sublayer. This variable is mapped to the bit defined in 45.2.1.110.aa."

## Suggested Remedy changes for CI91

- Bring in Table 91-2 from 802.3cd-2018 and add a row for RS-FEC Enable, RS\_FEC\_enable, 1.200.6, RS\_FEC\_enable
- Add new sub-clause to describe the FEC\_enable variable as "91.6.2a RS\_FEC\_enable"
- For PHYs supporting RS-FEC-Int operation this sublayer shall have the capability to enable or disable its FEC function. An MDIO interface or an equivalent management interface shall be provided to access the variable RS\_FEC\_Enable for the RS-FEC sublayer. When RS\_FEC\_Enable variable is set to zero, the RS-FEC sublayer performs the transmit function as specified in 91.5.2 and the receive function as specified in 91.5.3. When the variable is set to a one, the transmit and receive functions are disabled, and the RS-FEC sublayer is bypassed, effectively connecting its service interface to the service interface of its underlying sublayer. This variable is mapped to the bit defined in 45.2.1.110.xx."

## Addition to suggested remedy for CI 152

- Bring in Table 152-1 from P802.3ct and add a row for Inverse RS-FEC Enable, IFEC\_enable, 1.200.7, IFEC\_enable
- Add new sub-clause to describe the IFEC\_enable variable as "152.6.2a IFEC\_enable"
- For PHYs that support bypassing the FEC operation of the FEC sub-layer below the Inverse RS-FEC sub-layer this sublayer shall have the capability to enable or disable its FEC function. An MDIO interface or an equivalent management interface shall be provided to access the variable IFEC\_Enable for the Inverse RS-FEC sublayer. When IFEC\_Enable variable is set to zero, the Inverse RS-FEC sublayer performs the transmit function as specified in 152.5.2 and the receive function as specified in 152.5.3. When the variable is set to a one, the transmit and receive functions are disabled, and the Inverse RS-FEC sublayer is bypassed, effectively connecting its service interface to the service interface of its underlying sublayer. This variable is mapped to the bit defined in 45.2.1.110.xx."

## Suggested Remedy changes for CI45

- In Table 45-88 assign
  - bit 6 to be RS-FEC Enable with 1-RS-FEC is enabled, 0 - RS-FEC is disabled, R/W
  - bit 7 to be IFEC Enable with 1-Inverse RS-FEC is enabled, 0 – Inverse RS-FEC is disabled, R/W
- Add sub-section describing bit 6 as "Bit 1.200.6 enables the Reed-Solomon FEC described in Clause 91 for PHYs that support multiple FEC operating modes including Clause 91."
- Add sub-section describing bit 7 as "Bit 1.200.7 enables the Inverse Reed-Solomon FEC described in Clause 152 for PHYs that support bypassing the FEC Sub-layer below the Inverse RS-FEC sub-layer."
- Note that currently D1.1 already has bit 1.200.5 defined as RS-FEC-Int enable

Thank You





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