7.5 Gb/s Rate Considerations

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Introduction

- **There are P802.3dm applications that could benefit by a rate between 5 and 10 Gb/s**
  - For example, a camera using 3840x2160 @ 12bpp @ 60fps -> 5.986 Gbps
- **It was observed that adopting PAM3 modulation for 7.5 Gb/s would result in the same PHY baud rate as PAM2 for 5 Gb/s and PAM4 for 10 Gb/s**
  - Consequently, the performance should be as good or better than for 10 Gb/s
- **PAM3 is already defined and specified in IEEE 802.3 Table 97-2**
- **Consequently, adding 7.5 Gb/s support at the PHY is straightforward with effectively no change other than PAM3 modulation that can reference Table 97-2**
  - The added complexity is the PAM3 encoder/decoder, which is similar to the PAM4 complexity

MAC Rate Implications

- **The question is whether this would require defining a new MAC, which would be outside the scope of the P802.3dm PAR**

- **As explained in https://www.ieee802.org/3/ISAAC/public/012224/zimmerman_3ISAAC_01b_012224.pdf presented during the P802.3dm Study Group phase, the MAC is rate-less**
  - Per clause 4.2 and the pascal code specification, the MAC is not defined to have a speed
  - The RS defines an interface to the PHY (xMII) and interfaces to the MAC via primitives defined in subclause 6.3

- **Specifically:**
  - The MAC transmit rate is determined by the rate at which the RS services the bits presented to it by the MAC using the PLS_DATA.request primitive of the PLS service interface
  - The MAC receive rate is determined by the rate at which the RS presents bits to the MAC using the PLS_DATA.indication primitive of the PLS service interface.

- **Consequently, a MAC can support any aggregate data rate ≤ its MAC data rate.**

MAC Rate Implications (continued)

- **In other words, a MAC can support any aggregate data rate ≤ its MAC data rate.**
  - We already rely on that in the P802.3dm baseline where we specify that the 100 Mb/s also uses the XGMII.

- **Consequently, there is no need to define a new MAC to support 7.5 Gb/s**
  - It can use the existing 10 Gb/s MAC and can be added to Table 4-2

Conclusions

- **In summary:**
  - There are imager application that would benefit from having a rate between 5 and 10 Gb/s:
  - Using the existing Table 97-2 PAM3 modulation reserves a common baud rate with 5 and 10 Gb/s
  - Due to the MAC being inherently rate-less, 7.5 Gb/s can use the 10 Gb/s MAC

- **The addition of a 7.5 Gb/s high-speed path option was proposed and documented in comments to draft D0.b (Gorshe comment #257)**

- **Consequently, it is recommended to include this option as proposed in the comments**

Thank You