

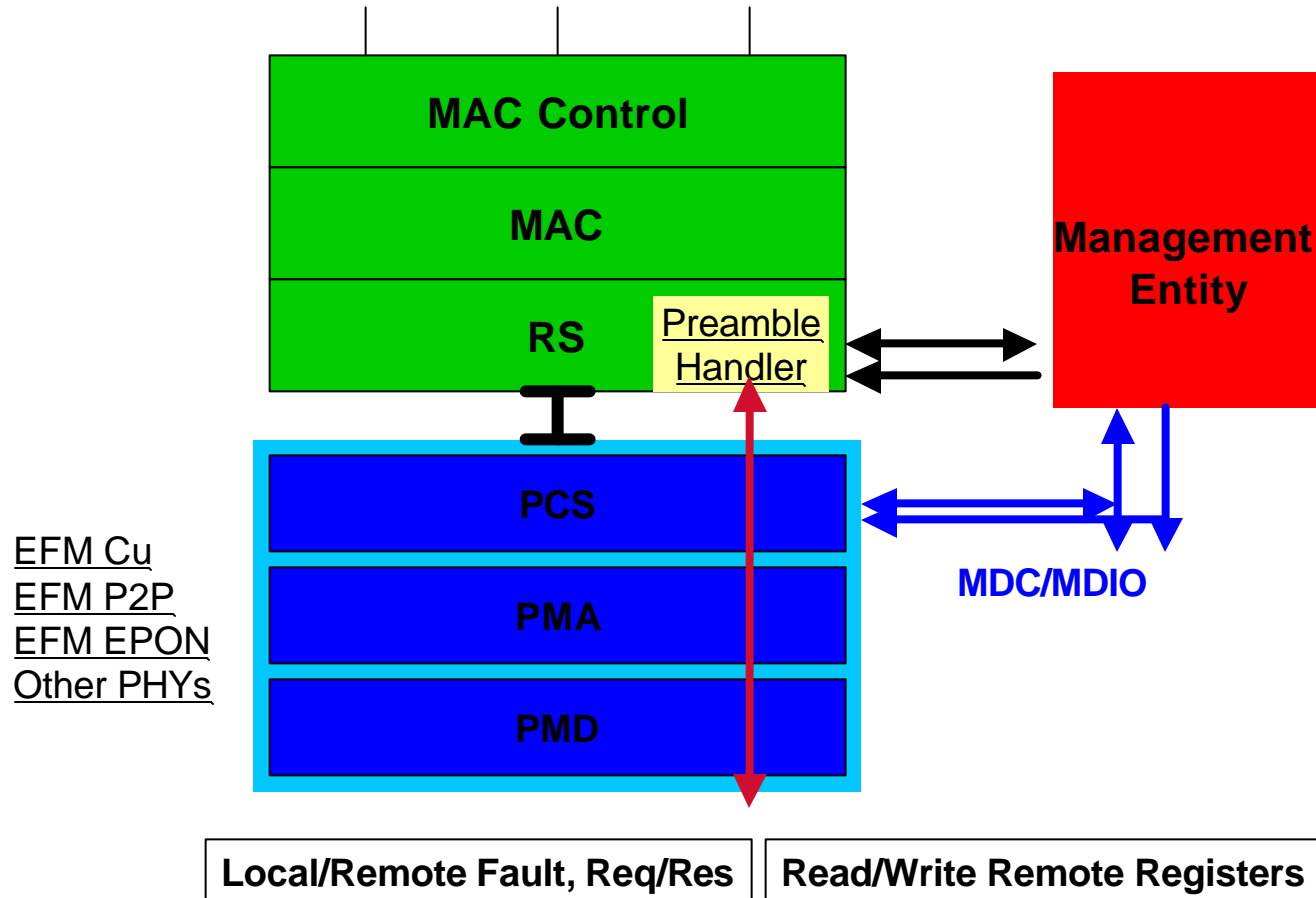
# **EFM OAM on Preamble**

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**Howard Baumer, David Sorensen, Broadcom**  
**Martin Nuss, Internet Photonics**  
**David Law, Martin Adams, 3Com**  
**Bob Barrett, Fiberintheloop**  
**Fred Mohamadi, XLOptics**  
**Rich Taborek, Intel**

# OAM on Preamble

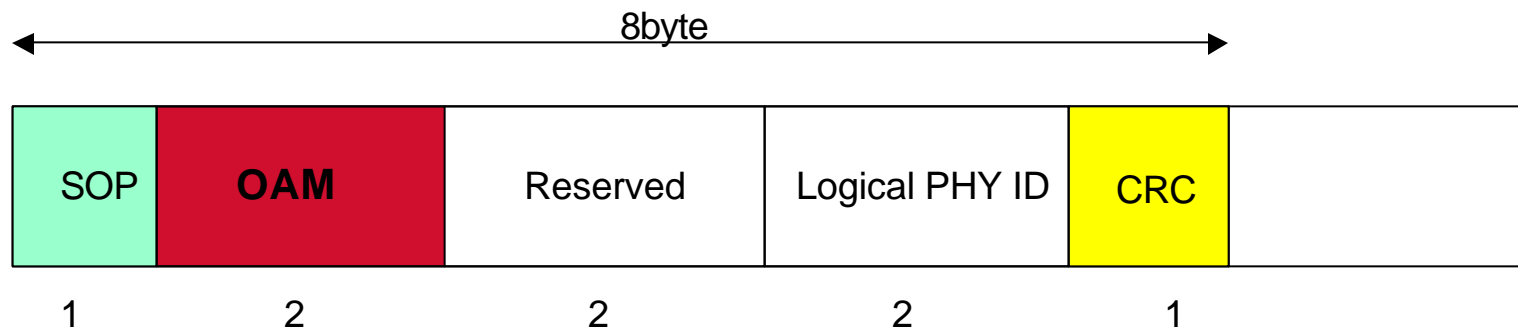
- **MAC/PHY Sub-Layer “OAM On Preamble “**
- **Service Provider Class OAM**
  - Secure (Invisible to MAC)
  - No overhead
  - Very Short Latency
  - Common to all EFM PHYs
  - Can match with PHY demarcation point ( Media Converter ) model
  - per\_logical\_port OAM by combination with Logical PHY ID, possible

# Where is Preamble Handler : RS



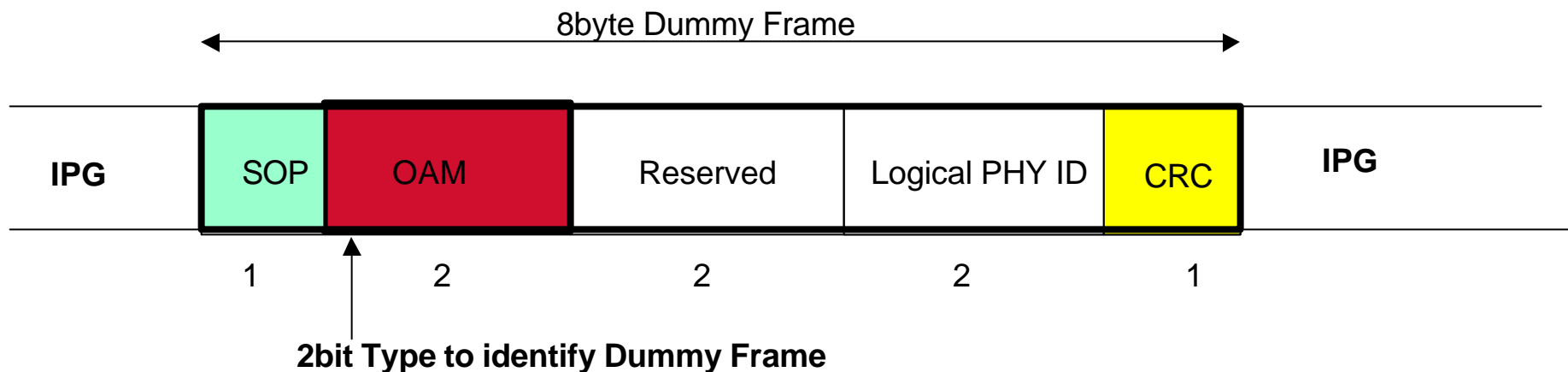
# OAM on Preamble

- **8 byte Preamble to carry:**
  - 2-4byte : OAM ( Defect Indication, Link Monitor Report, Loopback )
  - 2byte : Reserved for Logical PHY ID
  - 1byte : CRC
- **If there is no data frame, generate a dummy frame.**
- **When passing a frame to MAC, convert back to the normal preamble.**



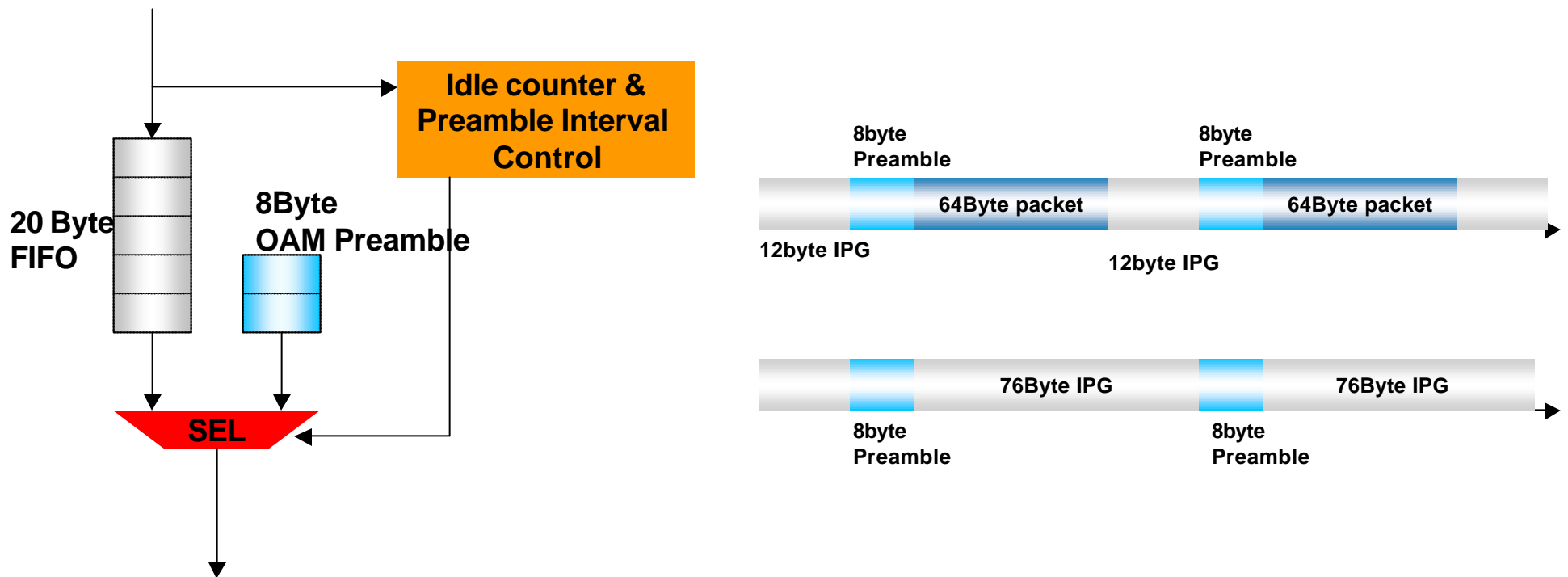
# When there is no data frame..

- Generate “Dummy-frame” = 8 byte Preamble
  - Replace “*minimum IPG + 8byte IPG + minimum IPG*” with “*minimum IPG + 8bte Preamble Frame+ minimum IPG*”
  - Interval of Dummy Frame
    - = Max OAM rate based on shortest legal MAC frame
  - Dummy Frame is terminated at the receiver side of RS



# How it works

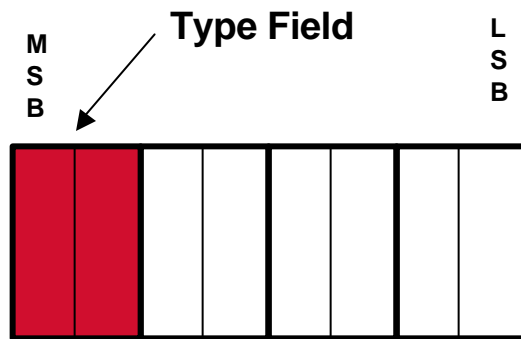
- 8Byte IPG replaced with Dummy-frame
- Make sure IPG rule for Dummy-frame as well as for Legal Frame
- Make sure min Dummy-frame Inter-gap = 76 Byte



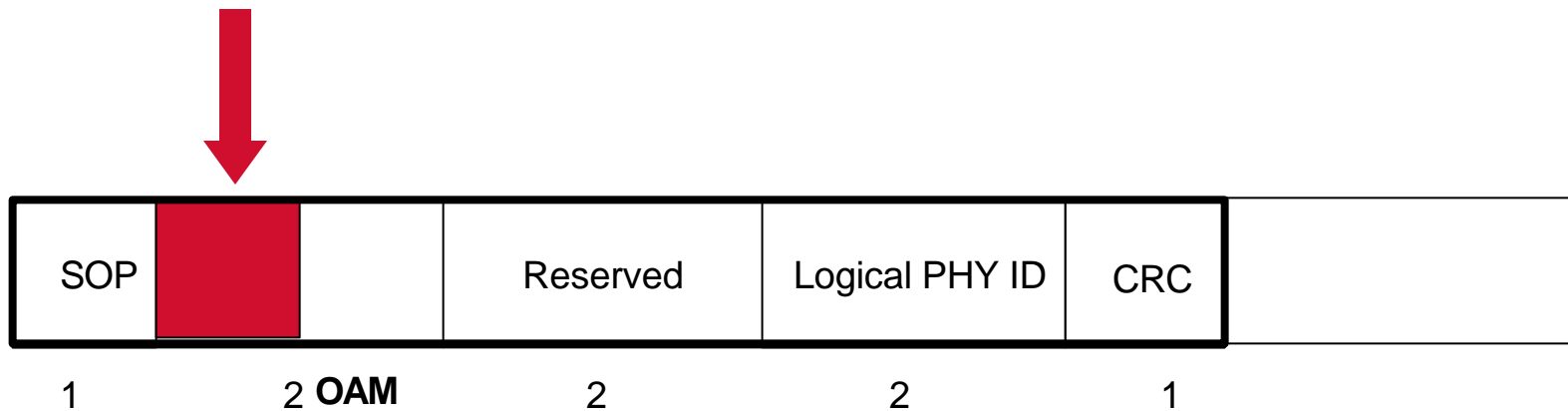
# OAM Bytes on Preamble

- **2bit :Preamble Type Field**  
Normal Frame / OAM Frame / Dummy Frame
- **6bit :OAM Code Points**  
Local / Remote Fault / Dying Gasp / Loopback
- **Ethernet Control Channel ( ECC ) Byte**  
Link Monitoring ( read / write remote registers )  
Packets with encapsulation ( HDLC ) over ECC bytes
- **Reserved Bytes**

# 2 bit Preamble Type Field

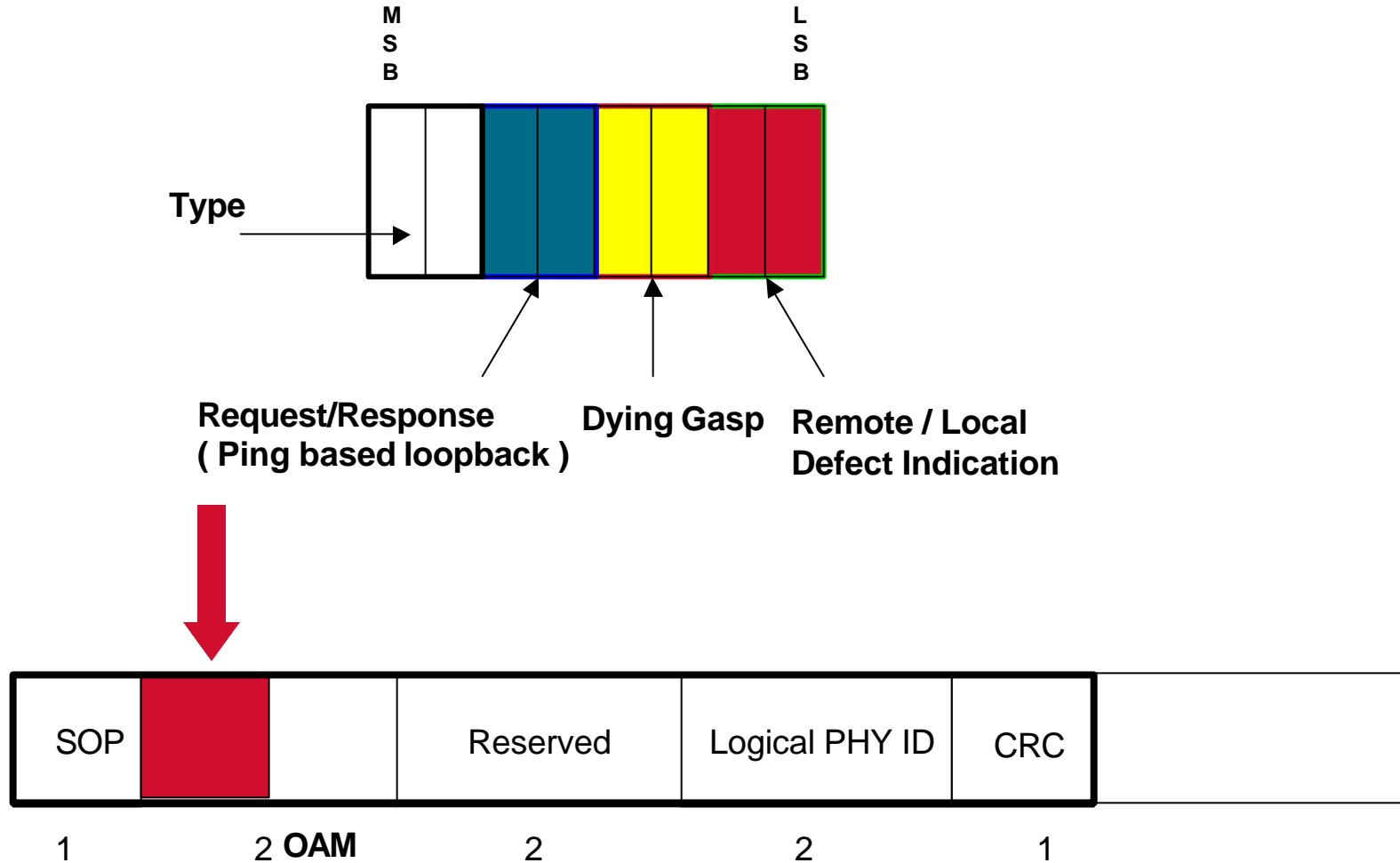


- **00: OAM Preamble with Data**
- **01: Standard Preamble Ethernet Packet**
- **10: Dummy Frame**
- **11: Reserved**



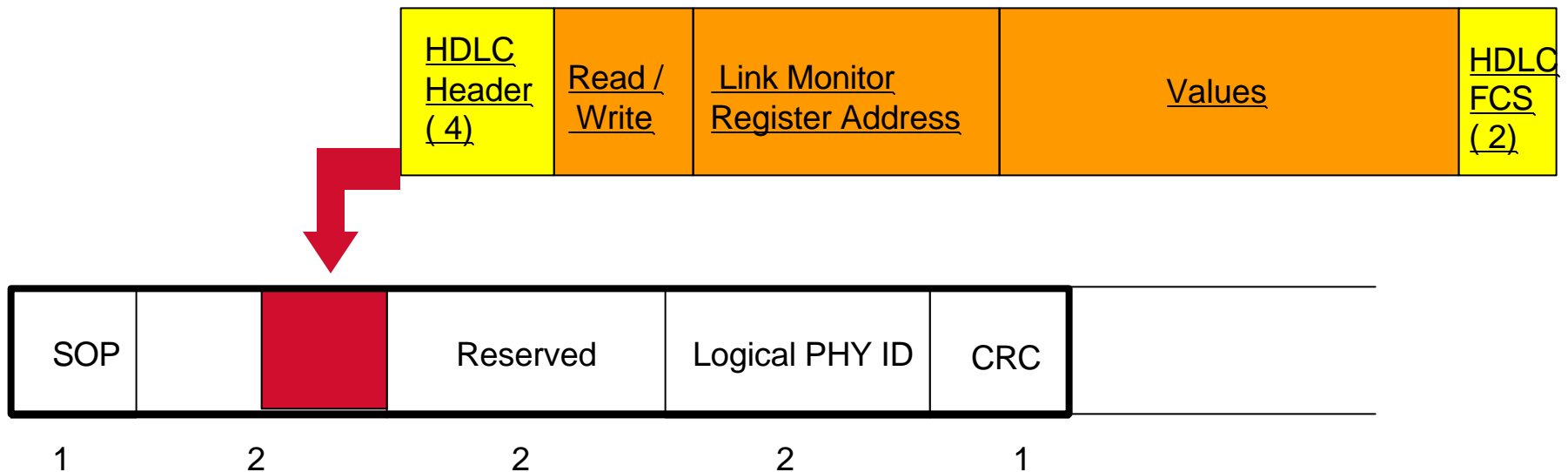


# 6 bit OAM Code Points



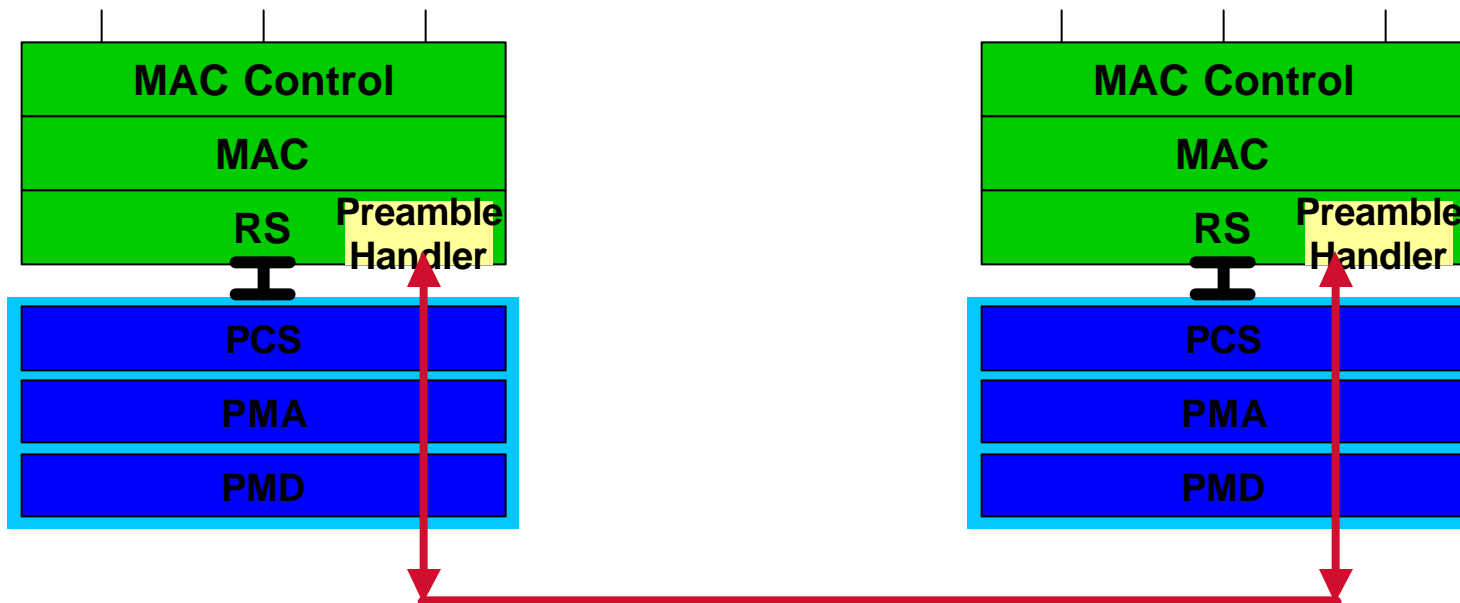
# Remote Link Monitor

- Read / Write Register Command
  - Link Status / BER / SN / CRC Error / MAC Tx&Rx Stats / Control Registers
- Carried by HDLC Encapsulated Message on OAM Byte Stream
- Min BW = 1byte / Longest Frame
  - about 600Kbps at GE, 60kbps at FE, 6kbps at 10M



# OAM preamble where to start & terminate

- RS layer to generate & terminate OAM preamble
- No forwarding beyond RS Layer
- Segment by segment protocol



# Conclusion

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- **RS Layer to handle OAM over Preamble**
- **Provides “Service Provider Class” OAM:**
  - Very secure,
  - Short latency
  - No overhead, no impact on user traffic bandwidth
- **Common OAM for EFM PHYs.**