Greater than 10G for PAR

William Lo

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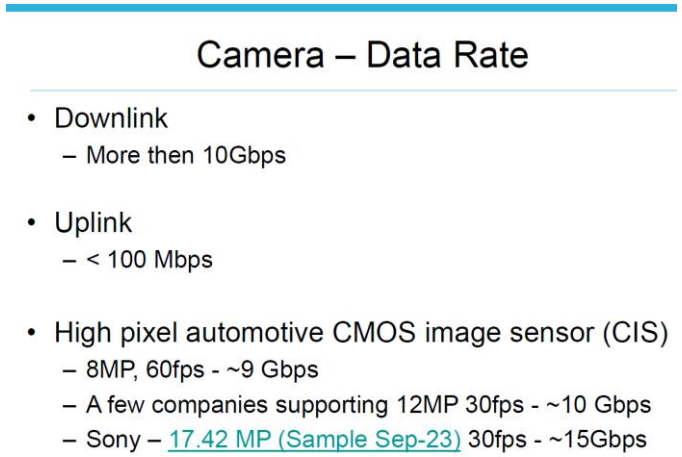
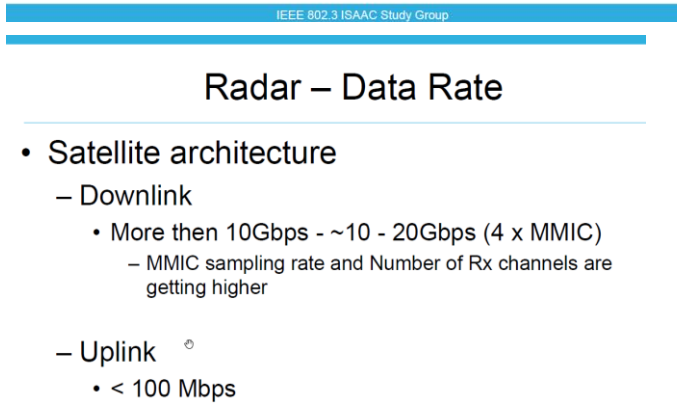
Agenda

- Summarize presented use cases for >10G speeds
- Who else is doing greater than 10G for sensors
- Small incremental effort to consider higher and lower speed combinations
- Next Steps

Presented Use Cases for Higher Speeds

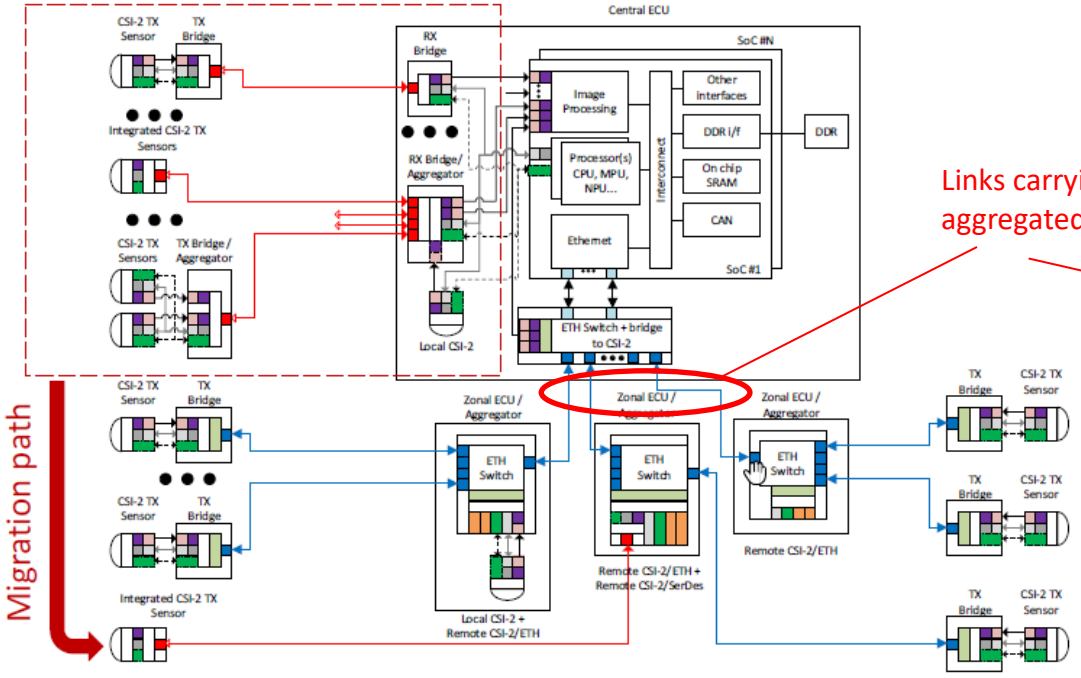
- High Pixel Count Camera
  - 9 - 15Gbps
- Radar
  - 10 - 20Gpbs



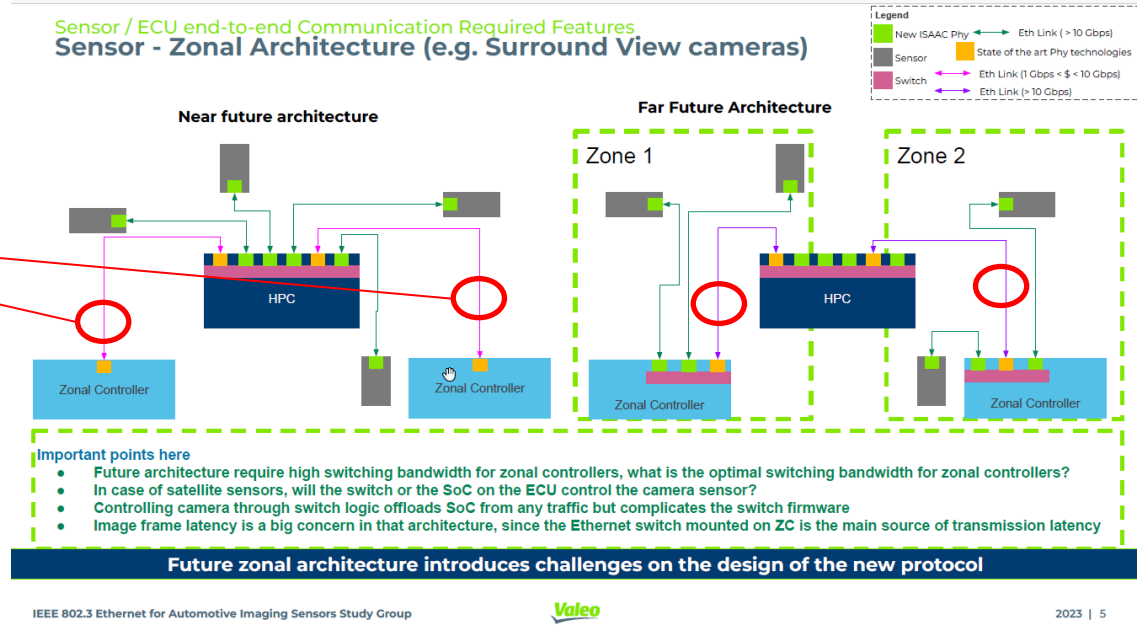


https://www.ieee802.org/3/ISAAC/public/092723/ringle_ISAAC_01_092723.pdf

Aggregators in Zones



Links carrying aggregated data



https://www.ieee802.org/3/ISAAC/public/092723/Nagiub-IEEE_802.3_ISAAC.pdf

https://www.ieee802.org/3/ISAAC/public/092723/lasry_isaac_sensor_protocols_20230912.pdf

- 4 x 8Gb/s ➔ 32 Gb/s aggregated
- 4 x 5Gb/s ➔ 20 Gb/s aggregated
- Up to 2.5Gb/s upstream

Other Standard with >10G speeds targeting sensor applications

- MIPI APHY
  - https://www.mipi.org/specifications/a-phy (under Fundamental Features)
  - 5 downlink speed gears (2, 4, 8, 12 and 16 Gbps)
  - Dual-downlink configuration using two data lanes offers a maximum downlink data rate of 32 Gbps

Incremental Effort to consider possible combinations

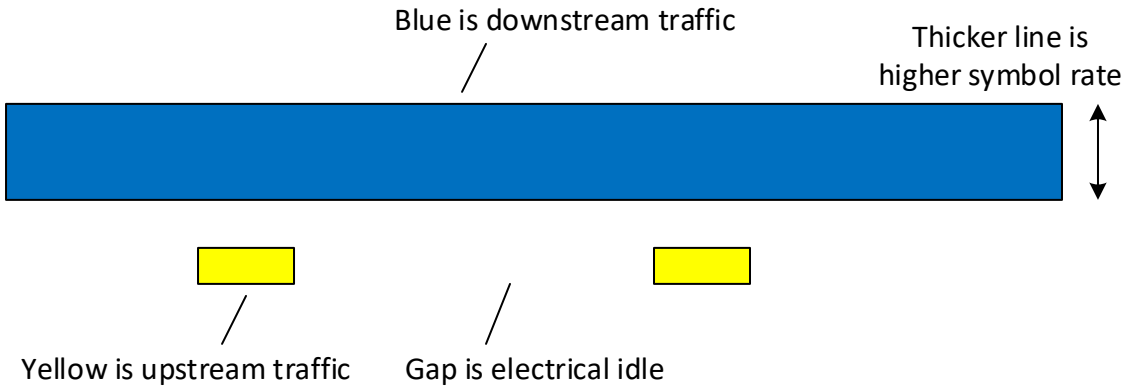
- Select base method (i.e. EEE, FDD, TDD)
- Then tune the parameters for combination in question
- Discussed possible combinations in meetings so far

	Down Stream				
Upstream	**1 G**	**2.5 G**	**5 G**	**10 G**	**25 G**
100 M	X	X	X	X	X
1 G				X	X
2.5 G					X

- Task force can winnow down supported combinations

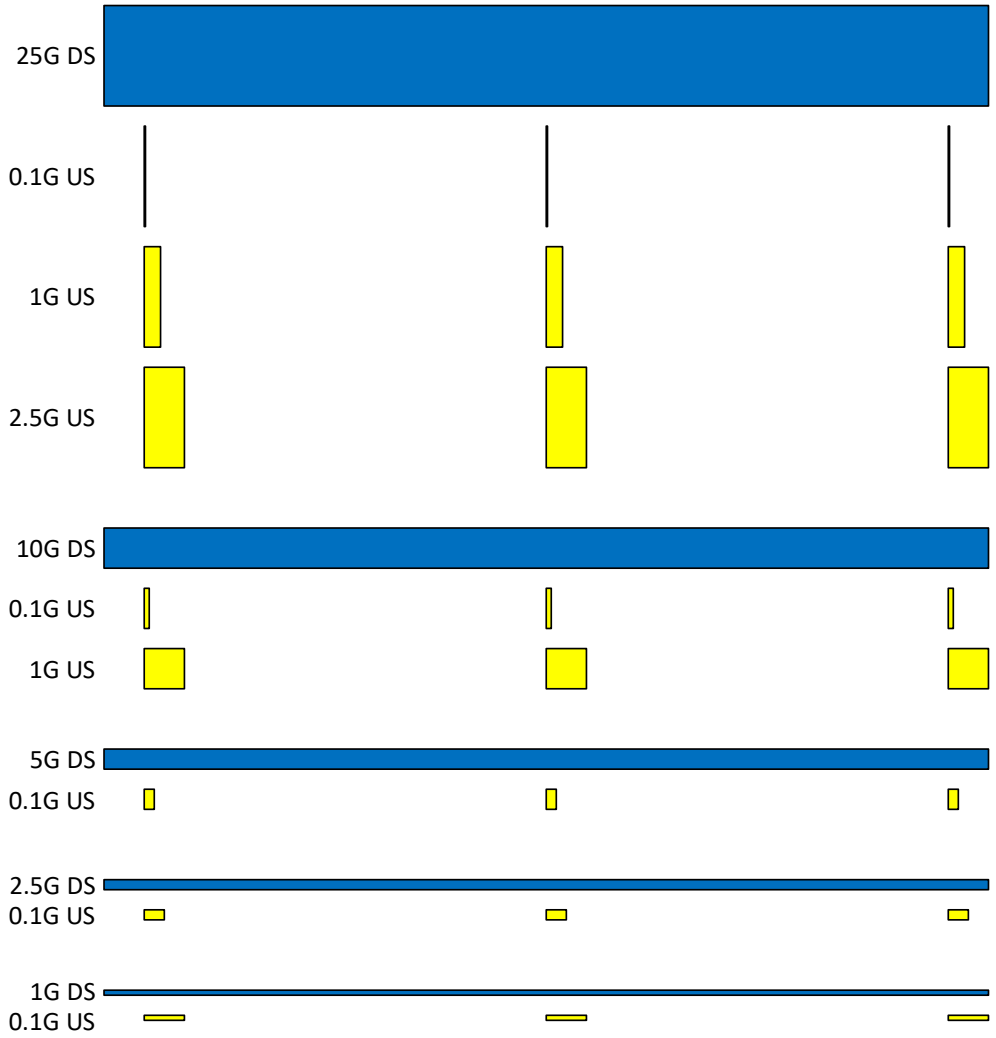
Key to Diagrams

- Following diagrams helps with understanding on the signaling over the PHY
  - Both width and height are close to scale but not exact



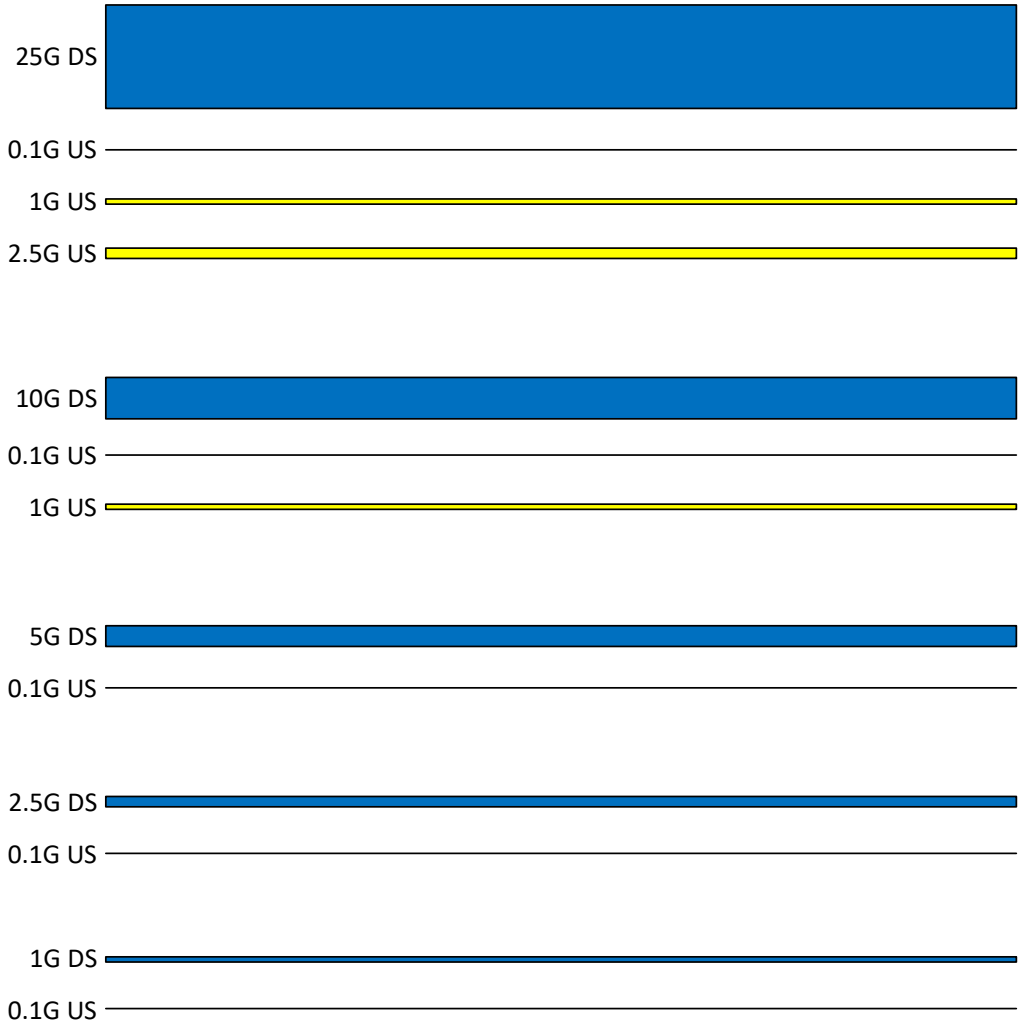
EEE Option

- Parameters to tune
  - Upstream duration
  - Period between bursts



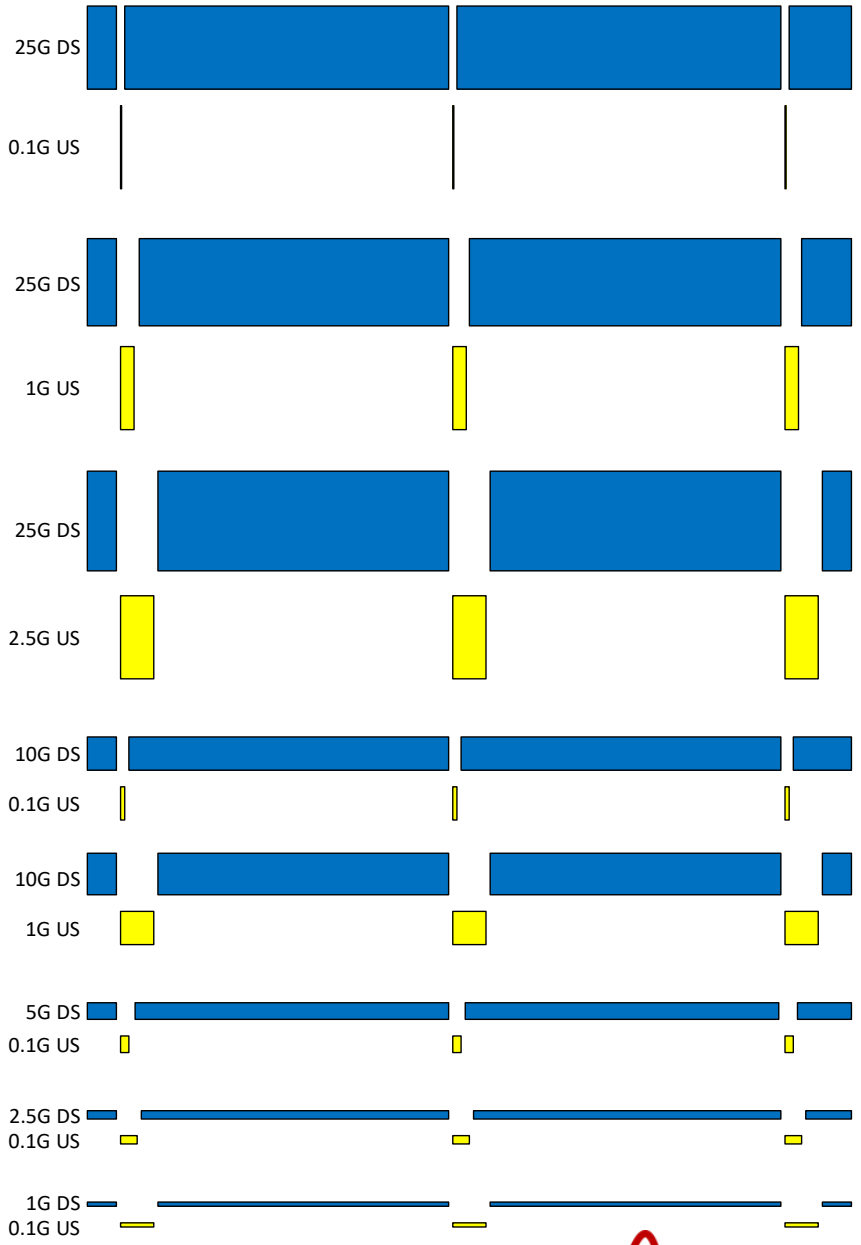
FDD Option

- Parameters to tune
  - Upstream baud rate



TDD Option

- Parameters to tune
  - Downstream and Upstream baud rates
  - Period and duration of bursts



Let’s evaluate

- Task force not obligated to define every combination
  - But let us at least discuss them
  - At this time let’s not preclude any combination that some people believe are needed in spirit of cooperation
- Implementor not obligated to implement every defined combination
  - Cost and Power optimized only for combinations needed for specific application
  - Lower speeds PHYs for sensors
  - Higher speeds PHYs for high resolution sensors, aggregators

Set the foundation for asymmetric Ethernet PHYs

- 802.3az (EEE) – set foundation for EEE
- 802.3an (10GBASE-T) – set foundation for training sequence used in 802.3bp.
- 802.3bp (1000BASE-T1) – set foundation for single pair Autoneg, link sync, inband OAM, single pair EEE, automotive focused - used in 802.3ch, 802.3cy
- Ideally, ISAAC can set the foundation for asymmetric Ethernet in a speed agnostic fashion that goes beyond the speed combinations

Proposed Alternative PAR Wording

- Current Wording:
  - Physical Layer specifications and management parameters for electrical media and operating conditions optimized for automotive end-node cameras for operation up to 10 Gbps in one direction and with a lower data rate in the other direction

- Proposed Change:
  - Physical Layer specifications and management parameters for electrical media and operating conditions optimized for automotive end-node cameras for operation with a higher data rate in one direction and with a lower data rate in the other direction

THANK YOU