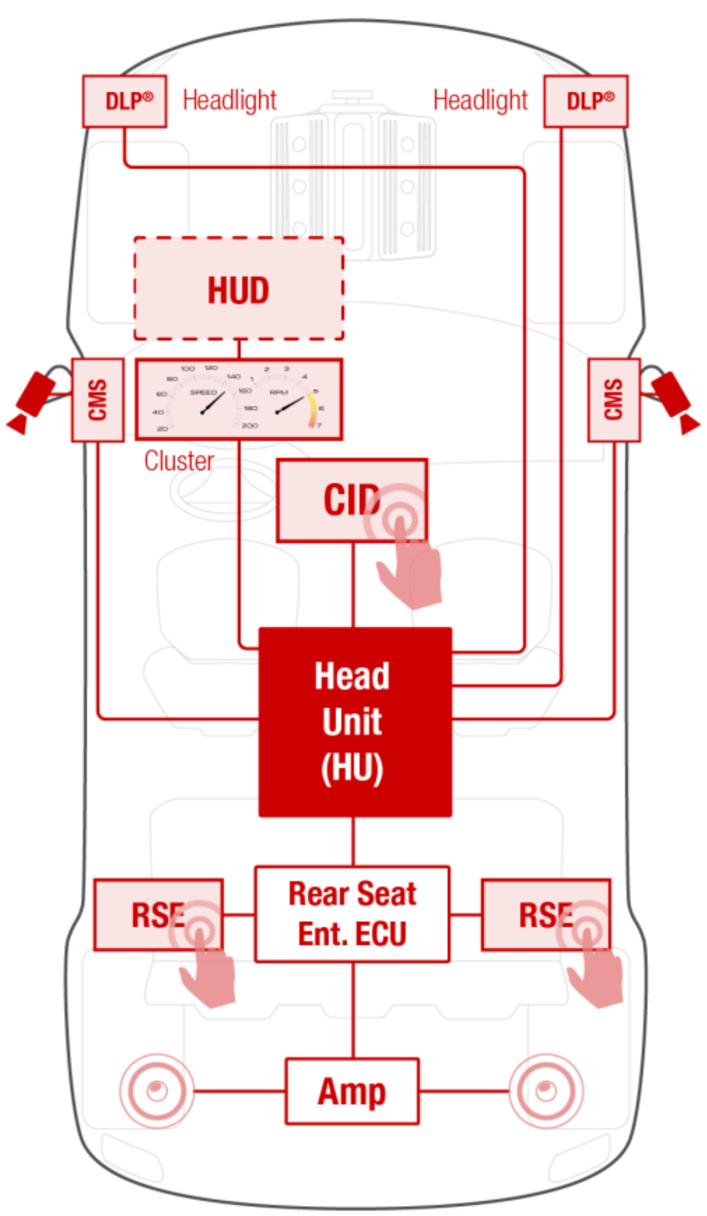
What is FPD-Link?

TI Precision Labs - FPD-Link

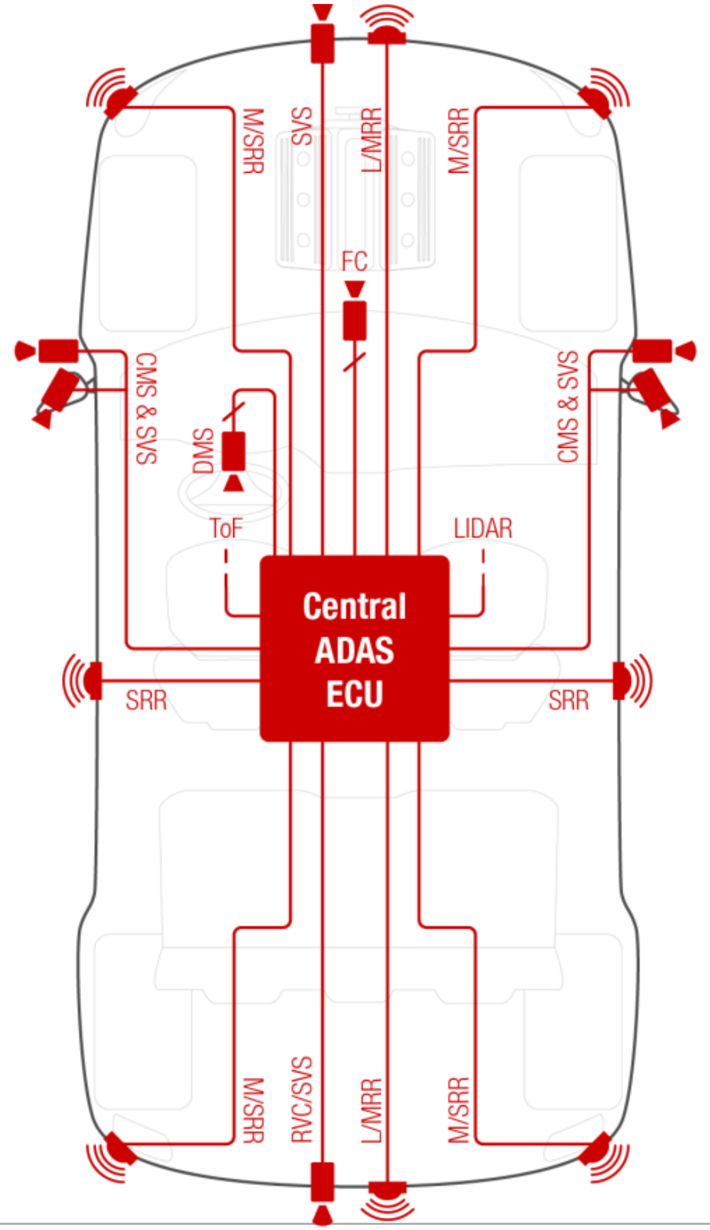
Prepared and presented by Casey McCrea

What is FPD-Link?

Infotainment FPD-Link

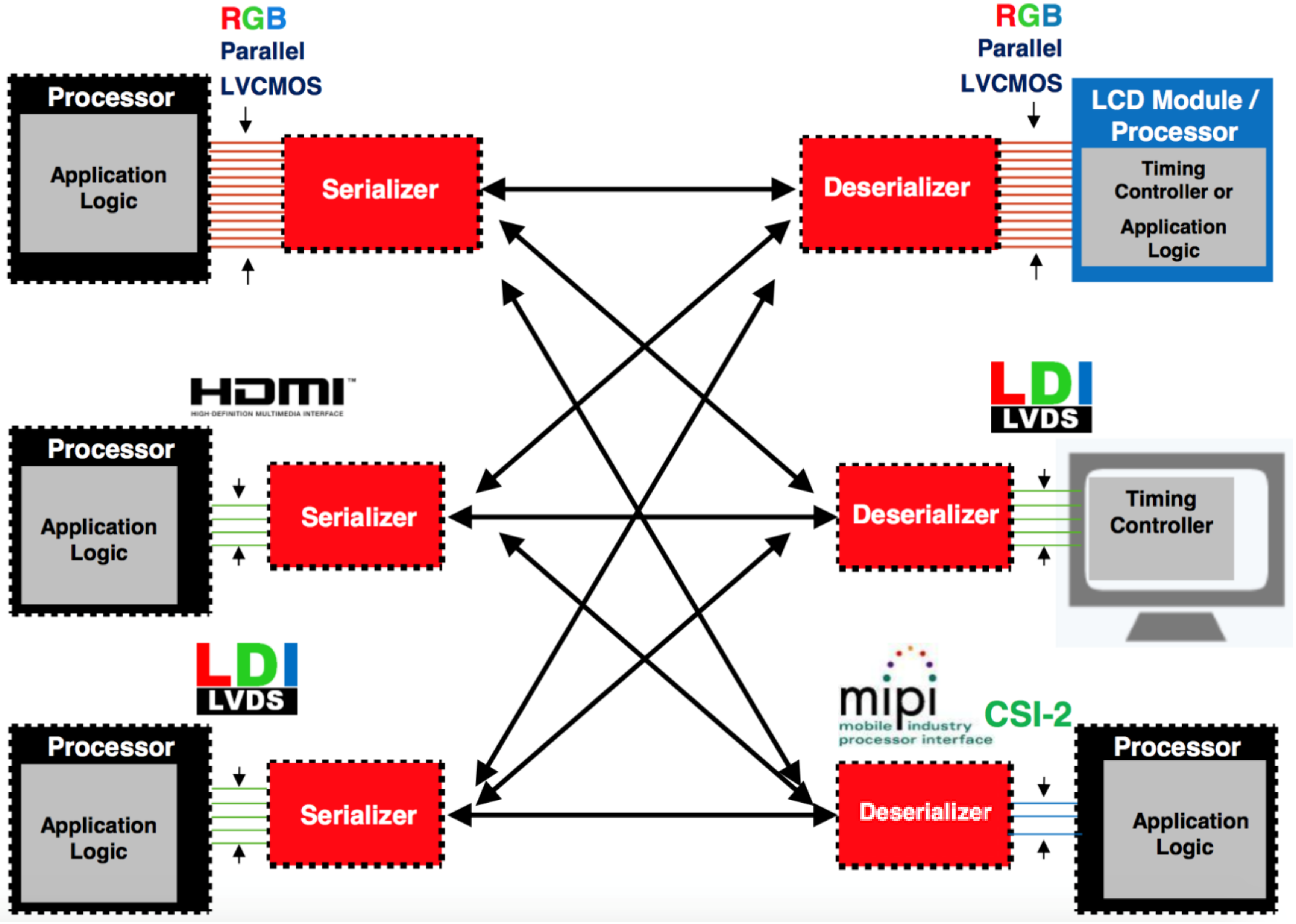

DLP®
Headlight
Headlight
DLP®
HUD
CMS
CMS
Cluster
CID
Head Unit (HU)
RSE
Rear Seat Ent. ECU
RSE
Amp

ADAS FPD-Link

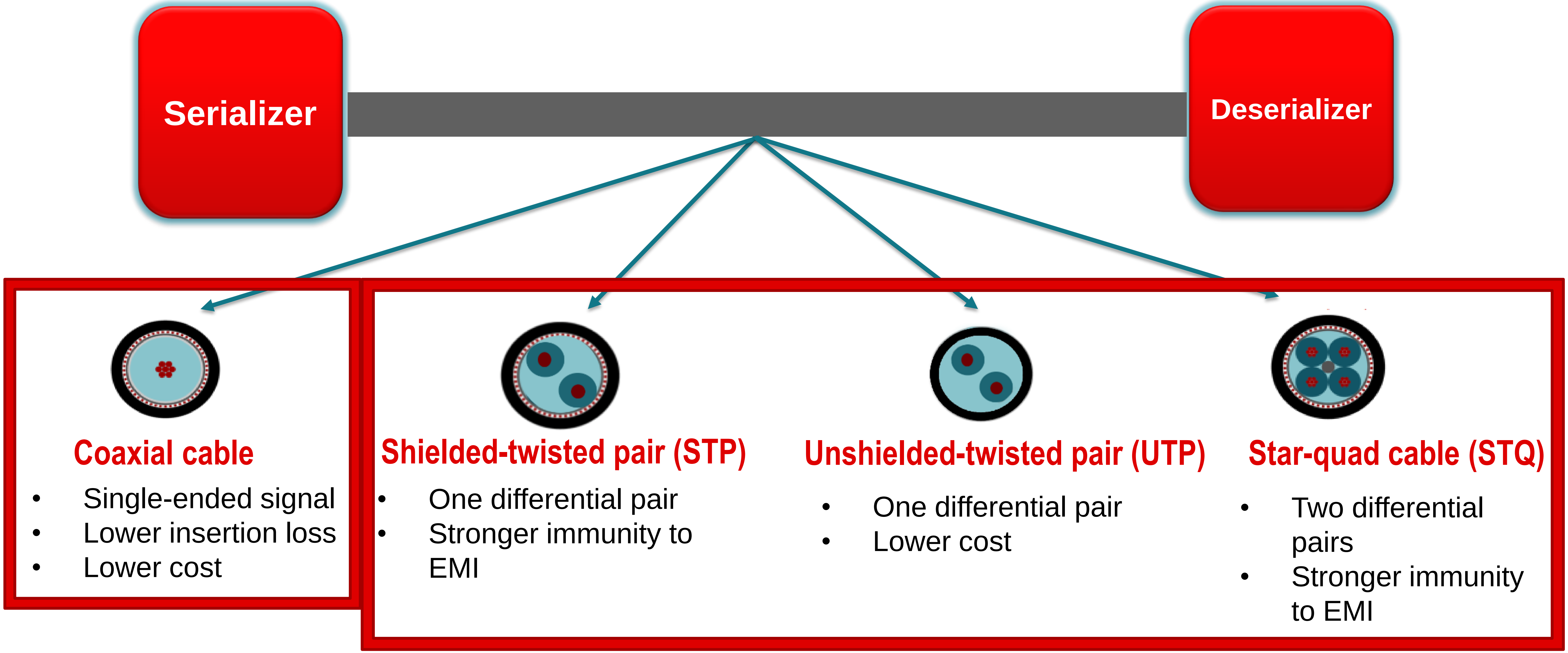

M/SRR
SVS
L/MRR
M/SRR
FC
CMS & SVS
DMS
CMS & SVS
ToF
LIDAR
Central ADAS ECU
SRR
SRR
M/SRR
RVC/SVS
L/MRR
M/SRR

Data interface standards

- HDMI
- LVDS
- Parallel LVCMOS
- MIPI CSI-2
- MIPI DSI
- Etc.


RGB
Parallel
LVCMOS
Processor
Application Logic
Serializer
RGB
Parallel
LVCMOS
LCD Module / Processor
Timing Controller or
Application Logic
Deserializer
HDMI
HIGH-DEFINITION MULTIMEDIA INTERFACE
Processor
Application Logic
Serializer
LDI
LVDS
Deserializer
Timing Controller
LDI
LVDS
Processor
Application Logic
Serializer
mipi
mobile industry processor interface
CSI-2
Deserializer
Processor
Application Logic

Cable types



Serializer

Deserializer

Coaxial cable

- Single-ended signal
- Lower insertion loss
- Lower cost

Shielded-twisted pair (STP)

- One differential pair
- Stronger immunity to EMI

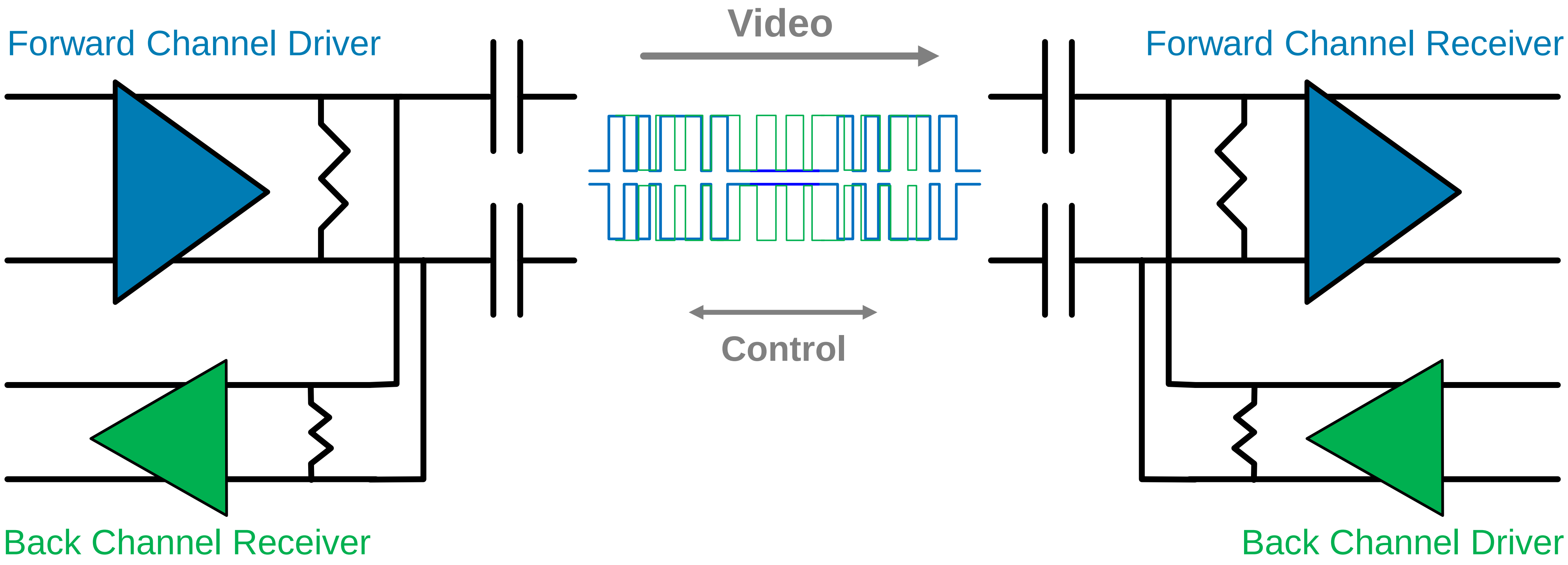
Unshielded-twisted pair (UTP)

- One differential pair
- Lower cost

Star-quad cable (STQ)

- Two differential pairs
- Stronger immunity to EMI

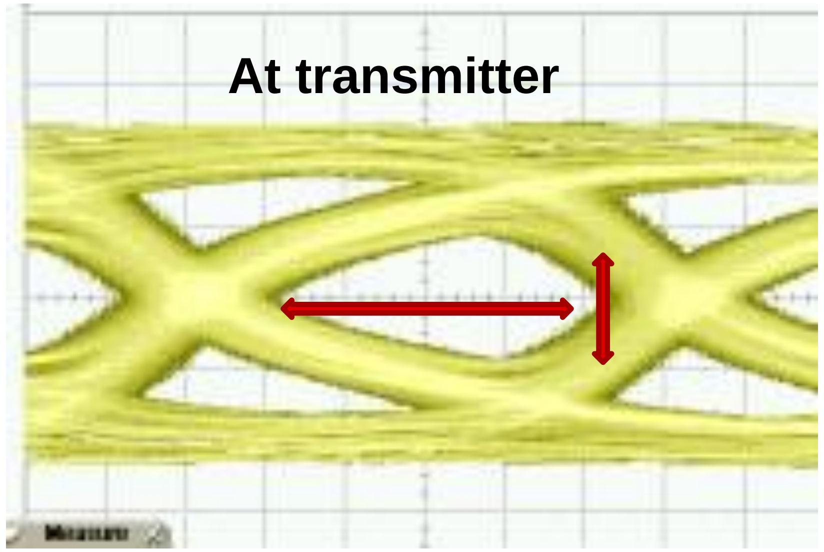
Forward-and-back channels


Forward Channel Driver
Video
Forward Channel Receiver
Control
Back Channel Receiver
Back Channel Driver

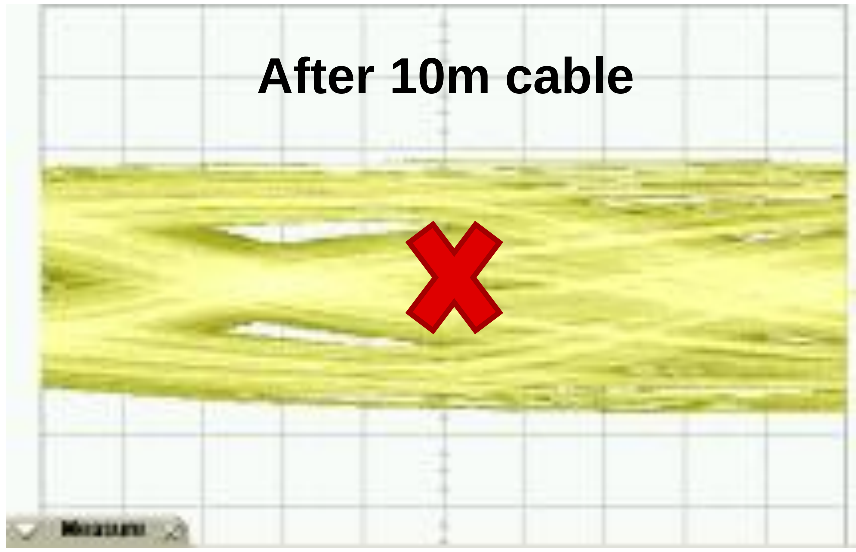
Forward channel:
- Serializer -> deserializer
- High-speed data transmission
- Provide video payload data, I^{2}C/SPI/GPIO data, and info on link diagnostics to deserializer

Back channel:
- Deserializer -> serializer
- Low-speed data transmission
- Provide CLK for forward-channel line rate
- Provide I^{2}C, GPIO and SPI info to serializer

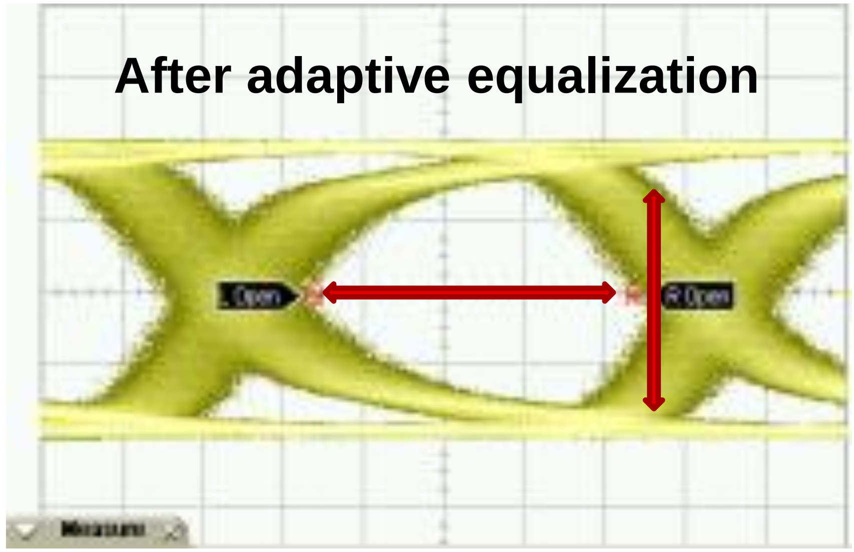
Adaptive equalization (AEQ)



At transmitter



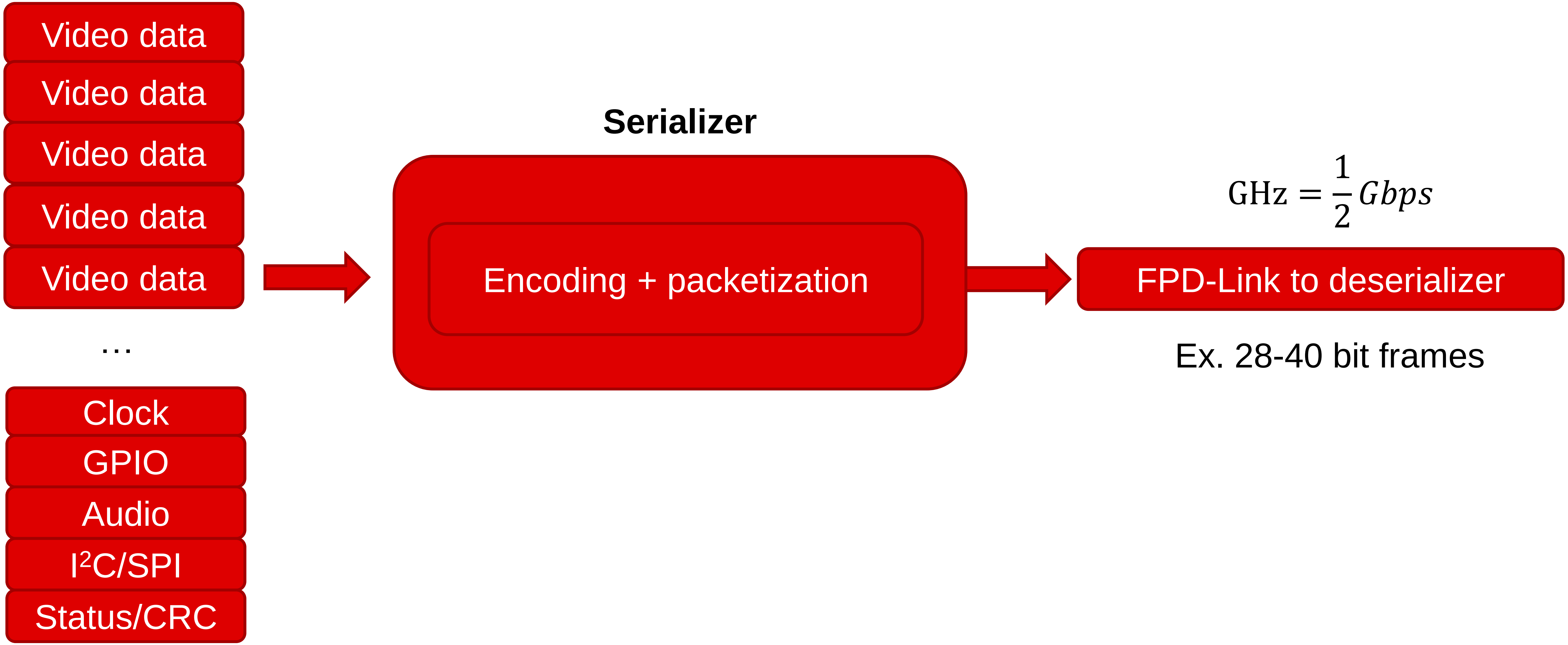
After 10m cable



After adaptive equalization

- Compensates cable loss and signal degradation
  - Continuous Time Linear Equalizer (CTLE)
  - Clock domain recovery (CDR)
- Continuously and automatically adapts to cable aging, temperature effects, and changing electromagnetic environments

Forward-channel serialization



Video data

Video data

Video data

Video data

Video data

…

Clock

GPIO

Audio

I^{2}C/SPI

Status/CRC

Serializer

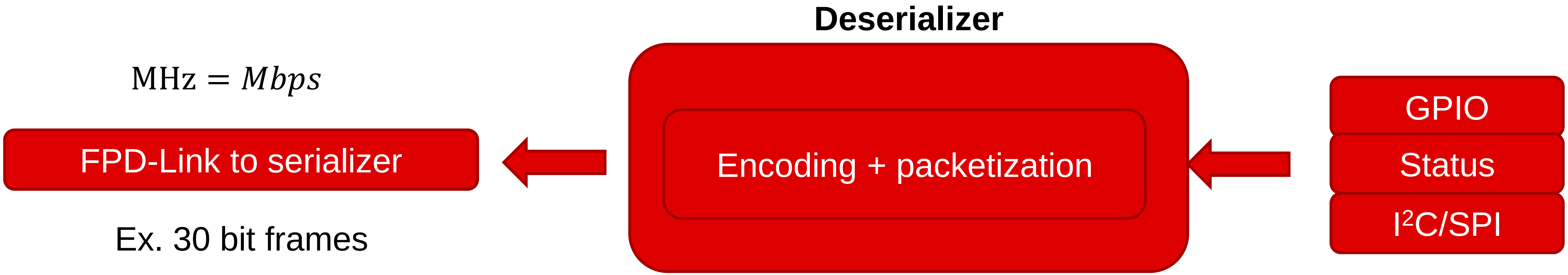
Encoding + packetization

$$\mathrm{GHz} = \frac{1}{2}\,Gbps$$

FPD-Link to deserializer

Ex. 28-40 bit frames

Back-channel communication



Deserializer

$\mathrm{MHz} = Mbps$

FPD-Link to serializer

Ex. 30 bit frames

Encoding + packetization

GPIO

Status

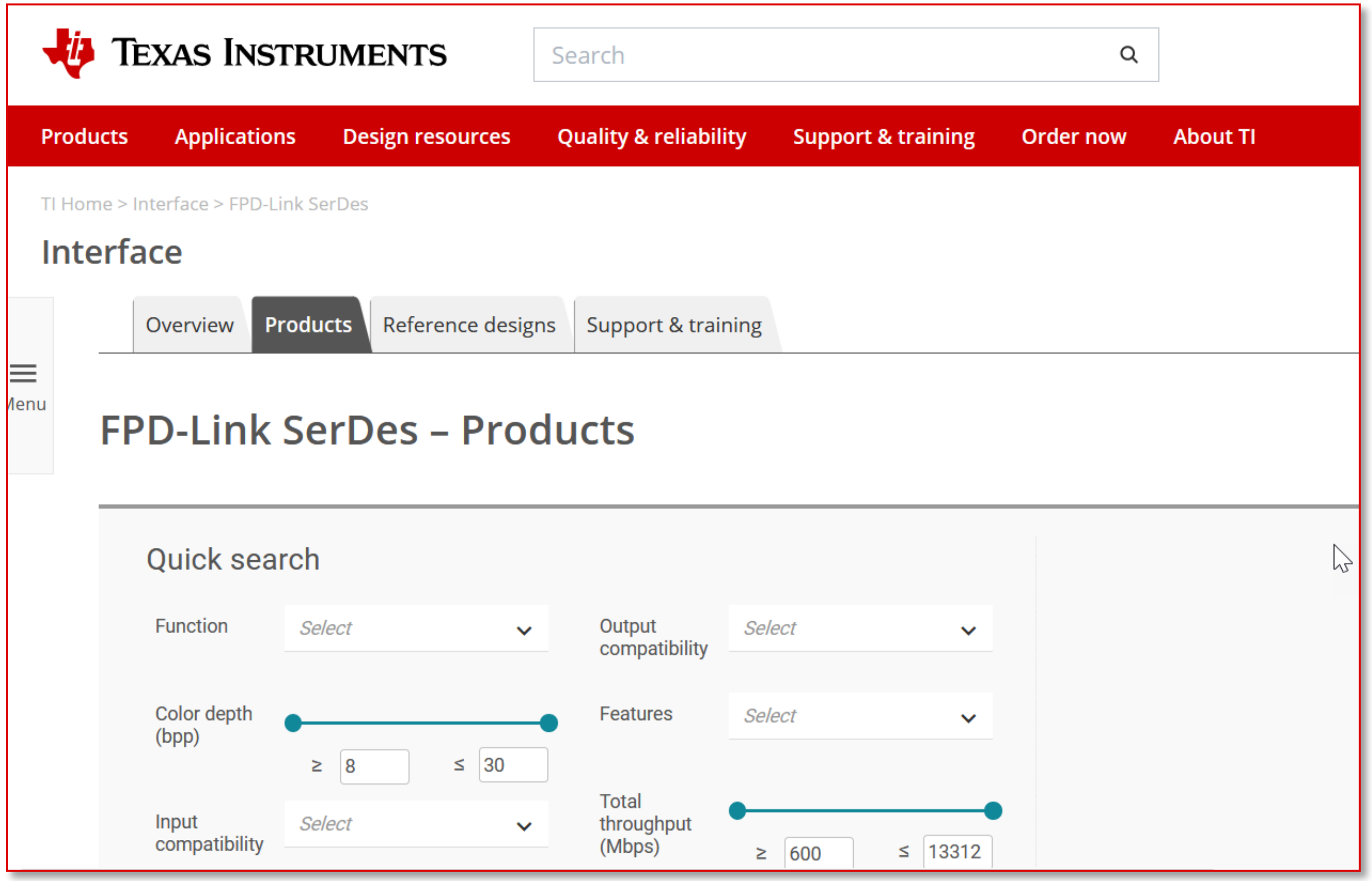
I^{2}C/SPI

Quiz

1. For an FPD-Link III forward-channel frequency of 3.36Gbps per lane, what is the fundamental carrier frequency for the signal per lane?
   a) 3.36GHz
   b) 96MHz
   [✓ c) 1.68GHz]
   d) 6.72GHz
2. For an FPD-Link III back-channel rate of 20Mbps, what is the fundamental carrier frequency for the signal?
   a) 10MHz
   [✓ b) 20MHz]
   c) 5MHz
   d) 40MHz
3. True or false?
   – FPD-Link III is a bidirectional half-duplex protocol FALSE

Thank you

- FPD-Link technical resources
- TI FPD-Link products
- ti.com/interface/fpd-link-serdes/products.html



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Interface

FPD-Link SerDes – Products

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Function: Select

Output compatibility: Select

Color depth (bpp): ≥ 8 ≤ 30

Features: Select

Input compatibility: Select

Total throughput (Mbps): ≥ 600 ≤ 13312

TEXAS INSTRUMENTS

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