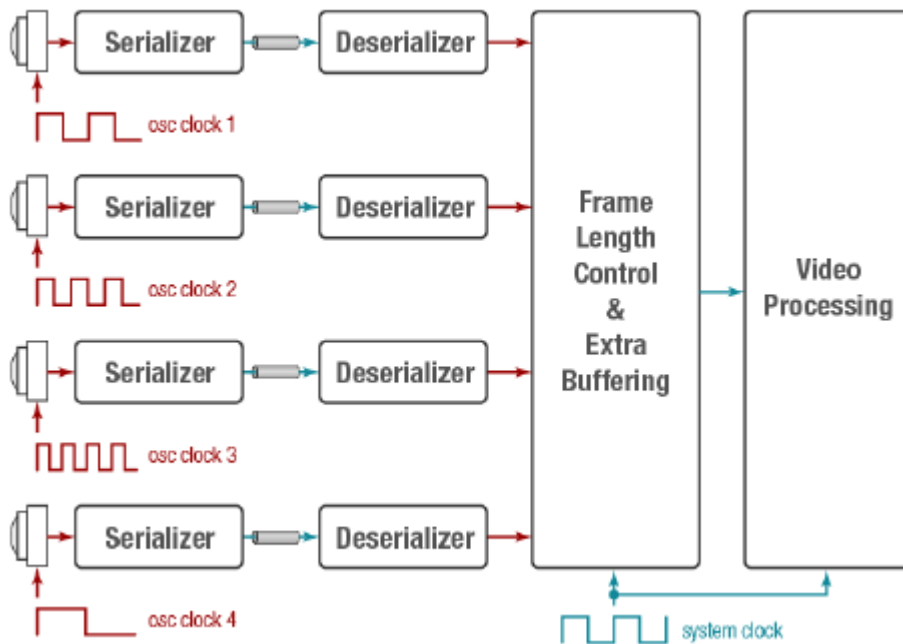


# Multi-camera Systems with DS90UB960 Deserializer Hub and TDA Driver-assisted SoCs

*Todd Toporski & Jelena Nikolic-Popovic*  
*Automotive Field Applications*

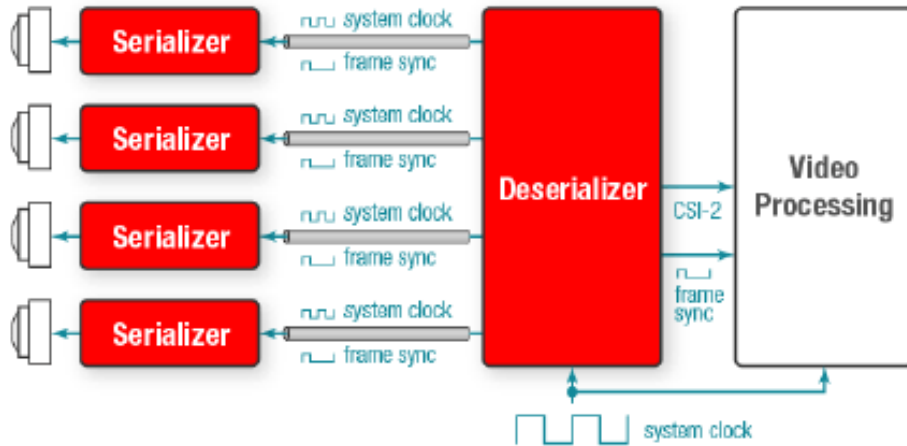
# System-level use cases for DS90UB960 deserializer hub: Aggregation and replication

# Traditional multi-camera system



- 4 individual ports into SoC
  - Physical channels
- 4-5 devices on the ECU PCB
- Sensor-side clocking
  - Susceptible to drift

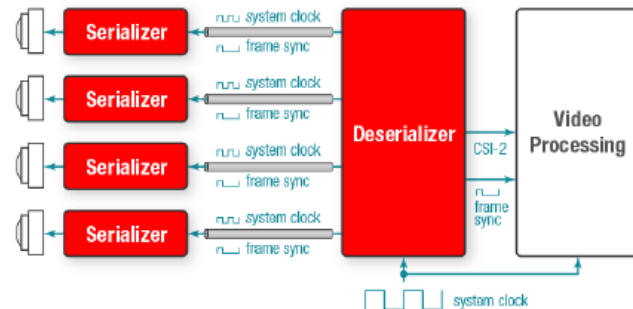
# Multi-camera system with DS90UB960



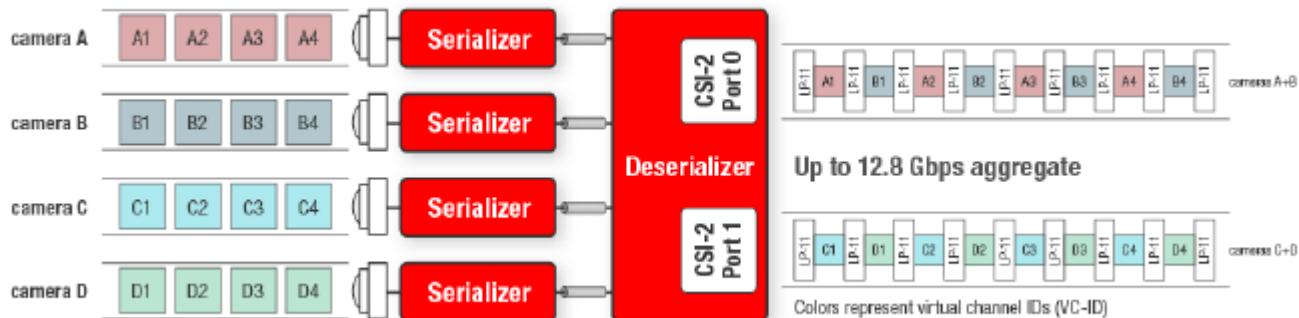
- **A single port into SoC**
  - Virtual channels
- **1 device on the ECU PCB**
- **ECU-side clocking mode**
  - Synchronized clocking mode available
  - Sent across backchannel
  - Shared oscillator

# Synchronous clocking & FrameSync mode

- Reference clock is provided by '960 and sent to serializer ('953) via backchannel:
  - The serializer will re-lock onto the extracted back channel reference clock once available.
  - There is no need for local crystal oscillator at the sensor.
  - Send internally-generated frame sync via a backchannel GPIO to trigger simultaneous exposure across multiple sensors.
- Configuration:
  - '953: Select MODE pin=0 via strap voltage (see '953 datasheet, "Table 8. Strap Configuration Mode Select")
  - '960: FS\_CTL.FS\_GEN\_ENABLE = 1

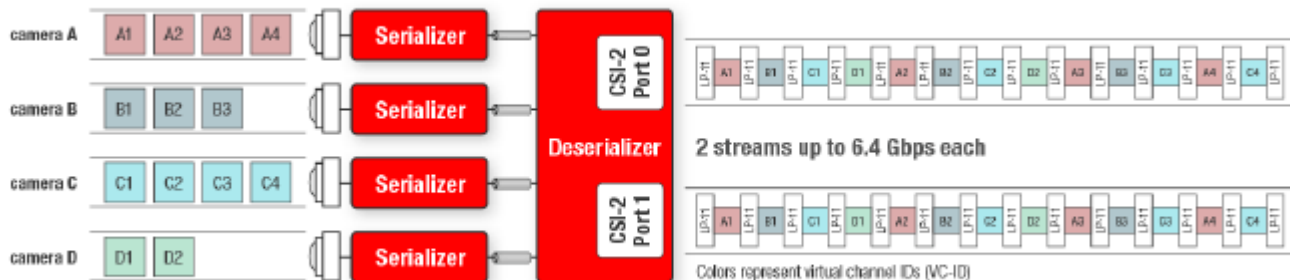


# Virtual channels



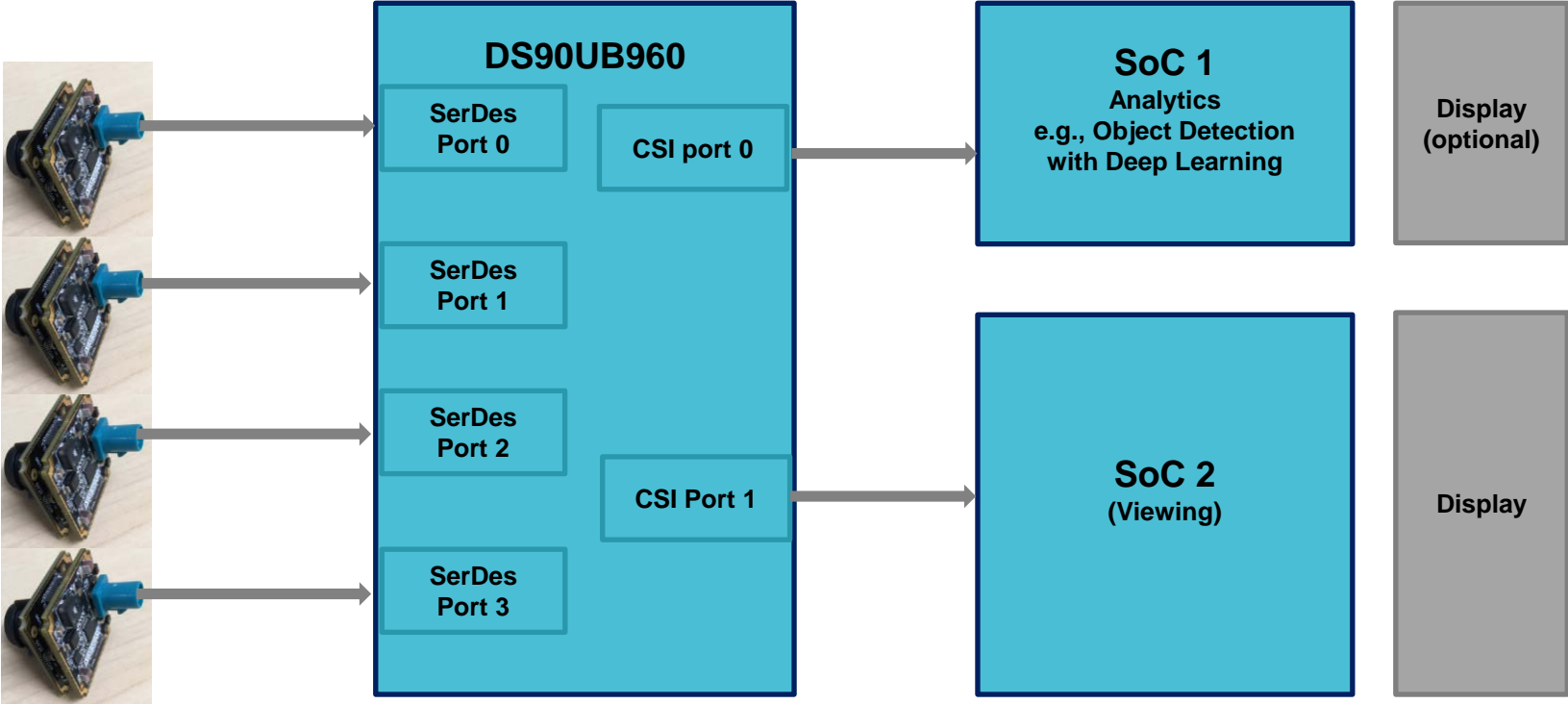
- Physical channels are interleaved on CSI-2 port as virtual channels.
- CSI-2 packets have a Virtual Channel IDentification (VC-ID) field to create distinct virtual data streams.
- Multi-input “hub” receiver remaps duplicate inbound virtual channels to unused VC-IDs so the ECU can distinguish packets correctly (changes CSI packet header).
- Configuration:
  - CSI\_VC\_MAP register, and RAWx\_VC (default is FPDlink Rx Port number - 0,1,2,3)

# Multi-camera system with DS90UB960 and cloning



- **Use cases:**
  - Dual-purpose camera processing (e.g., viewing vs analytics)
  - Data logging
- **Configuration:**
  - Replicate mode turn on, and enable the second CSI channel

# Replication use case #1: View vs analyze





# Replication use case #2: Data recording

