Use Case-Requirements for Camera and Backbone

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Case one-Automotive Camera

Image Quality vs Bandwidth

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Observations

- **Forward**
  - 4k is on the way, maybe not very soon, but very possible in the near 3-5 years
  - 20~32bit @60FPS might be needed for high level autonomous driving features/functions

- **Backward**
  - Control
  - OTA upgrade

- **Power supply**
  - Power on wire for space saving
  - Hybrid channel maybe a good option, fiber for forward, cooper for backward & power

Suggestions

- Asymmetric rate, ≥10Gbps for forward, approximately 100Mbps for backward

Note: The data rates are in the unit of Gbps, and include 20% protocol overhead

Image quality is determined by three key parameters: resolution, dynamic range and frame rate.
Case two - In-vehicle backbone

E/E architecture evolution

- Traditional architecture
- Domain architecture
- Zone architecture

Source: Continental

Observations

- Bandwidth: ≥ 25/50Gbps
  - Zone based architecture seems popular in the future
  - Massive sensor traffic aggregate at Zone Switches, for enabling high level AD features
- Symmetric vs Asymmetric
  - Implementation Specific
  - Symmetric is benefit for flexible AD ECU deployment and function redundancy
  - Asymmetric for lower cost
- EMC issue
  - EMI/EMS would be a big challenge, especial for electric cars

Suggestions

- ≥ 25/50Gbps
- Both Symmetric & Asymmetric are considered

Autonomous Driving Sensors

- 4-6 4k-Cameras
- 6-10 lower resolution Cameras
- 1-4 Lidars with 16/64-line
- 6-10 Radars
- Other sensors ...
Summary

Multiple Rate levels for different scenarios
• ≥ 25/50Gbps for backbone bidirectional
• ≥10Gbps for Camera forward
• <200Mbps for Camera backward

Support both Asymmetric and Symmetric mode
• Asymmetric only for Camera
• Symmetric and asymmetric for backbone

Hybrid Channel could be a choice for Automotive Camera
• Fiber for forward, cooper for backward & power
• Hybrid cable & connector
Thank you

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