Gigabit Ethernet for Automotive Industry

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1. Automotive Market Potential

### SAFETY
- Self Control
  - Increasing Sensors
  - Coordination Control
- Autopilot
  - All Around view monitoring
  - By Wire Controlling
- Navi-deployment
  - Coordination Control
  - Download
- Telematics deployment
  - Around monitoring
  - Wireless LAN
- Cognitive radio
  - Seamless communication

### Infotainment
- Infotainment
  - Multi Channel Camera
    - (Around view/ e-mirror)
- Audio (CD/DVD)
- Audio + Video (Blu-Ray)
- Integrated Digital data
  - (Drive assist/ Wireless)

### Data Rate
- P2P
- MOST25
- MOST150
- Gigabit Ethernet
- Radio on Fiber
- Multi Channel Camera
- Cognitive radio

### Timeline
- 2000
  - Air condition/ Navi data
- 2010
  - Audio (CD/DVD)
  - Audio + Video (Blu-Ray)
- 2020
  - Integrated Digital data
  - (Drive assist/ Wireless)

### Key Terms
- 10Gbps~
- 4Gbps~
- Mixed Signal
- Ethernet
- MOST
- Mixed Media
- Radio on Fiber
1. Automotive Market Potential

- Fiber optics solutions for Automotive have been installed since 1980’s
- Increasing data rate due to the video applications (camera, HD display)
- Very Strict about EMC requirement in the automotive environment, especially Hybrid Vehicles and Electric Vehicles
- Scaling up a seamless communications (V2X)
  Access to WiFi, WiMax…. , vehicle will be a one of the devices
- Increasing the number of circuits in the wire harness (W/H) due to vehicle intelligences, W/H will become a heavy weight

Vehicle to vehicle (V2V) communication

Vehicle to X (V2X) communication

V2X: Vehicle to something
2. Compatibility Requirement

- Automotive manufactures (OEMs) are willing to have multi vendors because of BCP

- OEMs are hardly to guarantee whole system, and want to ask suppliers to provide good components

- Well-organized specifications and standards are required

- Need to have rigid specifications (in order to avoid ambiguous responsibilities)

- Interface has to be specified (foot print, pin-assign have to be compatible)

- Certification authority is needed (third party)

BCP: Business Continuity Plan
OEMs is preferring to specify TP1 to TP4, respectively
3. Application

Infotainment/ Camera Display

Display size:
- Current: VGA (640 x 480, 30 fps) ≈ 150 Mbps
- Future: WXGA (1280 x 768, 60 fps) ≈ 950 Mbps

Reliability for Autopilot

Bit Error Ratio (BER)
- Frequency: 1 time a day
- Data rate: 1 Gbps
- → 1E-14 would be needed (ca. 1 times / 27 hours)

Physical Layer of 1 Gbps is mandatory for the vehicle network
BER would be required as 1E-14
- POF system was used more than 25 years with no failures
- Physical layers of 1 Gbps is required in the vehicle network applications
- One interface with multi venders is required by OEMs
- Rigid component specifications are required
- Highly signal integrity and BER of 1E-14@1Gbps are required

Thank you for your attention.