Signal to Service

Remote Control of Legacy Networks

Brian Petersen, Ethernovia, Inc.
IEEE SA Ethernet & IP Automotive Technology Day
Yokohama, Japan—November 2022
Agenda

- It’s all analog at the edges
- Levels of abstraction
- Positioning interfaces
- Unifying the network
- Taking abstraction to its limits
It’s All Analog at the Edges
Levels of Abstraction
Positioning Interfaces
Connection Type?

• Unreliable
  • UDP
  • periodic messages
  • last is best

• Reliable
  • TCP
  • file data transfers
  • software/database updates
Unifying the Network
Eventually, Ethernet will reach cost parity with CAN.
The Benefits of Ethernet

• Longer payloads
• Higher bandwidths
• Layered protocols
• Security
• Time sync
• QoS
• Etc.
Add layers of abstraction.
Brian Petersen — IEEE SA Ethernet & IP Automotive Technology Day, November 2022

```
struct SteeringInfo {
  int steeringAnglePhase0;
  int steeringAnglePhasel;
  int motorCurrent;
  int motorTemperature;
  int steeringWheelTorque;
  int ecuStatus;
} info;
```
≥ 12 bytes

- tag: type and ID, typically one byte
- value: 1–10 bytes, depending on type and magnitude
Remote Procedure Call (RPC)

• Functions called by local system
• Function executed by remote system
• Structured data as input/output parameters
• Widely adopted
• Numerous protocols
  • E.g., gRPC
Taking Abstraction to Its Limits
Why Not Sensors and Servos?

- Cheaper computing
- Cheaper communications
- Why burden the central or zonal ECUs?
What If?

• Ethernet everywhere
• Remote procedure calls
• Standardized, class-specific APIs
• Separate evolution of sensors/servos and controlling ECUs
Questions?
Thank You