CAN
Higher Layer Protocols
HLP
Basics

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CAN offers following functions

- Transmit a message
- Request a message
- Error handling
- Collision resolution
Transmit a message

- Complete package with priority, data and error protection
- Transfer without any errors in data
- If errors, low probability of undetected errors
- CAN will not guaranty that the information will reach the consumer
Request a message

- Consumer can request production of data.
- Some CAN controller support this without software interaction.
- Need a proper configuration by HLP
Error handling

- Five error checks
- One of them is a CRC checksum
- Automatic retransmission when errors
- All connected modules will check for errors
Collision resolution

- CAN will solve collision by priorities.
- The collision is solved without data loss.
- The Priorities must be schedule by the HLP.
- To guaranty latency must HLP schedule priority and message rate.
Parts that must be defined before module is installed.

- Physical layer
- Bit length
- Sometime also sample point and SJW
- Physical location
- HLP Higher Layer Protocol
HLP in Industrial use

- DeviceNet (USA, UK, Japan pacific rim)
- CANopen (Germany, partly Europe)

- Note most industrial applications in Europe is based on other protocols
- Profibus (Siemens), Interbus-S, ASI
- FieldBus foundation. (process industry)
HLP in Automotive

- Volcano, (Volvo partly in Ford)
- GMLAN, (SAAB and GM)
- OSEK, (German, with dialects in different companies.)
- Propriety
HLP in Marin

- Up to 1000 hp
- CAN-Kingdom, (Mercury, US-navy)
- NMEA 2000 (based on J1939)
- Propriety

- Large boats
- propriety
- CANopen dialects
HLP in Trucks, busses and mobile equipment

- J1939 dialects.
- CAN-Kingdom
- CANopen dialects
- Prority
HLP in smaller machinery

- Propriety
- CAN-Kingdom
- CANopen dialects
Different Classes of HLP

• **Standard devices**
  – J1939, DeviceNet, CANopen, SDS

• **In/out signal to application, with CAN configuration.**
  – Volcano, CAN-Kingdom

• **In/out signal to application, with network transport.**
  – OSEK, GMLAN
Resource dividing

• Identifiers given by node#, set by a switch
  – DeviceNet, CANopen, SDS

• Identifiers given by node# given and fixed by device type
  – J1939

• Identifiers given by the system master during configuration.
  – CAN-Kingdom, Volcano