

CAN Higher Layer Protocols HLP Basics

Kent Lennartsson

KVASER AB

www.kvaser.se



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
- Propriety

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