J1939 Protocol - Layer Description

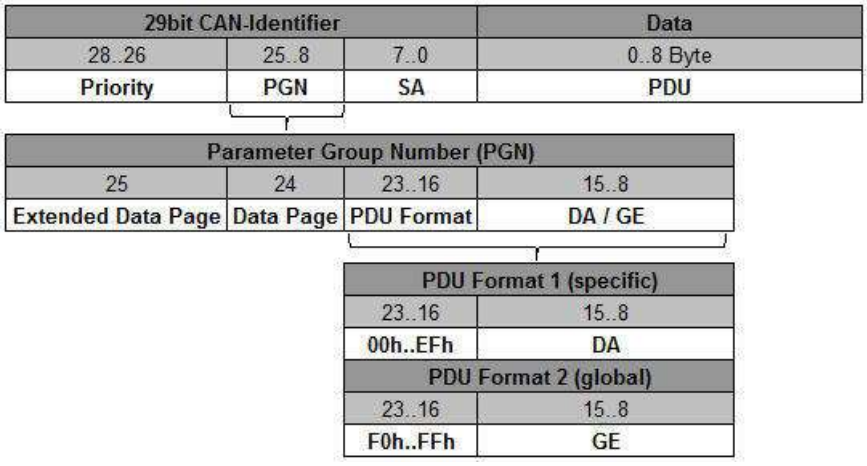
Physical Layer

The protocol SAE J1939 is based on the CAN bus and uses as physical layer CAN Highspeed to ISO 11898.

- Baud rate 250 kBit
- 30 nodes max.
- 2-wire line with a terminating resistor of 120 Ω
- Bus length (without tap line) 40 m
- Max. tap line length 1 m

Content of a J1939 Message

The following diagram shows the content of a J1939 message:



Abbreviation	Description
DA	Destination Address
GE	Group Extensions
PDU	Protocol Data Unit
PGN	Parameter Group Number
SA	Source Address

Identifier Structure

The following example shows the structure of an identifier (hexadecimal):
0x18**FEE9***27*

Identifier component	Description
27	Source Address
FEE9	Parameter Group Number
18	Priority

Meaning of SPN - Suspect Parameter Number

The SPN is a number defined by the SAE J1939 standard containing individual parameters (e.g. engine RPM) as standardized message.
Below is an example of SPN parameters:

spn110 - Engine Coolant Temperature - Temperature of the engine coolant.

Data Length:	1 byte
Resolution:	1 °C/bit , -40 °C offset
Data Range:	-40 to 210 °C
Type:	Measured value
Suspect Parameter Number:	110
Vehicle Application Layer - J1939-71 (J1939-71 Rev. Aug 2002)	
Parameter Group Number:	[65262]

Meaning of the Parameter Group Number (PGN)

The PGN is a number defined in the SAE J1939 standard that groups together several SPNs into a meaningful group. The PGN is part of the CAN identifier. The 8-byte data (PDU) contain the values of individual SPNs.

The example below shows a PGN 65262 (0xFEEE):

PGN 65262 Engine Temperature 1 - ET1

Part of the PGN	Value	Remarks
Transmission Repetition Rate	1 s	
Data Length	8	
Extended Data Page	0	
Data Page	0	
PDU Format	254	
PDU Specific	238	PGN Supporting Information
Default Priority	6	
Parameter Group Number	65262	in hex: 0xFEEE

Start position	Length	Parameter name	SPN
1	1 byte	Engine Coolant Temperature	110
2	1 byte	Engine Fuel Temperature 1	174
3 - 4	2 bytes	Engine Oil Temperature 1	175
5 - 6	2 bytes	Engine Turbocharger Oil Temperature	176
7	1 byte	Engine Intercooler Temperature	52
8	1 byte	Engine Intercooler Thermostat Opening	1134

Related Topics

- **Workspace Structure** on page 18
- **Description of Structure** on page 19