INTERNATIONAL STANDARD

Road vehicles — Low-speed serial data communication —

Part 1:
General and definitions

Véhicules routiers — Communication en série de données à basse vitesse —

Partie 1: Généralités et définitions

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a5f9bcbcc1e4/iso-11519-1-1994

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 11519-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Sub-Committee SC 3, *Electrical and electronic equipment*.

ISO 11519 consists of the following parts, under the general title *Road vehicles — Low-speed serial data communication*:

— *Part 1: General and definitions*

— *Part 2: Low-speed controller area network (CAN)*

— *Part 3: Vehicle area network (VAN)*

— *Part 4: Class B data communication network interface (J1850)*

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Road vehicles — Low-speed serial data communication —

Part 1:
General and definitions

1   Scope

This part of ISO 11519 specifies general definitions for low-speed serial data communication up to 125 kbit/s for road vehicle applications. Its object is to define the general architecture of the communication network and the content of the

— data link layer and

— physical layer

for transmission between the different types of electronic modules on board road vehicles.

NOTE 1   Parts 2, 3 and 4 of ISO 11519 are entirely independent and should be regarded as self-contained entities. No attempt should be made to implement any combination of the specifications in these parts.

2   Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 11519. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 11519 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7498:1984, *Information processing systems — Open Systems Interconnection — Basic Reference Model.*

3   Definitions

For the purposes of ISO 11519, the following definitions apply.

3.1   arbitration: Process of awarding the communications medium (signal bus) to one of the nodes trying to gain control of it.

3.2   arbitration field: Bits within the message frame attributed to each message for controlling the arbitration.

3.3   bit rate: Number of bits per time during transmission, independent of bit representation.

3.4   broadcast communication: Transmission of information from one node to all other nodes, in contrast to node-to-node communications.

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3.5 bus: Topology of a communication network where all nodes are reached by passive links which allow transmission in both directions.

3.6 Carrier Sense Multiple Access, CSMA: Arbitration procedure in which nodes ready to transmit sense the bus for a currently transmitted message. Multiple nodes may only access the idle bus, i.e. in the absence of a carrier signal on the bus.

3.7 communication integrity: Feature of a communication system such that information is transferred uncorrupted and arrives at its destination(s) without modification.

3.8 contention-based arbitration: CSMA arbitration procedure in which simultaneous access of multiple nodes results in a contention. One message will survive the contention uncorrupted.

3.9 data consistency: Feature of data processing and/or communication system where data remain consistent even after being partitioned and differently treated over time and location.

3.10 driver: Solid state device used to transfer electric power to the next stage, which may be another driver, an electric load (power driver), a wire or cable (line driver), a display (display driver), etc.

3.11 dynamic priority: Priority which may be altered during system operation.

3.12 encoding: Method for representing information bits in data processing or communication systems, eventually introducing redundancy.

3.13 error: Malfunction of a system caused by temporary influences or reversible/irreversible defects.

3.14 error message: Special message within a communication network informing all nodes of an error.

3.15 extensibility: Modules can be added to the network without having to change the software and/or hardware of any module for an existing application within the limits of the communication layers specified in this part of ISO 11519.

3.16 fault: Irreversible defect.

3.17 fault tolerance: Ability of a system to survive a certain number of faults; as a result, the performance of the system may be down-graded.

3.18 fibre optic: Communication medium (signal bus) consisting of either individual fibres or an assemblage of transparent glass or plastic fibre(s) bundled together parallel to one another. This fibre or bundle of fibres has the ability to transmit light along its axis by a process of reflection.

3.19 fibre optic receiver: Optical to electrical signal converter accomplishing the receiver function in fibre optics communications, typically consisting of a photodetector (either a photodiode or a phototransistor) and a preamplifier.

3.20 fibre optic transmitter: Electrical to optical signal converter accomplishing the driver function in fibre optics communications, typically consisting of a light-emitting diode (LED) and an LED drive circuit. In contrast with the preamplifier of a fibre optic receiver, the LED drive circuit is not required to be packaged with the LED (and typically is not).

3.21 fixed priority: Priority assigned before the start of system operation.

3.22 flexibility: Ability of a system to function with nodes manufactured by various suppliers.

3.23 functional addressing: Labelling of messages for their functional content.

3.24 frame: Data link layer protocol data unit specifying the arrangement and meaning of bits or symbols or bit fields in the sequence of transfer across the transmission medium.

3.25 global error: Error in a communication network which is similarly detected in all nodes.

3.26 ground bus: Portion of the wiring which provides ground potential and a return path for the current drawn by the node.

3.27 initialization: Parametrization and eventual configuration of a system during start-up.

3.28 length of communication medium: Maximum distance between any two nodes.

3.29 line driver: Solid state device (driver) used to transfer electrical energy to a wire or cable communication medium (signal bus) performing the transmit portion of the transceive function.   .

3.30 line receiver: Solid state device used to receive electrically transmitted signals from a wire or cable communication medium (signal bus) performing the receive portion of the transceive function.

3.31 local error: Error in a communication network which is detected only in part of the nodes.

3.32 master/slave system: System, partitioned into several modules, in which one module acts as a master or central unit and controls the action of all other modules.

3.33 monitoring: During transmission of a frame, the feeding of the actual physical signal on the transmission line back into the transmitting node in order to compare it with the transmitted reference signal.

3.34 multi-master system: System, partitioned into several nodes, in which every master node may initiate transmission.

3.35 multiplexing: Sharing the system transmission medium for transmission of multiple messages between multiple nodes.

3.36 network: Structure linking different systems for communication.

3.37 network access scheme: Method used to award the communication network to one of the nodes for the transmission of a frame.

3.38 node: Any subassembly linked to a communication network capable of communicating over the network according to a communication protocol.

3.39 non-return-to-zero: Method of representation of binary signals in which, within one and the same bit time, the signal level does not change, i.e. a stream of bits having the same logical value provides no edges.

3.40 physical addressing: Labelling of messages for the physical location of their source and/or destination(s).

3.41 physical assignment of contacts: Assignment of wires with specified functions to the contacts of a node's connector.

3.42 power bus: Portion of the wiring which provides the electrical power to the nodes and their associated loads.

3.43 priority: Attribute of a frame, controlling its ranking during arbitration. A high priority increases the probability that a message wins the arbitration process.

3.44 protocol: Formal set of conventions or rules for the exchange of information among nodes.

3.45 pulse width modulation: Coding technique in which signals are represented by the width of a pulse duration.

3.46 receiver: Device that converts physical signals used for transmission back into logical information or data signals.

3.47 recovery time: Time delay between detection of an error and restart of regular operation.

3.48 signal bus: Wire(s) in that portion of the wiring serving all multiple nodes which are dedicated to communication between the nodes.

3.49 synchronization: Procedure to ensure a desired timing for interrelated actions and/or processes.

3.50 topology: Geometric configuration of a communication network.

3.51 transceiver: Active device which both transmits (line driver portion) and receives (line receiver portion).

3.52 transmitter: Device that converts information or data signals to electrical or optical signals so that these signals can be physically transferred over a communication medium.

3.53 twisted pair: Cable composed of two insulated conductors twisted about one another.

4 Decomposition of layers

Parts 2 to 4 of ISO 11519 are structured following the ISO-OSI model according to ISO 7498, and describe the data link layer and the physical layer.

Figure 1 shows the ISO-OSI model and indicates the interfaces described.
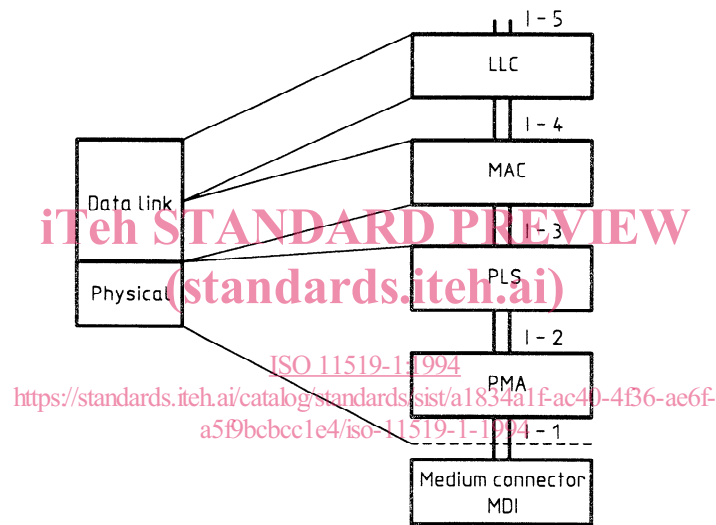
Key

LLC: Logical Link Control
MAC: Medium Access Control
PLS: Physical Signalling
PMA: Physical Medium Attachment
MDI: Medium-Dependent Interface

Link between layers	Description	In integrated circuit
I - 5	Mandatory services	Not mandatory to follow it
I - 4	Mandatory services	Not mandatory to follow it
I - 3	Mandatory services	Not mandatory to follow it
I - 2	Mandatory services	If implemented mandatory to follow it

Figure 1

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