

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J2366-1

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ITS Data Bus—IDB-C Physical Layer

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- 1. Scope**—This SAE Recommended Practice details the Physical Layer of the Intelligent Transportation Systems (ITS) Data Bus on CAN (IDB-C), which is generally intended for in-vehicle use. It has been developed by the ITS Data Bus (IDB) Physical Layer Subcommittee of the IDB Committee. The objectives of the subcommittee are to develop information reports, recommended practices and standards concerned with the requirements, design, and usage of devices that communicate electronic signals and control information among ITS related components within the vehicle environment.

The IDB-C is a non-proprietary virtual-token passing bus, designed to allow disparate consumer, vehicle, and commercial electronic components to communicate and share information across a standard, open data bus.

This document describes the Physical Layer of the IDB-C, as shown in Figure 1. The Physical Layer of the IDB-C incorporates the CAN 2.0B specification per SAE J2284-2, with modifications as noted in this document.

The IDB-C Physical Layer includes the line drivers/receivers, bus topology and termination, and the physical IDB-C connector. This connector is defined only for the IDB-C backbone, and is not intended to define the actual connector on the IDB-C device itself.

The usage of this document is not limited to automotive, truck, bus, agriculture, and marine applications.

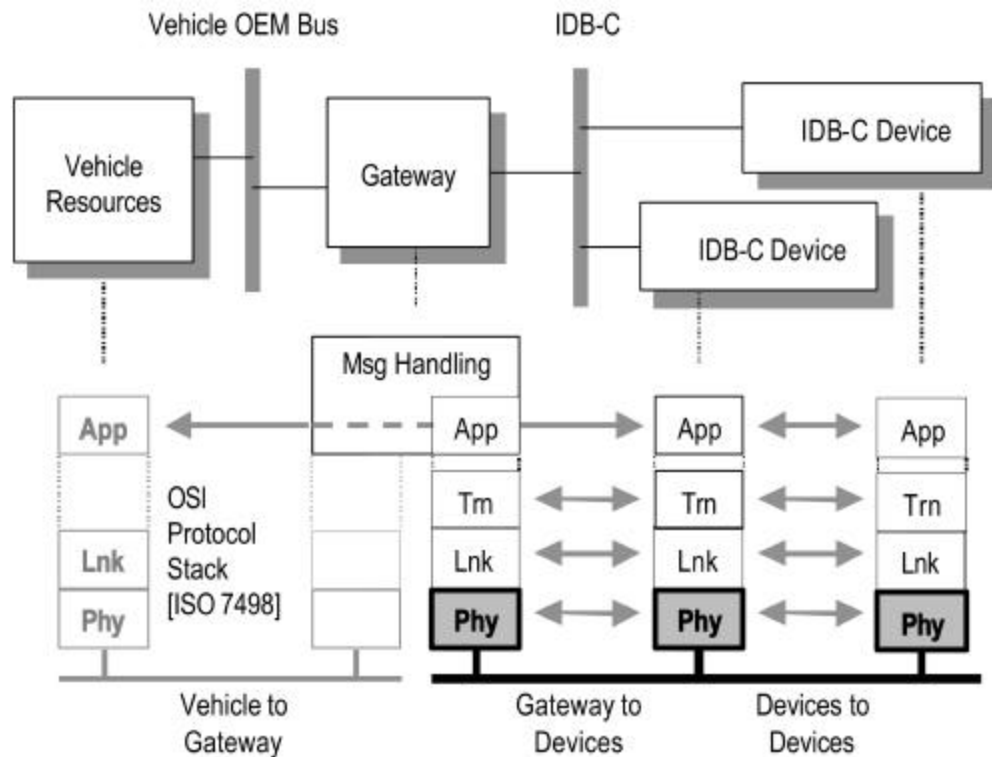


FIGURE 1—SCOPE OF SAE J2366-1

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version of SAE Publications shall apply. In the event of any conflicting requirements, this specification shall prevail.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, or <http://www.sae.org>.

SAE J2284-2—High-Speed CAN (HSC) for Vehicle Applications at 250 Kbps

SAE J2366-1L—Low Impedance Stereo Audio Bus

SAE J2590—PMODE for In-Vehicle Networks

SAE/USCAR-2—Performance Specification for Automotive Connector Systems

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, or <http://www.sae.org>.

SAE J2355—ITS Data Bus – Architecture Reference Model Information Report

SAE J2366-2—ITS Data Bus—Link Layer

SAE J2366-4—ITS Data Bus—Thin Transport Layer

SAE J2366-7—ITS Data Bus—Application Message Layer

SAE J2366-7X—ITS Data Bus—Message Sets for Device Classes

SAE J2366-7LX—ITS Data Bus—IDB Lexicon

2.2.2 AMI-C PUBLICATIONS—Available from <http://www.ami-c.org>.

AMI-C SPEC 1001—Release 1 Architecture
AMI-C SPEC 1002—Functional Requirements
AMI-C SPEC 3001—Vehicle Interface Specification – Release 1
AMI-C SPEC 3002—Common Message Set
AMI-C SPEC 3003—OEM to IDB-C Gateway
AMI-C SPEC 4001—Physical Specification

3. **Definitions**

- 3.1 **CCP (Consumer Convenience Port)**—The CCP is a connector that allows a user to plug portable IDB-C components into the on-board IDB-C network. The connector specifications are being developed by a joint working group of the IDB-C Physical Layer subcommittee of the SAE IDB Committee in cooperation with the Mobile Electronics Division Committee R6 of the Consumer Electronics Association (CEA), and are not provided in this document.
- 3.2 **Embedded IDB-C Component**—This is used to describe those components that are typically permanently mounted in the vehicle. These components include those that are installed by the vehicle manufacturer or the user.
- 3.3 **IDB-C Number of Devices**—An IDB-C network is limited to a maximum of 16 physical devices
- 3.4 **Portable IDB-C Component**—This is used to describe those components that are brought to the vehicle by the user and used temporarily or semi-permanently in the passenger cabin of the vehicle.
- 3.5 **Power Mode (PMODE)**—The Power Mode Signal indicates the power mode of the IDB-C subsystem to all connected devices. The requirements for the Power Mode signal are defined in SAE J2590, incorporated by reference into this document.
- 3.6 **Vehicle Connector**—This is the standard connector required by this document to be installed on an IDB-C component. This connector is to be used on embedded IDB-C components.
4. **Network Speed and Bit Timing**—The Data rate of the IDB-C is 250 Kbps. Refer to SAE J2284-2 for CAN bit timing at 250 Kbps.
5. **Network Topology**—The IDB-C Physical Layer topology is a terminated daisy chained bus, such that a single segment of cable is connected between each component. Each component in the daisy chain has two male connectors, which mate to the Vehicle Connector on the incoming and outgoing cables. The male connectors incorporate a terminating resistor connecting clip, which provides a means for automatically terminating the network (see 5.2).

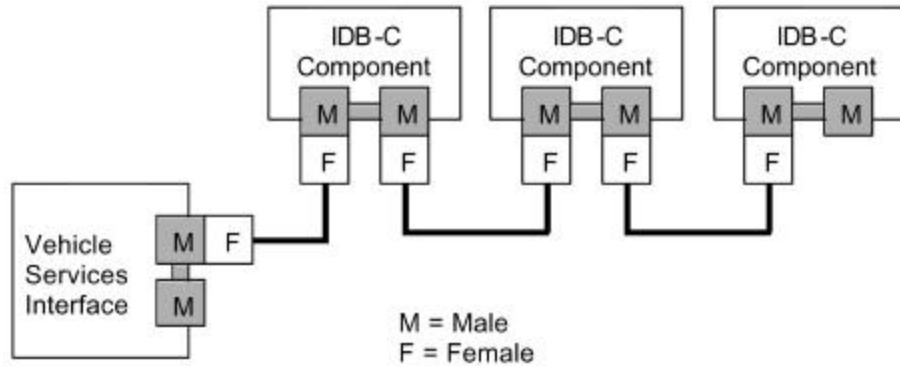


FIGURE 2—DAISY CHAIN WIRING CONFIGURATION

- 5.1 IDB-C Cable Segments**—Cable segments incorporate the IDB-C signal set defined in Table 1. These cable segments contain only standard signals. Any additional circuit requirements by a component must be contained in a separate, unique harness or cable assembly.

The total length of an IDB-C daisy chain is calculated as the sum of the lengths of the individual cable segments (excluding stubs – see 5.3). The maximum total length allowed is defined in SAE J2284-2.

- 5.2 IDB-C Termination**—When IDB-C components are daisy chained, the end components in the chain are left with a single vacant connector, which must provide termination for the IDB-C data signal pair. Each IDB-C component connector (M in Figure 2) shall have a resistor connected between the two IDB-C data pins in such a way that this resistor is disconnected when a cable segment is mated to the component. When the cable is removed, the resistor is again connected between the two pins. This approach, described further in 6.2 allows the last component in a daisy chain to be automatically terminated without user intervention. The bus termination resistor value is defined in SAE J2284-2.

- 5.3 Stubs and the Consumer Convenience Port (CCP)**—In certain cases, the IDB-C component may be connected to the IDB-C network via a short drop cable or stub between the component and the female CCP on an adaptor (see Figure 3). This method will be used when a portable device is brought in to the vehicle (not permanently mounted in the vehicle) and is to be connected to the on-board IDB-C network. The CCP itself is not defined in this document (see 3.1).

The maximum stub length is defined in SAE J2284-2. The stub length is not included in the calculation of the maximum length of the IDB-C daisy chain, and the stub shall not be terminated at the component end. If the adaptor is the last component in the daisy chain, termination will be provided on the vacant connector on the adaptor, as described in 5.2.