SAE International™

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Class A Application/Definition

RATIONALE

This document has been reaffirmed to comply with the SAE 5-Year Review policy.

FOREWORD

The Vehicle Network for Multiplexing and Data Communication Subcommittee has defined three classes of communication networks. Perhaps, the least understood, with respect to function and implementation, is the Class A network. A clear understanding of Class A functions is necessary before any standards for protocol can be established.

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1. SCOPE

This SAE Information Report will explain the differences between Class A, B, and C networks and clarify through examples, the differences in applications. Special attention will be given to a listing of functions that could be attached to a Class A communications network.

2. REFERENCES

2.1 Applicable Publication

The following publication forms a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publication

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1213/1 Glossary of Automotive Electronic Terms

3. DEFINITIONS

SAE J1213/1 defines three classes of communication networks, Class A, Class B, and Class C.

3.1 Class A

The Class A network is defined as, “A potential multiplex system usage whereby vehicle wiring is reduced by the transmission and reception of multiple signals over the same signal bus between nodes that would have been accomplished by individual wires in a conventionally wired vehicle. The nodes to accomplish multiplexed body wiring typically did not exist in the same or similar form in a conventionally wired vehicle.”

3.2 Class B

The Class B network is defined as, “A potential multiplex system usage whereby data is transferred between nodes to eliminate redundant sensors and other system elements. The nodes of this form of a multiplex system typically already existed as standalone modules in a conventionally wired vehicle.”

3.3 Class C

The Class C network is defined as, “A potential multiplex system usage whereby high data rate signals typically associated with real time control systems, such as engine controls and antilock brakes, are sent over the signal bus to facilitate distributed control and to further reduce vehicle wiring.”

4. INTERRELATIONSHIP OF THE THREE CLASSES

A hierarchical relationship exists between the classes of networks. By definition, Class C is a superset of Class B. Also, Class B is a superset of Class A. It should be noted that this is a functional relationship only. Therefore, it is important to distinguish between the function and the application of the multiplex network.

4.1 System Speed versus Functional Speed

Most discussions on multiplexing focus on two issues; system speed and system complexity. Confusion arises from associating functional speed with system speed and complexity. As described in 3.3, Class C is defined as high speed and real time control. Intuitively, high function speed requires high system speeds and perhaps complexity. The Class B definition also makes no reference to the speed of the network or the function but places an emphasis on the type of function, "data communications". Class A defines the functions as being individually wired and not normally connected to intelligent nodes within the vehicle. Here again, no mention is made about the system speed or complexity required to achieve the function. Networks operating at high or medium speeds, therefore, must not be excluded from consideration as a Class A network.

5. TYPICAL APPLICATIONS OF THE CLASSES

Table 1 lists some characteristics of the three classes of multiplex networks. The real functional purpose is shown for each. In addition, the type of information and the timeliness of its distribution is noted.

TABLE 1 - CHARACTERISTICS OF MULTIPLEX NETWORKS

	Class A	Class B	Class C
Purpose	Sensor/Actuator Control	Information Sharing	Real-Time Control
Information	Real Time	Occasional	Real TIme
Latency Response Time	Wide Window	Varying Window	Narrow Window
System	Multiple Systems	Multiple Systems	System Specific
Information Lost or Corrupted	Nuisance	Nuisance or Failure	Failure

5.1 Class C Typical Applications

Systems that require real time, high speed control normally require a significant amount of information to function properly. This information must be available within a narrow time window that cannot vary. A delay of information longer than the specified time window may cause reduced operation or in extreme cases could result in the vehicle becoming inoperable. Figure 1 illustrates a Class C application.

5.1.1 Examples of Class C Applications

AntiLock Brakes, Steer by Wire, Traction Control.