

A Conceptual ITS Architecture: An Atis Perspective

Foreword—This SAE Information Report describes a conceptual framework for Intelligent Transportation Systems (ITS) Architecture and Protocols. The emphasis is on communications between user equipment and the infrastructure, although the architecture is easily extendable to cover the vehicle-to-vehicle communications required for advanced vehicle control systems. This document will allow system developers and standards groups to identify specific interfaces and protocols within a larger conceptual framework.

The initial focus is to define a conceptual architecture that will support communications technologies and applications that are currently being deployed, while allowing room for expansion to accommodate new applications and new communications bearers. It is hoped that a single ITS media-independent application layer protocol can serve many services. The primary audience for this document includes systems developers of ITS products and services and international ITS standards bodies. The primary focus is on Advanced Traveller Information Systems. This architecture supports a variety of implementations that are based on current technology, while allowing for growth, change, and the ability to accommodate new components and technologies that have not yet been developed. This document is one of several substantial efforts to develop a national system architecture for ITS. Others include the FHWA ITS Architecture Development Program.

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1. **Scope**—This SAE Information Report represents an information report on a conceptual ITS architecture and its accompanying protocols from the perspective of Advanced Traveller Information Systems providers and users. While a specific logical and physical architecture for ITS is still in the development stages, this conceptual architecture provides a robust general view of ITS functions and interfaces.
2. **References**
 - 2.1 **Related Publications**—The following publications are provided for information purposes only and are not a required part of this document.
 - 2.1.1 ANSI PUBLICATION—Available from ANSI, 25 West 43rd Street, New York NY 10036-8002.

ANSI D20.1 Standard—State's Model Motorist Data Base: Data Element Dictionary
 - 2.1.2 ISO PUBLICATIONS—Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002.

ISO 7498—Information processing systems—Open systems interconnection—Basic reference model
ISO 9735—Electronic data interchange for administration, commerce and transport (EDIFACT)—
Application level syntax rules
 - 2.1.3 TRANSPORTATION RESEARCH BOARD PUBLICATION—Available from Transportation Research Board, TRB, 2101 Constitution Avenue N.W., Washington, DC 20418.

Transportation Research Circular 412—ITS Primer
3. **Definitions**
 - 3.1 **System Architecture**—A system architecture is a master plan that describes the fundamental components of the system and the information that is to be exchanged or communicated among the components. It provides guidance on how components interact and work together to achieve overall system goals.
 - 3.2 **ATIS**—Advanced Traveller Information Systems. Systems that provide information to the traveller, usually the driver. Sources of information include the traffic management center and value-added service providers. User equipment includes in-vehicle navigation systems, interactive cable TV, wireless hand-held devices, and on-line information services.
 - 3.3 **Protocol**—A set of rules and formats (semantic and syntactic) that determines the communications behavior of entities in the performance of functions within a system architecture.
 - 3.4 **Application Layer Protocol**—The Open Systems Interconnect model contains seven layers. The highest layer is the application layer and it consists of the application entities that cooperate in the OSI environment. The only means by which user elements in different systems may communicate is through application protocol data units of finite size.
4. **ITS Architecture**—The overall conceptual architecture is portrayed in Figure 1. Information sources and users of information are identified by the rectangular boxes; information flows (interfaces) are identified by the arrows. The information flows identified in this diagram include traveller information from both public and private service providers to a variety of applications and devices. The broad vertical lines indicate information networks such as Internet or the National Information Infrastructure.

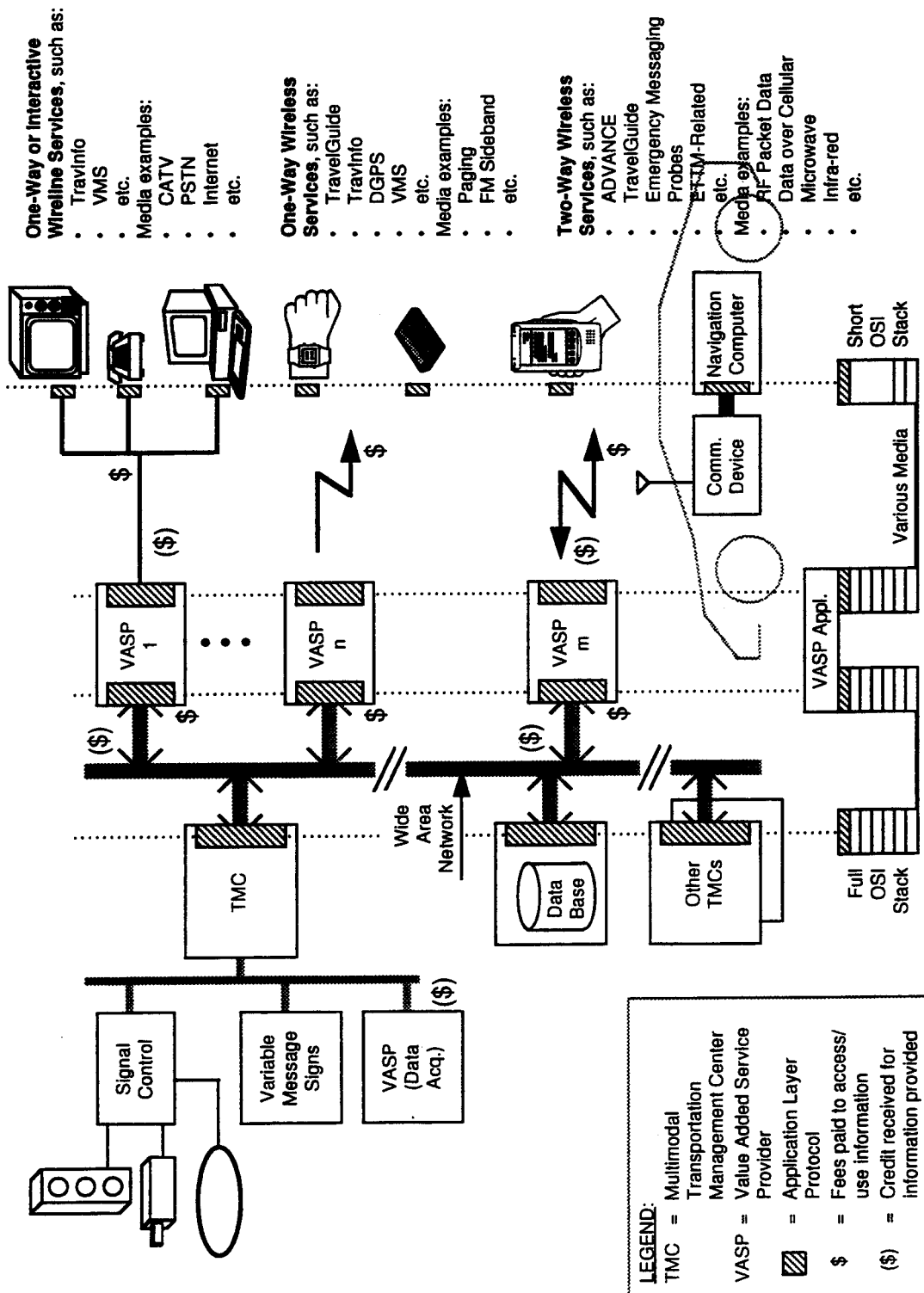


FIGURE 1—A CONCEPTUAL ITS ARCHITECTURE