

## WAVE and PSID Tutorial

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This tutorial provides an introduction to the terms and concepts related to PSIDs and their use in a WAVE system. For more detailed information, specifications and descriptions regarding their use, please see IEEE Std 1609.3-2016 and IEEE Std 1609.12-2016.

### Introduction to WAVE and the PSID

A Wireless Access in Vehicular Environments (WAVE) system is a radio communication system intended to provide seamless, interoperable services to transportation. These services include those recognized by the U. S. National Intelligent Transportation Systems (ITS) architecture and many others contemplated by the automotive and transportation infrastructure industries around the world, such as communication between vehicles and infrastructure (V2I), and communication among vehicles (V2V). Related IEEE WAVE standards include IEEE Std 1609.0, IEEE Std 1609.2, IEEE Std 1609.3, IEEE Std 1609.4, IEEE Std 1609.11, and IEEE Std 1609.12, as well as IEEE Std 802.11 (stations communicating outside the context of a Basic Service Set).

The Provider Service Identifier (PSID) has three uses specified in WAVE standards and described below. In general terms, the PSID is used to identify advertised provider services that are available, and once messages sent by those services are received, the PSID is used to route messages to the appropriate user applications that wish to receive those messages. The PSID is also used to identify the permissions of the senders of some information.

WAVE systems use a highly efficient messaging protocol known as WAVE Short Message Protocol (WSMP). The messages used by WSMP are known as WAVE Short Messages (WSM). The PSID resides in the header of WSM messages transported by WSMP.

A WAVE system advertises available services by way of sending periodic messages known as WAVE Service Advertisements (WSA). Each WSA may include a list of PSIDs for services that are available on the network, as well as information needed to receive and process the WSMs pertaining to each service being advertised. These concepts will be explained in greater detail below.

### PSID Specifics

A PSID is a globally unique integer with a value from 0 to 270,549,119 (0x1020407F, where '0x' indicates hexadecimal, or hex notation). Each allocated PSID value is associated with a WAVE service. Conceptually a WAVE service can be thought of as any application, service, protocol or higher layer entity that resides above the WSMP protocol layer.

A PSID is also associated with an organization that specifies use of that PSID. To facilitate interoperability between WAVE devices, the organization may develop and provide specifications pertaining to the PSID.

PSIDs have two uses specified in IEEE Std 1609.3. First, a service provider identifies advertised service opportunities by the PSID values in WSA messages it transmits. Second, the WSMP delivers WSM content to higher layer entities based on the PSID value set by the sender in the WSM message header.

A third use of the PSID is specified in IEEE Std 1609.2. A security certificate lists the PSID value(s) identifying applications for which a sender is authorized to generate signed secured messages.

Note: As a prerequisite for the allocation of a PSID, the requestor of a PSID must demonstrate the need based on at least one of the above uses. For example, if a service identified by a PSID will be advertised via the WSA mechanism, then a PSID is required. Even for some services that are unadvertised, if the protocol used by the service is WSMP, then a PSID is required. Lastly, if the service uses certificates as defined in IEEE Std 1609.2, then a PSID is required. One or any combination of the above three uses indicates the need for a PSID.

The PSID shares characteristics and a number space with the Intelligent Transportation Systems Application Identifier (ITS-AID) used in standards from other international standards organizations involved in Intelligent Transportation Systems including ISO, CEN and ETSI. The specification of the ITS-AID and a high-level functional description of its management and assignment procedures can be found in ISO 17419. The intention of the IEEE is to encourage the global uniqueness of the PSID/ITS-AID values by coordinating allocations with the appropriate ITS-AID assignment entities. Currently allocated ITS-AID values are found at <http://standards.iso.org/iso/ts/17419/TS17419%20Assigned%20Numbers/>.