Use Case Probe car data (floating car data)

ProbeData for the ITS-G5 context

This ProbeData use-case focuses specifically to road user floating data recovery. It enabled the road operators to improve the purpose to improve road safety, efficiency and limiting CO_2 emission based on awareness and warning messages as provided by the ITS-G5 system.
Road Users such as cars, trucks, motorcycles, moppets, bicycles, impaired road users, pedestrians, priority traffic and others send awareness and warning messages to each other and others. Road operators can collect the information by the installation of ITS-G5 equipped Road Site Unit (RSU) ITS Station (ITS-S) along urban roads and highways.
From the implementation point of view there can be 2 sub-Use-Cases functionally leading to the same information gathering result distinguished.

1. The locations of RSU ITS-S's is spread along the road or highway as such that all standard messages can be received without any storage and retransmission of information by the transmitting ITS-S's.

2. The locations of RSU ITS-S's is limited to specific locations such that the reception of standard information transmitted by any initiating ITS-Ss participating in road traffic may not been captured by the road infrastructure. In this case the RSU sends requests to ITS-S's in the facinity. Road User ITS-S's receiving this request need have stored the requested information in case a request like this arrives. When Road User ITS-S's are equiped with this function they can send this requested information at the time of the request. By this mechanism the road infrastructure can receive information which has been transmitted in the past by the Road User ITS-S's.
This use-case description only specifies the required functional requirements. It does not cover Privacy and security related requirements although these are essential for the realization of this use-case.
Beside data recovery being realized based on ITS-G5 awareness and warning services, data recovery can also be done through other communications. This Use-Case description handles the ITS-G5 specific Use-Cases implementation and only indicates others when of relevance.

1.0 Use-Cases
At present time 2 sub Use-Cases can be identified. Sub Use-Case 1, based on information derived from the reception of CAM and DENM awareness and event messages and Sub Use-Case 2, a Sub Use-Case 1 based Use-Case with extended possibility to request information from other stations and limit the placement of RSU's such that not all CAMs and DENM are received.

1.1 Introduction Sub Use-Case 1,
based on information derived from received CAM and DENM messages

1.1.2 Objective:
To recover the relevant information from road users to support road operators realizing there road efficiency and safety responsibility in a privacy and secured way by placing Infrastructural ITS-G5 stations such that all relevant data can be received and no relevant information gets lost.

1.1.4 Description
The intention of this Use-Case is that all for traffic controle relevant information can be received

form road users by road operators with the purpose to improve road efficiency and predictable travel time, to improve road safety, lower CO_2 emissions and improve road safety. In this Sub-Use-Case this is realized by maxizing the possibility to receive all relevant information by placing RSU ITS-S's at all locations ensuring that all relevant information can be captured by the road infrastructure system. In case of full capure this results that at any location along the relevant road or highway ITS-G5 ITS reception units (RSU's) are placed. By doing so, automatically the by road users ITS-S's transmitted relevant awareness information will be received and no active requesting for information by the road-infrastructure is required. The only thing to agree is that road user ITS-S's do provide the relevant information/parameters. Within the section requirements a description of the current known required parameters are included as well as expected message transmission behaviour.

This initial use-case description is followed by Eco-AT, Scoop@F and expected to be followed by the Dutch Corridor project and is supported by the Amsterdam Group. The related Infrastructural implementation may differ based on the existing infrastructure. The message exchange will be European wide harmonized and specified at ETSI in cooperation with CEN/ISO.

1.1.5 Target System

The targeted system is composed of road user ITS's, RSU ITS's and road infrastructure data systems enabled to collect and combine information as received my more then 1 RSU.
Target system includes: any user ITS-S (such as V-ITS-S), R-ITS-S, C-ITS-S and traffic management system (TLC).

1.1.7 Actors

- _Road user
- _Road user ITS-S
- o Road user equipment provider
- o Road user service provider
- _Road Infrastructure ITS-S
- o Road Infrasturctture supplier
- o Road Infrastructure service provider (such like NDW)
- _Road Operator (such like NDW)

1.1.8 Pre-conditions

For this Use-Case it is required that RSU's are placed such that all relevant road user ITS-S's information radio technically can be received without any request from the RSU being sent to any user ITS-S.

- TLC is connected to the ITS-G5 equipped R-ITS-S's which can provide information on current (T=0) and the TLC can process the information within T=0+t, where t needs to be defined but is in line with maximum CAM rate)
- The R-ITS-S's can receive CAM and DEMN information from other ITS-S's.
- The V-ITS-S provides CAM and DEMN as standardized.

Diagrams

Road Operator ITS-S   **Road User ITS-S**
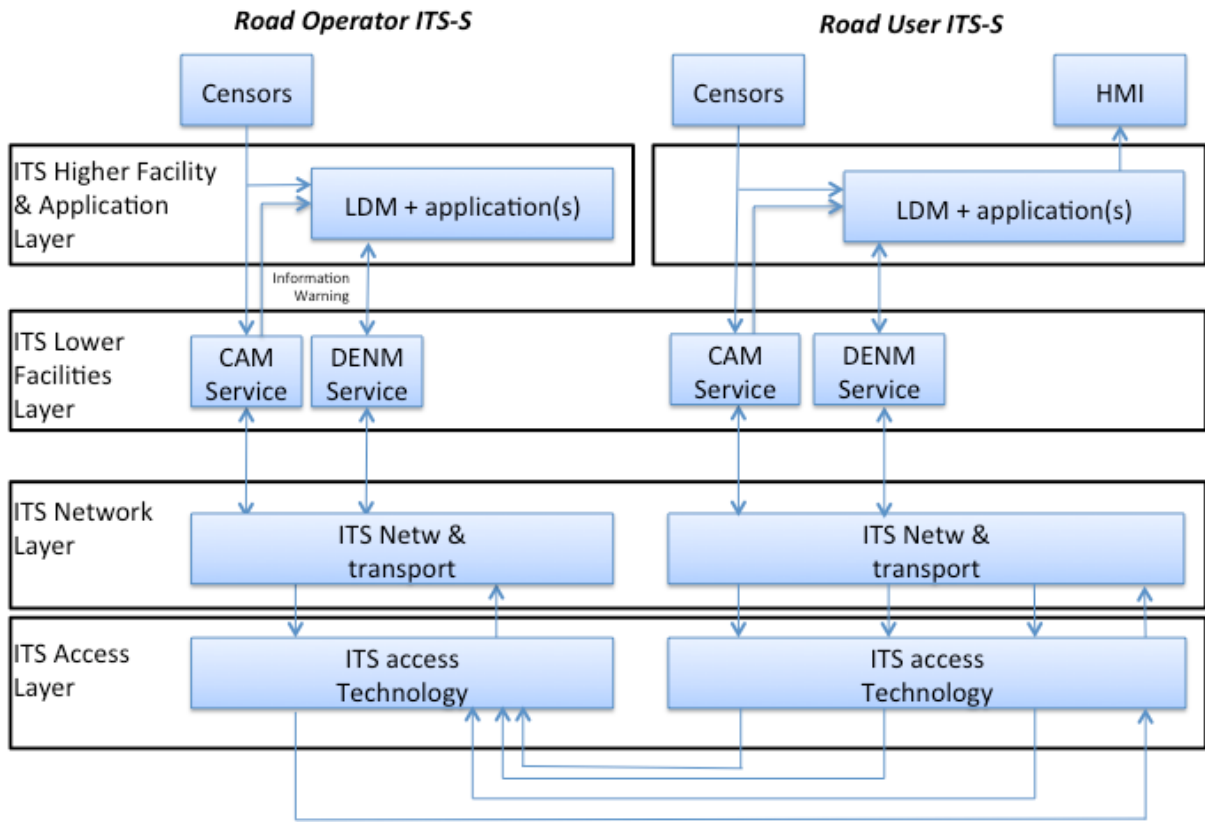
Use case Illustration
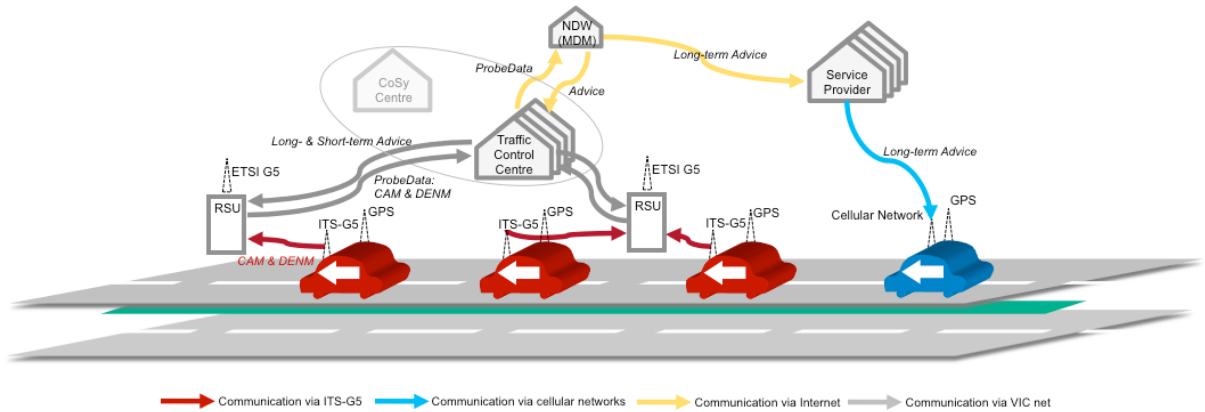
1.2 Introduction Sub Use-Case 2,
Extended Sub Use-Case 1 with requests (PDM) sent by RSU's and earlier transmitted data response (PVD) by Road User ITS-S's.

1.2.2 Objective:
To recover the relevant information from road users to support road operators realizing there road efficiency and safety responsibility in a privacy and secured way by placing Infrastructural ITS-G5 stations such that all relevant data can be received and no relevant information gets lost.

Description
The intention of this Use-Case is that all for traffic control relevant information can be received form road users by road operators with the purpose to improve road efficiency and predictable travel time, to improve road safety, lower CO_2 emissions and improve road safety.

In this Sub-Use-Case this is realized by an handshake between road infrastructure RSU's and Road User ITS stations such that RSU's can be placed on a limited scale along urban roads and highways but still get all relevant information while not being present at all locations to receive the data without a request. This method will allow the deployment of a much lower amount of RSU's especially in none urban areas. The functionally as described in Sub-Use-Case 1 is also applicable here and for those aspects we refer to this Sub-Use-Case 1.

This initial use-case description is followed by Eco-AT, and expected to be followed by the Dutch Corridor project and is supported by the Amsterdam Group. The related Infrastructural implementation may differ based on the existing infrastructure. The message exchange will be European wide harmonized and specified at ETSI in cooperation with CEN/ISO.
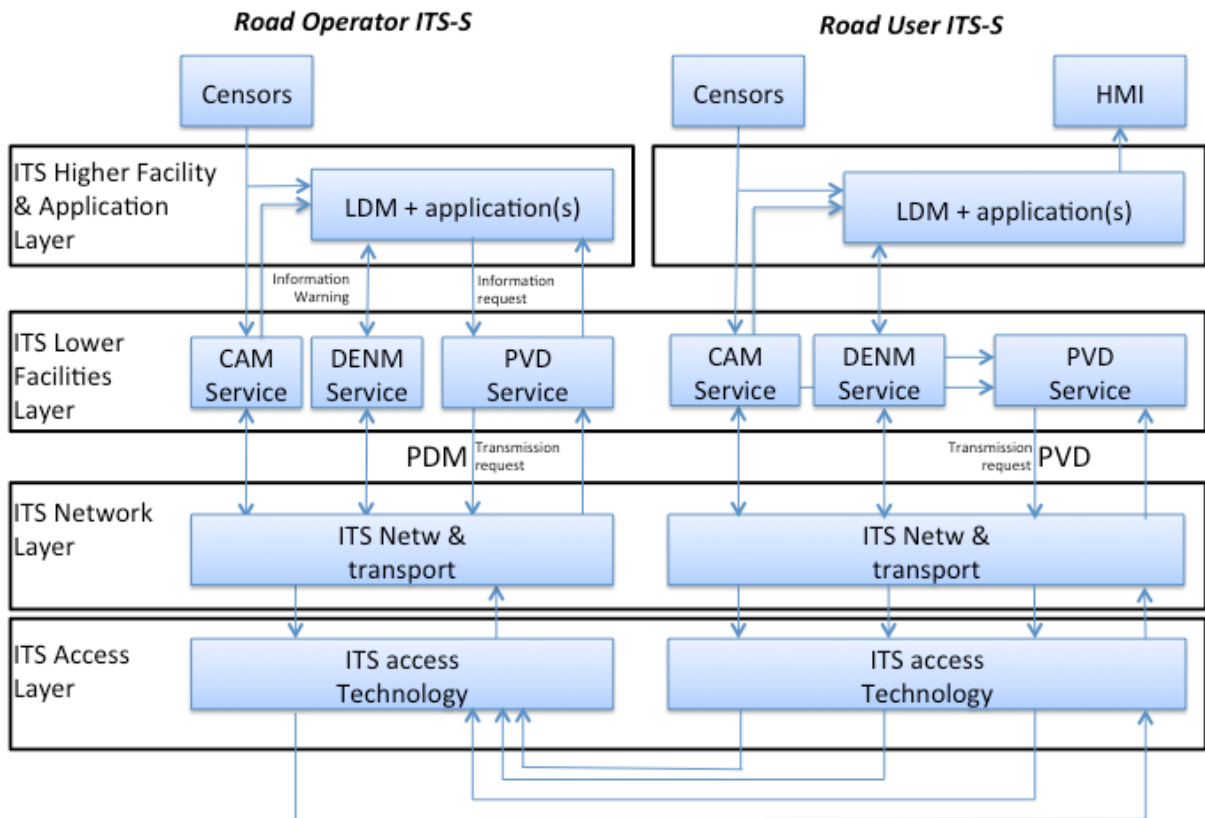
1.2.5 Target System
The targeted system is composed of road user ITS's, RSU ITS's and road infrastructure data systems enabled to collect and combine information as received my more then 1 RSU.

Target system includes: any user ITS-S (such as V-ITS-S), R-ITS-S, C-ITS-S and traffic management system (TLC).

1.2.8 Pre-conditions
- For this Use-Case it is required that RSU's are placed such that all relevant road user ITS-S's information radio technically can be received without any request from the RSU being sent to any user ITS-S.
- TLC is connected to the ITS-G5 equipped R-ITS-S's which can provide information on current (T=0) and the TLC can process the information within T=0+t, where t needs to be defined but is in line with maximum CAM rate)
- The R-ITS-S's can receive CAM, DEMN and PVD information from other ITS-S's and provides PDM to those others.
- The V-ITS-S can receive CAM, DENM and PDM from other ITS-S's and provides CAM, DEMN and PVD.
- That PDM and PVD are standardized which they are not at the moment of release of this document.

Diagrams

Use case Illustration