ETSI TS 103 836-2 V2.1.1 (2024-07)

TECHNICAL SPECIFICATION

Intelligent Transport Systems (ITS);
Vehicular Communications;
GeoNetworking;
Part 2: Scenarios;
Release 2

Important notice

The present document can be downloaded from:
https://www.etsi.org/standards-search

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx

If you find errors in the present document, please send your comment to one of the following services:
https://portal.etsi.org/People/CommiteeSupportStaff.aspx

If you find a security vulnerability in the present document, please report it through our
Coordinated Vulnerability Disclosure Program:
https://www.etsi.org/standards/coordinated-vulnerability-disclosure

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or
other professional standard and applicable regulations.
No recommendation as to products and services or vendors is made or should be implied.
No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.
In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

Contents

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (https://ipr.etsi.org/).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM**® and the GSM logo are trademarks registered and owned by the GSM Association.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Intelligent Transport Systems (ITS).

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.1].

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Executive summary

The present document defines general design guidelines, functional requirements and performance requirements for support of single-hop and multi-hop communications in vehicular ad hoc networks. It is applicable to ITS stations implementing the GeoNetworking protocol.

The present document classifies the communication scenarios with respect to connection multiplicity and the addressing mode, which are supported by the GeoNetworking protocol: point-to-point, point-to-multipoint, GeoAnycast and GeoBroadcast. It further defines an additional classification by direct or indirect usage of the GeoNetworking protocol. More advanced communication scenarios are possible when multiple network protocols are combined by different types of ITS Stations.

1   Scope

The present document classifies and specifies all communication scenarios that are supported by GeoNetworking.

2   References

2.1   Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference.

> NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2   Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

> NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1]   ETSI TS 103 836-1: "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 1: Requirements; Release 2".

[i.2]   ETSI TS 103 836-3: "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 3: Network Architecture; Release 2".

3   Definition of terms, symbols and abbreviations

3.1   Terms

For the purposes of the present document, the terms given in ETSI TS 103 836-3 [i.2] apply.

3.2   Symbols

Void.

3.3   Abbreviations

For the purposes of the present document, the following abbreviations apply:

R2R   Roadside-to-Roadside
R2V   Roadside-to-Vehicle
V2R   Vehicle-to-Roadside
V2V   Vehicle-to-Vehicle

4   Classification of communication scenarios

This clause specifies the basic communication scenarios for GeoNetworking. The communication scenarios for GeoNetworking can be classified in two ways:

- by connection multiplicity and addressing mode (address or location);

- by direct or indirect usage of the GeoNetworking protocol.

The GeoNetworking standard series is focused on, but not limited to the communication between vehicle ITS stations and vehicle ITS stations (V2V) and between vehicle ITS station and roadside ITS stations (V2R/R2V). The number of hops is not considered in the classification of the scenarios, therefore a GeoNetworking packet may travel over multiple ITS stations before reaching its communication endpoint(s). Roadside-to-Roadside (R2R) communication via GeoNetworking is possible but not explicitly specified.

GeoNetworking shall support the following communication scenarios classified by connection multiplicity and addressing mode (address or location):

- Point-to-point: communication from an ITS station to another.

- Point-to-multipoint: communication from an ITS station to multiple ITS stations.

- GeoAnycast: communication from an ITS station to an arbitrary ITS station within a geographical target area.

- GeoBroadcast: communication from an ITS station to all ITS stations within a geographical target area.

NOTE: Point-to-point and point-to-multipoint communication are legacy communication scenarios. GeoAnycast and GeoBroadcast are special scenarios in GeoNetworking.

GeoNetworking shall support the following communication scenarios classified according to the way how to access the ITS network and transport layer:

- Direct mode: applications directly access the ITS network and transport layer, e.g. safety and traffic efficiency applications.

- Indirect mode: applications indirectly access the ITS network and transport layer, i.e. applications access the ITS network and transport layer via an intermediate layer such as IPv6.

5   Communication scenarios

5.1   General

Clauses 5.2 to 5.5 specify communication scenarios for GeoNetworking. The scenarios may be combined with each other to create more advanced communication scenarios. An example of such a communication scenario is illustrated in annex A.

NOTE: The example of the advanced communication scenario does not limit the implementation and is here for clarification.

5.2   Point-to-Point

Communication starts at a single ITS station and ends at one ITS station. This scenario is applicable to V2V, V2R and R2V communication. Figure 1 illustrates the point-to-point communication scenario for V2V.
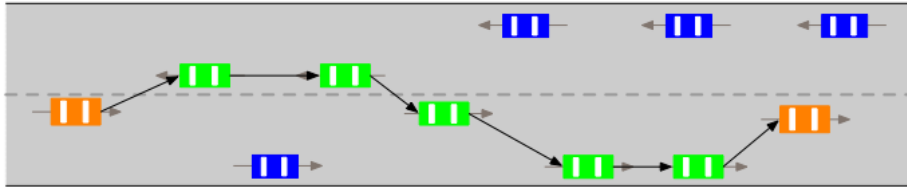

Figure 1: An example of V2V only point-to-point communication

5.3   Point-to-Multipoint

Communication starts at a single ITS station and ends at multiple ITS stations. This scenario is applicable to V2V, V2R and R2V communication. Figure 2 illustrates the point-to-multipoint communication scenario for V2V.

NOTE: This scenario is also applicable to combinations of V2V, V2R and R2V, e.g. V2R/V and R2R/V.
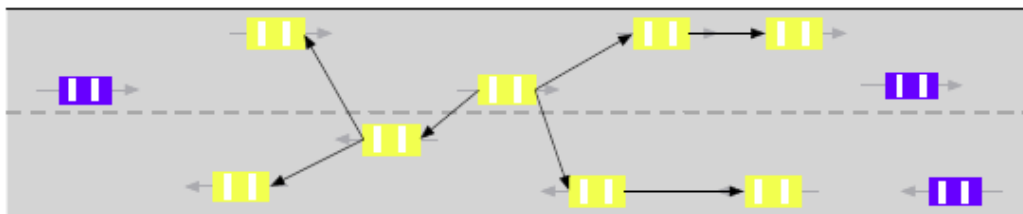

Figure 2: An example of V2V point-to-multipoint communication

5.4   GeoAnycast

Communication starts from a single ITS station and ends at an arbitrary vehicle ITS station within a geographical area. This scenario is applicable to V2V, V2R and R2V communication. Figure 3 illustrates the GeoAnycast communication scenario for V2V, where the source of the GeoNetworking packet is located outside of the geographical area.

NOTE: This scenario is also applicable to combinations of V2V, V2R and R2V, e.g. V2R/V and R2R/V.
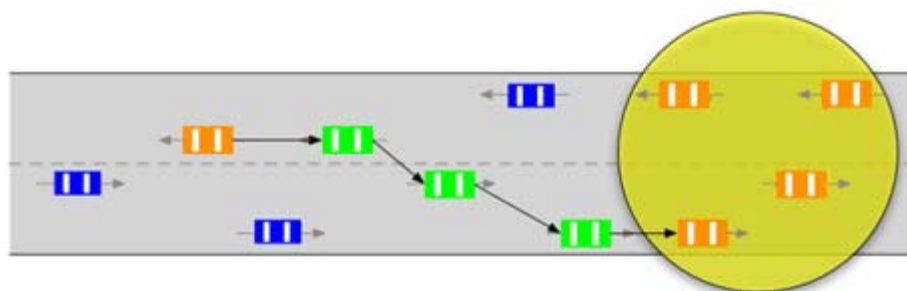

Figure 3: An example of V2V GeoAnycast communication

5.5   GeoBroadcast

Communication starts from a single vehicle ITS station and ends at multiple vehicle ITS stations within a geographical area. This scenario is applicable to V2V, V2R and R2V communication. Figure 4 illustrates the GeoBroadcast communication scenario for V2V, where the source of the GeoNetworking packet is located outside of the geographical area.

NOTE: This scenario is also applicable to combinations of V2V, V2R and R2V, e.g. V2R/V and R2R/V.
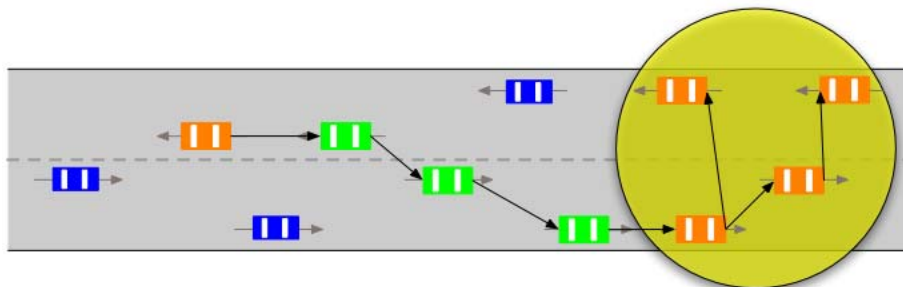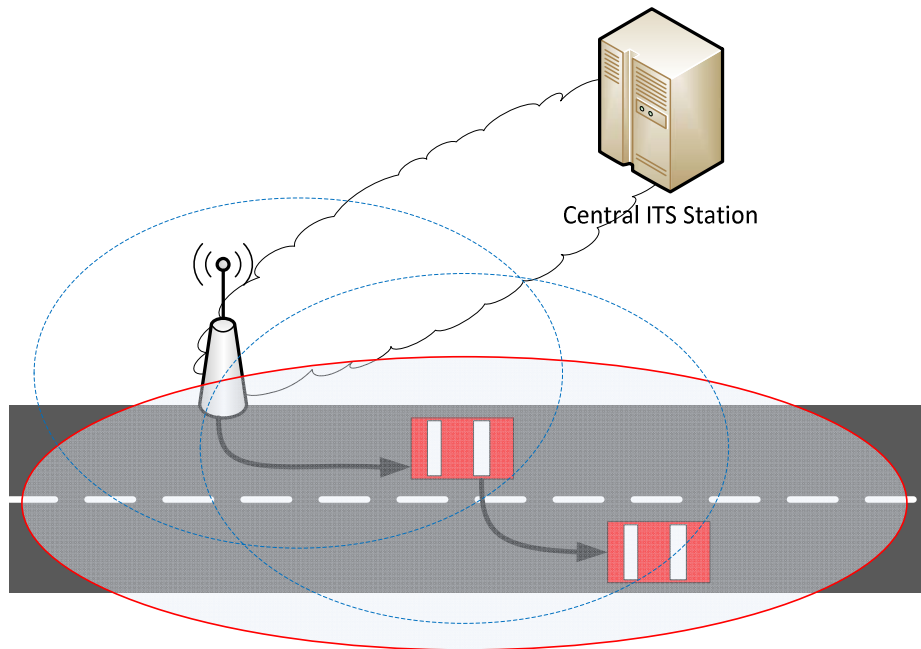
Figure 4: An example of V2V GeoBroadcast communication

Annex A (informative):
Advanced communication scenarios

More advanced communication scenarios are possible when multiple network protocols are combined by different types of ITS Stations. Figure A.1 provides an example of one such scenario.

Central ITS Station

Figure A.1: Combination of central ITS station to roadside communication, R2V and V2V

In Figure A.1 a central ITS-Station sends a message to vehicle ITS stations within a given geographical area. First, the central ITS Station sends a message to at least one roadside ITS station. The roadside ITS station processes the message and broadcasts a GeoNetworking packet using GeoBroadcast (R2V). Under certain conditions, a vehicle ITS station may forward this message to other vehicle ITS Station(s) (V2V).

NOTE: The communication between the central ITS Station to roadside ITS station is beyond the scope of the GeoNetworking standard series.

Annex B (informative):
Change history

Date	Version	Information about changes
February 2022	0.0.1	Initial version based on EN 302 636-2 v1.2.1 using ETSI TS template
January 2024	0.0.2	Update based on discussions in ITS-WG3#64
March 2024	0.0.3	Clean version
July 2024	2.1.1	First published version

History

Document history		
V2.1.1	July 2024	Publication