



SLOVENSKI STANDARD
SIST EN 302 636-1 V1.2.1.2014
01-junij-2014

**Inteligentni transportni sistemi - Komunikacija med vozili - Geomreženje - 1. del:
Zahteve**

Intelligent Transport Systems (ITS) - Vehicular Communications - GeoNetworking - Part
1: Requirements

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: **EN 302 636-1 Version 1.2.1**
<https://standards.iteh.ai/catalog/standards/sist/55d0ac1a-d295-41a7-a0a7-0399d39d1c0e/sist-en-302-636-1-v1-2-1-2014>

ICS:

35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade
-----------	--	---

SIST EN 302 636-1 V1.2.1.2014 **en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 302 636-1 V1.2.1.2014

<https://standards.iteh.ai/catalog/standards/sist/55d6ae1a-d293-4fa7-a0a7-0399d39d1c0e/sist-en-302-636-1-v1-2-1-2014>

ETSI EN 302 636-1 V1.2.1 (2014-04)



**Intelligent Transport Systems (ITS);
Vehicular Communications;
(GeoNetworking);
Part 1: Requirements**

<https://standards.iteh.ai/catalog/standards/sist/55d6ae1a-d293-4fa7-a0a7-0399d39d1c0e/sist-en-302-636-1-v1-2-1-2014>

Reference

REN/ITS-0030032

Keywords

autonomic networking, ITS, network, safety

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 302 636-1 V1.2.1.2014<https://standards.iteh.ai/catalog/standards/sist/55d6ae1a-d293-4fa7-a0a7-0399d39d1c1d/etsi-en-302-636-1-v1-2-1-2014>**Important notice**

The present document can be downloaded from:

<http://www.etsi.org>

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 only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

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

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

http://portal.etsi.org/chaicor/ETSI_support.asp

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2014.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	4
Foreword.....	4
Introduction	5
1 Scope	7
2 References	7
2.1 Normative references	7
2.2 Informative references	8
3 Definitions and abbreviations.....	8
3.1 Definitions	8
3.2 Abbreviations	8
4 Design guidelines	8
5 Functional requirements	9
5.1 Communication mode	9
5.2 GeoNetworking addressing	9
5.3 Geographical routing	9
5.4 Status information signalling.....	9
5.5 Priority and buffering	9
5.6 Decentralized congestion control	10
5.7 Security and privacy	10
5.8 Cross-layer signalling.....	10
5.9 GeoNetworking and IPv6.....	10
5.10 Transport layer functions.....	11
6 Performance requirements.....	11
Annex A (informative): Bibliography.....	12
History	14

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is 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 (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, 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.

Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Intelligent Transport Systems (ITS).

The present document is part 1 of a multi-part deliverable covering Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking, as identified below:

Part 1: "Requirements";

Part 2: "Scenarios";

Part 3: "Network architecture";

Part 4: "Geographical addressing and forwarding for point-to-point and point-to-multipoint communications";

Part 5: "Transport Protocols";

Part 6: "Internet Integration".

ITEH STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 302 636-1 V1.2.1.2014
<https://standards.iteh.ai/catalog/standards/sist/55d6ae1a-d293-4fa7-a0a7-0399d39d1c0e/sist-en-302-636-1-v1-2-1-2014>

National transposition dates

Date of adoption of this EN:	28 April 2014
Date of latest announcement of this EN (doa):	31 July 2014
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2015
Date of withdrawal of any conflicting National Standard (dow):	31 January 2016

Introduction

Wireless communication is a cornerstone of future Intelligent Transport Systems (ITS). Many ITS applications require the dissemination of information with a rapid and direct communication, which can be achieved by ad hoc networking. GeoNetworking is a network-layer protocol for mobile ad hoc communication based on wireless technology, such as ITS-G5. It provides communication in mobile environments without the need for a coordinating infrastructure. GeoNetworking utilizes geographical positions for dissemination of information and transport of data packets. It offers communication over multiple wireless hops, where nodes in the network forward data packets on behalf of each other to extend the communication range. Originally proposed for general mobile ad hoc networks, variants of GeoNetworking have been proposed for other network types, such as vehicular ad hoc networks (VANETs), mesh networks and wireless sensor networks. Therefore, GeoNetworking can also be regarded as a family of network protocols based on the usage of geographical positions for addressing and transport of data packets in different types of networks.

In VANETs, GeoNetworking provides wireless communication among vehicles and among vehicles and fixed stations along the roads. GeoNetworking works connectionless and fully distributed based on ad hoc network concepts, with intermittent or even without infrastructure access. The principles of GeoNetworking meet the specific requirements of vehicular environments: It is well suited for highly mobile network nodes and frequent changes in the network topology. Moreover, GeoNetworking flexibly supports heterogeneous application requirements, including applications for road safety, traffic efficiency and infotainment. More specifically, it enables periodic transmission of safety status messages at high rate, rapid multi-hop dissemination of packets in geographical regions for emergency warnings, and unicast packet transport for Internet applications.

GeoNetworking basically provides two, strongly coupled functions: *geographical addressing* and *geographical forwarding*. Unlike addressing in conventional networks, in which a node has a communication name linked to its identity (e.g. a node's IP address), GeoNetworking can send data packets to a node by its position or to multiple nodes in a geographical region. For forwarding, GeoNetworking assumes that every node has a partial view of the network topology in its vicinity and that every packet carries a geographical address, such as the geographical position or geographical area as the destination. When a node receives a data packet, it compares the geo-address in the data packet and the node's view on the network topology, and makes an autonomous forwarding decision. As a result, packets are forwarded "on the fly", without need for setup and maintenance of routing tables in the nodes.

The most innovative method for distribution of information enabled by geographical routing is to target messages to certain geographical areas. In practise, a vehicle can select and specify a well-delimited geographic area to which messages should be delivered. Intermediate vehicles serve as message relays and only the vehicles located within the target area process the message and further send it to corresponding applications. In this way, only vehicles that are actually affected by a dangerous situation or a traffic notification are notified, whereas vehicles unaffected by the event are not targeted.

Basically, geographical routing comprises the following forwarding schemes:

- **GeoUnicast:** figure 1 shows a possible method of packet delivery between two nodes via multiple wireless hops. When a node wishes to send a unicast packet, it first determines the destination's position and then forwards the data packet to a node towards the destination, which in turn re-forwards the packet along the path until the packet reaches the destination.

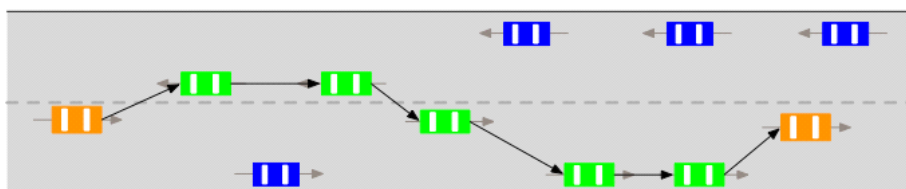


Figure 1: GeoUnicast

- GeoBroadcast: figure 2 shows a possible method of geographical broadcast. A packet is forwarded hop-by-hop until it reaches the destination area determined by the packet, and nodes rebroadcast the packet if they are located inside the destination area. GeoAnycast is different from geographical broadcast in that a node within the destination area will not re-broadcast any received packets.

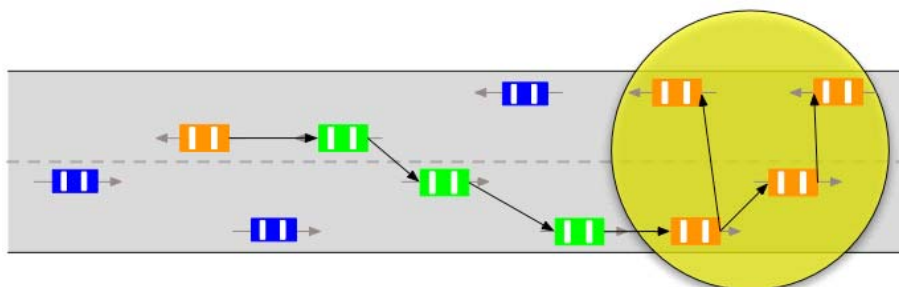


Figure 2: GeoBroadcast

- Topologically-scoped broadcast: figure 3 shows rebroadcasting of a data packet from a source to all nodes in the n-hop neighbourhood. Single-hop broadcast is a specific case of topologically-scoped broadcast, which is used to send packets only to one-hop neighbourhood.

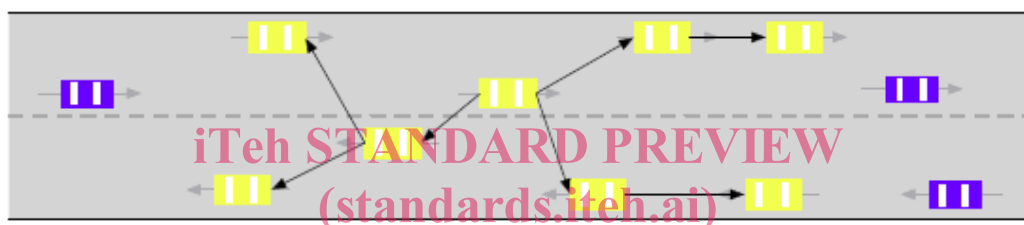


Figure 3: Topologically-scoped broadcast

<https://standards.iteh.ai/catalog/standards/sist/55d6ae1a-d293-4fa7-a0a7-0399d39d1c0e/sist-en-302-636-1-v1-2-1-2014>

1 Scope

The present document specifies, at an abstract level, the general, functional and performance requirements that apply to the GeoNetworking protocols (EN 302 636-4 [i.1], EN 302 636-5 [i.2] and EN 302 636-6 [i.3]) for use in ETSI ITS G5 access technology (EN 302 663 [i.4]).

The present document is applicable to ITS stations implementing ETSI ITS G5 access technology (EN 302 663 [i.4]) and the GeoNetworking protocols (EN 302 636-4 [i.1], EN 302 636-5 [i.2] and EN 302 636-6 [i.3]) for both single hop and multi-hop communications.

2 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 reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://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.

2.1 Normative references

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

- [1] ETSI EN 302 665: "Intelligent Transport Systems (ITS); Communications Architecture".
- [2] ETSI ITS 101 539-1: "Intelligent Transport Systems (ITS); V2X Applications; Part 1: Road Hazard Signalling (RHS) application requirements specification".
- [3] ETSI TS 102 637-1: "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 1: Functional Requirements".
- [4] ETSI TS 102 687: "Intelligent Transport Systems (ITS); Decentralized Congestion Control Mechanisms for Intelligent Transport Systems operating in the 5 GHz range; Access layer part".
- [5] ETSI EN 302 636-2: "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 2: Scenarios".
- [6] ETSI TS 102 636-3: "Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 3: Network architecture".
- [7] IETF RFC 4861: "Neighbor Discovery for IP version 6 (IPv6)".
- [8] IETF RFC 4862: "IPv6 Stateless Address Autoconfiguration".
- [9] IETF RFC 3775: "Mobility Support in IPv6".
- [10] IETF RFC 3963: "Network Mobility (NEMO) Basic Support Protocol".
- [11] IETF RFC 5648: "Multiple Care-of Addresses Registration".