Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Transmission of IP packets over GeoNetworking; Part 2: Test Suite Structure and Test Purposes (TSS & TP)
Contents

Intellectual Property Rights .................................................................................................................. 4
Foreword .................................................................................................................................................... 4
Modal verbs terminology ......................................................................................................................... 4

1 Scope .................................................................................................................................................... 5

2 References ............................................................................................................................................. 5
2.1 Normative references ....................................................................................................................... 5
2.2 Informative references ...................................................................................................................... 5

3 Definition of terms, symbols and abbreviations .................................................................................. 6
3.1 Terms .................................................................................................................................................. 6
3.2 Symbols ............................................................................................................................................. 6
3.3 Abbreviations .................................................................................................................................. 6

4 Test Suite Structure (TSS) .................................................................................................................. 7
4.1 Structure for IPV6overGEONET tests ............................................................................................ 7
4.2 Test groups ....................................................................................................................................... 7
4.2.1 Root ................................................................................................................................................ 7
4.2.2 Groups ......................................................................................................................................... 7
4.2.3 Sub-groups .................................................................................................................................. 7
4.2.4 Categories .................................................................................................................................. 7

5 Test Purposes (TP) .............................................................................................................................. 8
5.1 Introduction ...................................................................................................................................... 8
5.1.1 TP definition conventions ........................................................................................................... 8
5.1.2 TP Identifier naming conventions .............................................................................................. 8
5.1.3 Rules for the behaviour description ........................................................................................... 8
5.1.4 Sources of TP definitions .......................................................................................................... 8
5.1.5 Mnemonics for PICS reference ................................................................................................ 9
5.2 Test purposes for IPV6overGEONET ........................................................................................... 9
5.2.1 Message Generation .................................................................................................................. 9
5.2.1.1 GVL ......................................................................................................................................... 9
5.2.1.2 TVL ....................................................................................................................................... 12
5.2.2 Message Reception ................................................................................................................... 13
5.2.2.1 GVL ..................................................................................................................................... 13
5.2.2.2 TVL .................................................................................................................................... 18
5.2.3 Virtual Interface Management ................................................................................................ 19
5.2.3.1 New virtual interfaces ......................................................................................................... 19
5.2.3.2 Expired virtual interfaces .................................................................................................... 19

History ................................................................................................................................................... 20
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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 covering Conformance test specifications for Transmission of IP packets over GeoNetworking, as identified below:

- **Part 1**: “Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma”;
- **Part 2**: “Test Suite Structure and Test Purposes (TSS & TP)”; 
- **Part 3**: “Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT)”.

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.
1 Scope

The present document provides the Test Suite Structure and Test Purposes (TSS&TP) for Transmission of IP packets over GeoNetworking as defined in ETSI EN 302 636-6-1 [1] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [i.4].

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [i.2] and ISO/IEC 9646-2 [i.3]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [i.5]) are used as a basis for the test methodology.

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.


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 EG 202 798 (V1.1.1): “Intelligent Transport Systems (ITS); Testing; Framework for conformance and interoperability testing”.


3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 302 636-6-1 [1], ISO/IEC 9646-1 [i.2] and in ISO/IEC 9646-7 [i.4] apply.

3.2 Symbols

Void.

3.3 Abbreviations

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

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI</td>
<td>Invalid Behaviour</td>
</tr>
<tr>
<td>BV</td>
<td>Valid Behaviour</td>
</tr>
<tr>
<td>DEPV</td>
<td>Destination Position Vector</td>
</tr>
<tr>
<td>DGVL</td>
<td>Dynamic Geographical Virtual Link</td>
</tr>
<tr>
<td>EUI</td>
<td>Extended Unique Identifier</td>
</tr>
<tr>
<td>EVI</td>
<td>Expired virtual interfaces</td>
</tr>
<tr>
<td>GVL</td>
<td>Geographical Virtual Link</td>
</tr>
<tr>
<td>HT</td>
<td>Header Type</td>
</tr>
<tr>
<td>IID</td>
<td>Interface Identifier</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>IPv6</td>
<td>Internet Protocol version 6</td>
</tr>
<tr>
<td>ITS</td>
<td>Intelligent Transportation Systems</td>
</tr>
<tr>
<td>IUT</td>
<td>Implementation Under Test</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>MAC</td>
<td>Media Access Control</td>
</tr>
<tr>
<td>MIB</td>
<td>Management Information Base</td>
</tr>
<tr>
<td>MR</td>
<td>Message Reception</td>
</tr>
<tr>
<td>NBMA</td>
<td>Non-Broadcast Multi-Access</td>
</tr>
<tr>
<td>NH</td>
<td>Next Header</td>
</tr>
<tr>
<td>NVI</td>
<td>New virtual interfaces</td>
</tr>
<tr>
<td>PICS</td>
<td>Protocol Implementation Conformance Statement</td>
</tr>
<tr>
<td>RA</td>
<td>Router Advertisement</td>
</tr>
<tr>
<td>SAP</td>
<td>Service Access Point</td>
</tr>
<tr>
<td>SGVL</td>
<td>Static Geographical Virtual Link</td>
</tr>
<tr>
<td>SOPV</td>
<td>Source Position Vector</td>
</tr>
<tr>
<td>SRC</td>
<td>Source address</td>
</tr>
<tr>
<td>TP</td>
<td>Test Purposes</td>
</tr>
<tr>
<td>TSB</td>
<td>Topologically Scoped Broadcast</td>
</tr>
<tr>
<td>TSS</td>
<td>Test Suite Structure</td>
</tr>
<tr>
<td>TVL</td>
<td>Topological Virtual Link</td>
</tr>
<tr>
<td>VM</td>
<td>Virtual Interface Management</td>
</tr>
</tbody>
</table>
4 Test Suite Structure (TSS)

4.1 Structure for IPV6overGEONET tests

Table 1 shows the IPV6overGEONET Test Suite Structure (TSS) including its subgroups defined for conformance testing.

Table 1: TSS for IPV6overGEONET

<table>
<thead>
<tr>
<th>Root Group</th>
<th>Sub-group</th>
<th>category</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPv6GEO</td>
<td>Message Generation</td>
<td>GVL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TVL</td>
</tr>
<tr>
<td>Message Reception</td>
<td>GVL</td>
<td>Valid behaviour</td>
</tr>
<tr>
<td></td>
<td>TVL</td>
<td>Valid behaviour</td>
</tr>
<tr>
<td>Virtual Interface Management</td>
<td>New virtual interfaces</td>
<td>Valid behaviour</td>
</tr>
<tr>
<td></td>
<td>Expired virtual interfaces</td>
<td>Valid behaviour</td>
</tr>
</tbody>
</table>

The test suite is structured as a tree with the root defined as IPv6GEO. The tree is of rank 3 with the first rank a Group, the second a Sub-group and the third a Category. The third rank is the standard ISO conformance test categories.

4.2 Test groups

4.2.1 Root

The root identifies the Transmission of IP packets over GeoNetworking given in ETSI EN 302 636-6-1 [1].

4.2.2 Groups

This level contains three functional areas identified as: Message Generation, Message Reception, and Virtual Interface Management.

4.2.3 Sub-groups

This level contains four sub-functional areas identified as: GVL, TVL, New virtual interfaces, and Expired virtual interfaces.

4.2.4 Categories

This level contains the standard ISO conformance test categories limited to the valid behaviour.
5 Test Purposes (TP)

5.1 Introduction

5.1.1 TP definition conventions

The TPs are defined by the rules shown in Table 2.

<table>
<thead>
<tr>
<th>Table 2: TP definition rules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TP Header</strong></td>
</tr>
<tr>
<td>TP ID</td>
</tr>
<tr>
<td>Test objective</td>
</tr>
<tr>
<td>Reference</td>
</tr>
<tr>
<td>PICS Selection</td>
</tr>
</tbody>
</table>

| **TP Behaviour**            |
| Initial conditions          | The initial conditions define in which initial state the IUT has to be to apply the actual TP. In the corresponding Test Case, when the execution of the initial condition does not succeed, it leads to the assignment of an Inconclusive verdict. |
| Expected behaviour (TP body) | Definition of the events, which are parts of the TP objective, and the IUT are expected to perform in order to conform to the base specification. In the corresponding Test Case, Pass or Fail verdicts can be assigned there. |
| Final conditions            | Definition of the events that the IUT is expected to perform or shall not perform, according to the base standard and following the correct execution of the actions in the expected behaviour above. In the corresponding Test Case, the execution of the final conditions is evaluated for the assignment of the final verdict. |

5.1.2 TP Identifier naming conventions

The identifier of the TP is built according to Table 3.

<table>
<thead>
<tr>
<th>Table 3: TP naming convention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identifier:</strong> TP/&lt;root&gt;/&lt;gr&gt;/&lt;sgr&gt;/&lt;x&gt;/&lt;nn&gt;</td>
</tr>
<tr>
<td>&lt;root&gt; = root IPv6GEO IPv6 over GeoNetworking</td>
</tr>
<tr>
<td>&lt;gr&gt; = group MG Message Generation</td>
</tr>
<tr>
<td>VM Virtual Interface Management</td>
</tr>
<tr>
<td>&lt;sgr&gt; = subgroup GVL GVL</td>
</tr>
<tr>
<td>TVL TVL</td>
</tr>
<tr>
<td>&lt;x&gt; = type of testing EVI Expired virtual interfaces</td>
</tr>
<tr>
<td>&lt;nn&gt; = sequential number 01 to 99</td>
</tr>
</tbody>
</table>

5.1.3 Rules for the behaviour description

The description of the TP is built according to ETSI EG 202 798 [i.1].

5.1.4 Sources of TP definitions

All TPs shall be specified according to ETSI EN 302 636-6-1 [1].
5.1.5 Mnemonics for PICS reference

To avoid an update of all TP tables when the PICS document is changed, the following table introduce mnemonics name and the correspondence with the real PICS item number.

<table>
<thead>
<tr>
<th>Mnemonic</th>
<th>PICS Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICS_SGVL</td>
<td>A.6/1 [2]</td>
</tr>
<tr>
<td>PICS_DGVL</td>
<td>A.6/2 [2]</td>
</tr>
<tr>
<td>PICS_TVL</td>
<td>A.6/3 [2]</td>
</tr>
<tr>
<td>PICS_Ethernet</td>
<td>A.7/1 [2]</td>
</tr>
</tbody>
</table>

5.2 Test purposes for IPV6overGEONET

5.2.1 Message Generation

5.2.1.1 GVL

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/MG/GVL/BV/01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test objective</td>
<td>Checks that an IPv6 link-local multicast message is carried out over a GeoBroadcast message into the correct geographical area, when sent over an SGVL</td>
</tr>
<tr>
<td>Reference</td>
<td>ETSI EN 302 636-6-1 [1], clauses 8.2.1 and 9.2.1</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PICS_SGVL</td>
</tr>
</tbody>
</table>

**Initial conditions**

with {
the IUT having a configured SGVL (SGVL1)
the IUT's Upper Layer being configured to use the virtual interface associated with SGVL1 to send link-local multicast packets
}

**Expected behaviour**

ensure that {
when {
the IUT receives an IPv6 packet from the Upper Layer containing destination address indicating a link-local multicast IPv6 address
}
then {
the IUT sends a valid GeoNetworking GeoBroadcast message containing the geographical Destination area corresponding to SGVL1 containing NH field indicating value '3' containing HT field indicating value '4' carrying the IPv6 packet received from Upper Layer as payload
}
}
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/MG/GVL/BV/02</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test objective</strong></td>
<td>Checks that an IPv6 global-scoped unicast-prefix-based multicast message is carried out over a GeoBroadcast message into the correct geographical area, when sent over an SGVL</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>ETSI EN 302 636-6-1 [1], clauses 8.2.1 and 9.2.1</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PICS_SGVL</td>
</tr>
</tbody>
</table>

**Initial conditions**

with {
  the IUT having a configured SGVL (SGVL1)
}

**Expected behaviour**

ensure that {
  when {
    the IUT receives an IPV6 packet from the Upper Layer
    containing destination address
    containing a global-scoped unicast-prefix-based multicast IPv6 address
    indicating prefix associated with SGVL1
  }
  then {
    the IUT sends a valid GeoNetworking GeoBroadcast message
    containing the geographical Destination area corresponding to SGVL1
    containing NH field
    indicating value '2'
    containing HT field
    indicating value '4'
    carrying the IPv6 packet received from Upper Layer as payload
  }
}

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/MG/GVL/BV/03</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test objective</strong></td>
<td>Checks that an IPv6 Geographic anycast message is carried out over a GeoAnycast message into the correct geographical area, with an SGVL link manually configured</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>ETSI EN 302 636-6-1 [1], clauses 8.2.1 and 9.4</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PICS_SGVL</td>
</tr>
</tbody>
</table>

**Initial conditions**

with {
  the IUT having a configured SGVL (SGVL1)
  the IUT's Upper Layer being configured to use the virtual interface associated with GVL1 to send Geographic anycast packets
}

**Expected behaviour**

ensure that {
  when {
    the IUT receives an IPV6 packet from the Upper Layer
    containing destination address
    indicating a Geographic anycast IPv6 address
  }
  then {
    the IUT sends a valid GeoNetworking GeoAnycast message
    containing the geographical Destination area corresponding to GVL1
    containing NH field
    indicating value '3'
    containing HT field
    indicating value '3'
    carrying the IPv6 packet received from Upper Layer as payload
  }
}
TP Id | TP/IPv6GEO/MG/GVL/BV/04
---|---
Test objective | Checks that an IPv6 unicast message is carried out over a GeoUnicast when using an SGVL associated to an Ethernet V2.0/IEEE 802.3™ [3] LAN type virtual interface with address resolution
Reference | ETSI EN 302 636-6-1 [1], clauses 8.2.1 and 10.3
PICS Selection | PICS_SGVL

Initial conditions

with {
  the IUT having a configured SGVL (SGVL1)
  the IUT's Upper Layer being configured to use the virtual interface associated with SGVL1
  the IUT being configured with MIB attribute itsgn6asIVResolAddr set to true
}

Expected behaviour

ensure that {
  when {
    the IUT receives an IPv6 packet from the Upper Layer
    containing destination address
    indicating unicast IPv6 address of the Tester
  }
  then {
    the IUT sends a valid GeoUnicast message
    containing DEPV field
    containing GN_ADDR field
    indicating value derived from the unicast IPv6 address IID
    containing NH field
    indicating value '3'
    containing HT field
    indicating value '2'
    carrying the IPv6 packet received from Upper Layer as payload
  }
}

TP Id | TP/IPv6GEO/MG/GVL/BV/05
---|---
Test objective | Checks that an IPv6 unicast message is carried out over a GeoUnicast when using an SGVL associated to an Ethernet V2.0/IEEE 802.3™ [3] LAN type virtual interface without address resolution
Reference | ETSI EN 302 636-6-1 [1], clauses 8.2.1 and 10.3
PICS Selection | PICS_SGVL

Initial conditions

with {
  the IUT having a configured SGVL (SGVL1)
  the IUT's Upper Layer being configured to use the virtual interface associated with SGVL1
  the IUT being configured with MIB attribute itsgn6asIVResolAddr set to false
}

Expected behaviour

ensure that {
  when {
    the IUT receives an IPV6 packet from the Upper Layer
    containing destination address
    indicating unicast IPv6 address of the Tester
  }
  then {
    the IUT sends a valid GeoUnicast message
    containing DEPV field
    containing GN_ADDR field
    indicating value derived from the GN6_SAP destination parameter
    containing NH field
    indicating value '3'
    containing HT field
    indicating value '2'
    carrying the IPv6 packet received from Upper Layer as payload
  }
}
5.2.1.2 TVL

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/MG/TVL/BV/01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test objective</td>
<td>Checks that an IPv6 unicast message is carried out over a GeoUnicast when using a TVL virtual interface with address resolution</td>
</tr>
<tr>
<td>Reference</td>
<td>ETSI EN 302 636-6-1 [1], clause 8.2.1</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PICS_TVL</td>
</tr>
</tbody>
</table>

Initial conditions

- with {
  - the IUT having a configured TVL (TVL1)
  - the IUT’s Upper Layer being configured to use the virtual interface associated with TVL1
  - the IUT being configured with MIB attribute itsgn6asvI/ResolAddr set to true
}

Expected behaviour

ensure that {
  when {
    the IUT receives an IPV6 packet from the Upper Layer
    containing destination address
    indicating unicast IPv6 address of the Tester
  }
  then {
    the IUT sends a valid GeoUnicast message
    containing DEPV field
    containing GN_ADDR field
    indicating value derived from the unicast IPv6 address IID
    containing NH field
    indicating value '3'
    containing HT field
    indicating value '2'
    carrying the IPv6 packet received from Upper Layer as payload
  }
}

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/MG/TVL/BV/02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test objective</td>
<td>Checks that an IPv6 unicast message is carried out over a GeoUnicast when using a TVL virtual interface without address resolution</td>
</tr>
<tr>
<td>Reference</td>
<td>ETSI EN 302 636-6-1 [1], clause 8.2.1</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PICS_TVL</td>
</tr>
</tbody>
</table>

Initial conditions

- with {
  - the IUT having a configured TVL (TVL1) and
  - the IUT’s Upper Layer being configured to use the virtual interface associated with TVL1
  - the IUT being configured with MIB attribute itsgn6asvI/ResolAddr set to false
}

Expected behaviour

ensure that {
  when {
    the IUT receives an IPV6 packet from the Upper Layer
    containing destination address
    indicating unicast IPv6 address of the Tester
  }
  then {
    the IUT sends a valid GeoUnicast message
    containing DEPV field
    containing GN_ADDR field
    indicating value derived from the GN6_SAP destination parameter
    containing NH field
    indicating value '3'
    containing HT field
    indicating value '2'
    carrying the IPv6 packet received from Upper Layer as payload
  }
}
TP Id | TP/IPv6GEO/MG/TVL/BV/03  
--- | ---  
Test objective | Checks that an IPv6 link-local multicast message is carried out over a GeoBroadcast message into the correct geographical area, when sent over a TVL  
Reference | ETSI EN 302 636-6-1 [1], clauses 8.2.1 and 9.2.1  
PICS Selection | PICS_TVL  

Initial conditions

with {
  the IUT having a configured TVL (TVL1)
  the IUT's Upper Layer being configured to use the virtual interface associated with TVL1 to send link-local multicast packets
}

Expected behaviour

ensure that {
  when {
    the IUT receives an IPV6 packet from the Upper Layer
    containing destination address
    indicating a link-local multicast IPv6 address
  }
  then {
    the IUT sends a valid GeoNetworking TSB message
    containing NH field
    indicating value '3'
    containing HT field
    indicating value '5'
    carrying the IPv6 packet received from Upper Layer as payload
  }
}

5.2.2 Message Reception

5.2.2.1 GVL

TP Id | TP/IPv6GEO/MR/GVL/BV/01  
--- | ---  
Test objective | Checks handling of a received GeoBroadcast message containing an IPv6 packet, which has destination area corresponding to an existing SGVL of the IUT  
Reference | ETSI EN 302 636-6-1 [1], clause 8.2.2  
PICS Selection | PICS_SGVL  

Initial conditions

with {
  the IUT having configured SGVL (SGVL1)
  the IUT having configured SGVLs (SGVL2 .. SGVLx)
}

Expected behaviour

ensure that {
  when {
    the IUT receives a GeoBroadcast message
    containing Destination Area parameters corresponding to SGVL1
    containing payload
    indicating an IPv6 packet
  }
  then {
    the IUT transmits on the virtual interface associated to SGVL1 an Ethernet packet
    containing Destination MAC address
    indicating the broadcast value
    containing Source MAC address
    indicating a value derived from Source GN_ADDR field
    containing Ether Type value
    indicating IPv6
    containing the IPv6 packet
  }
}
TP Id | TP/IPv6GEO/MR/GVL/BV/02
---|---
Test objective | Checks handling of a received GeoBroadcast message containing an IPv6 packet not carrying a Router Advertisement, which has destination area not corresponding to any existing GVL of the IUT
Reference | ETSI EN 302 636-6-1 [1], clause 8.2.2
PICS Selection | PICS_SGVL and PICS_DGVL

**Initial conditions**

with {
  the IUT having configured SGVLs (SGVL1 .. SGVLx)
  the IUT having configured DGVL (DGVL1)
}

**Expected behaviour**

ensure that {
  when {
    the IUT receives a GeoBroadcast message
    containing Destination Area parameters not corresponding to any GVLs
    containing payload
    containing an IPv6 packet
    not containing an ICMPv6 RA message
  }
  then {
    the IUT transmits on the virtual interface associated to DGVL1 an Ethernet packet
    containing Destination MAC address
    indicating the broadcast value
    containing Source MAC address
    indicating a value derived from Source GN_ADDR field
    containing Ether Type value
    indicating IPv6
    containing the IPv6 packet
  }
}

TP Id | TP/IPv6GEO/MR/GVL/BV/03
---|---
Test objective | Checks handling of a received GeoAnycast message containing an IPv6 packet, which has destination area corresponding to an existing SGVL of the IUT
Reference | ETSI EN 302 636-6-1 [1], clause 8.2.2
PICS Selection | PICS_SGVL

**Initial conditions**

with {
  the IUT having configured SGVLs (SGVL1 .. SGVLx)
}

**Expected behaviour**

ensure that {
  when {
    the IUT receives a GeoAnycast message
    containing Destination Area parameters corresponding to SGVL1
    containing payload
    indicating an IPv6 packet
  }
  then {
    the IUT transmits on the virtual interface associated to SGVL1 an Ethernet packet
    containing Source MAC address
    indicating a value derived from Source GN_ADDR field
    containing Ether Type value
    indicating IPv6
    containing the IPv6 packet
  }
}
**Test objective**
Checks handling of a received GeoAnycast message containing an IPv6 packet, which has destination area not corresponding to any existing GVL of the IUT

**Reference**
ETSI EN 302 636-6-1 [1], clause 8.2.2

**PICS Selection**
PICS_SGVL and PICS_DGVL

**Initial conditions**
with {
  the IUT having configured SGVLs (GVL1 .. GVLx)
  the IUT having configured a DGVL (DGVL1)
}

**Expected behaviour**
ensure that {
  when {
    the IUT receives a GeoAnycast message
    containing Destination Area parameters not corresponding to any SGVLs and
    containing payload
    indicating an IPv6 packet
  }
  then {
    the IUT transmits on the virtual interface associated to DGVL1 an Ethernet packet
    containing Destination MAC address
    indicating the broadcast value
    containing Source MAC address
    indicating a value derived from Source GN_ADDR field
    containing Ether Type value
    indicating IPv6
    containing the IPv6 packet
  }
}

---

**Test objective**
Checks handling of a received GeoBroadcast message containing an IPv6 packet carrying a Router Advertisement, which has destination area not corresponding to any existing GVL of the IUT

**Reference**
ETSI EN 302 636-6-1 [1], clause 8.2.2

**PICS Selection**
PICS_SGVL

**Initial conditions**
with {
  the IUT having configured SGVLs (SGVL1 .. SGVLx)
}

**Expected behaviour**
ensure that {
  when {
    the IUT receives a GeoBroadcast message
    containing Destination Area parameters not corresponding to any SGVLs
    containing an IPv6 packet
  }
  then {
    the IUT creates a new SGVL and a new virtual interface associated to it
    the IUT transmits on the virtual interface associated to the new GVL an Ethernet packet
    containing Destination MAC address
    indicating '33:33:00:00:00:01'
    containing Source MAC address
    indicating a value derived from Source GN_ADDR field
    containing Ether Type value
    indicating IPv6
    containing the IPv6 packet
  }
}
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/MR/GVL/BV/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test objective</td>
<td>Checks handling of a received GeoUnicast message, containing an IPv6 packet with destination address matching one and only one address associated to a virtual interface of the IUT</td>
</tr>
<tr>
<td>Reference</td>
<td>ETSI EN 302 636-6-1 [1], clause 8.2.2</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PICS_SGVL</td>
</tr>
<tr>
<td><strong>Initial conditions</strong></td>
<td></td>
</tr>
<tr>
<td>with {</td>
<td></td>
</tr>
<tr>
<td>the IUT having configured SGVLs (SGVL1 .. SGVLx)</td>
<td></td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
<tr>
<td><strong>Expected behaviour</strong></td>
<td></td>
</tr>
<tr>
<td>ensure that {</td>
<td></td>
</tr>
<tr>
<td>when {</td>
<td></td>
</tr>
<tr>
<td>the IUT receives a GeoUnicast message</td>
<td></td>
</tr>
<tr>
<td>containing payload</td>
<td></td>
</tr>
<tr>
<td>containing an IPv6 packet</td>
<td></td>
</tr>
<tr>
<td>containing a destination address</td>
<td></td>
</tr>
<tr>
<td>indicating address associated to one SGVL (SGVLy)</td>
<td></td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
<tr>
<td>then {</td>
<td></td>
</tr>
<tr>
<td>the IUT transmits on the virtual interface associated to SGVLy an Ethernet packet</td>
<td></td>
</tr>
<tr>
<td>containing Destination MAC address</td>
<td></td>
</tr>
<tr>
<td>indicating a value derived from the Destination GN_ADDR field</td>
<td></td>
</tr>
<tr>
<td>containing Source MAC address</td>
<td></td>
</tr>
<tr>
<td>indicating a value derived from Source GN_ADDR field</td>
<td></td>
</tr>
<tr>
<td>containing Ether Type value</td>
<td></td>
</tr>
<tr>
<td>indicating IPv6</td>
<td></td>
</tr>
<tr>
<td>containing the IPv6 packet</td>
<td></td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/MR/GVL/BV/07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test objective</td>
<td>Checks handling of a received GeoUnicast message, containing an IPv6 packet with destination address not matching addresses associated to IUT's SGVLs and with SOPV contained in one and only one geoArea associated to IUT's SGVLs</td>
</tr>
<tr>
<td>Reference</td>
<td>ETSI EN 302 636-6-1 [1], clause 8.2.2</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PICS_SGVL</td>
</tr>
<tr>
<td><strong>Initial conditions</strong></td>
<td></td>
</tr>
<tr>
<td>with {</td>
<td></td>
</tr>
<tr>
<td>the IUT having configured SGVLs (SGVL1 .. SGVLx)</td>
<td></td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
<tr>
<td><strong>Expected behaviour</strong></td>
<td></td>
</tr>
<tr>
<td>ensure that {</td>
<td></td>
</tr>
<tr>
<td>when {</td>
<td></td>
</tr>
<tr>
<td>the IUT receives a GeoUnicast message</td>
<td></td>
</tr>
<tr>
<td>containing payload</td>
<td></td>
</tr>
<tr>
<td>containing an IPv6 packet</td>
<td></td>
</tr>
<tr>
<td>containing a destination address</td>
<td></td>
</tr>
<tr>
<td>indicating address not associated to any GVL</td>
<td></td>
</tr>
<tr>
<td>containing Source position coordinates only contained in GVLY</td>
<td></td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
<tr>
<td>then {</td>
<td></td>
</tr>
<tr>
<td>the IUT transmits on the virtual interface associated to GVLY an Ethernet packet</td>
<td></td>
</tr>
<tr>
<td>containing Destination MAC address</td>
<td></td>
</tr>
<tr>
<td>indicating a value derived from the Destination GN_ADDR field</td>
<td></td>
</tr>
<tr>
<td>containing Source MAC address</td>
<td></td>
</tr>
<tr>
<td>indicating a value derived from Source GN_ADDR field</td>
<td></td>
</tr>
<tr>
<td>containing Ether Type value</td>
<td></td>
</tr>
<tr>
<td>indicating IPv6</td>
<td></td>
</tr>
<tr>
<td>containing the IPv6 packet</td>
<td></td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
</tbody>
</table>
TP Id | TP/IPv6GEO/MR/GVL/BV/08
--- | ---
Test objective | Checks handling of a received GeoUnicast message, containing an IPv6 packet with destination address not matching addresses associated to IUT's GVLs and with SOPV not contained in any geoArea associated to IUT's GVLs
Reference | ETSI EN 302 636-6-1 [1], clause 8.2.2
PICS Selection | PICS_SGVL and PICS_DGVL
Initial conditions
with {
    the IUT having configured SGVLs (SGVL1 .. SGVLx)
    the IUT having configured a DGVL (DGVL1)
}
Expected behaviour
ensure that {
    when {
        the IUT receives a GeoUnicast message
        containing payload
        containing an IPv6 packet
        containing a destination address
        indicating address not associated to any GVL
        containing Source position coordinates not contained in any GVL
    }
    then {
        the IUT transmits on the virtual interface associated to DGVL an Ethernet packet
        containing Destination MAC address
        indicating a value derived from the Destination GN_ADDR field
        containing Source MAC address
        indicating a value derived from Source GN_ADDR field
        containing Ether Type value
        indicating IPv6
        containing the IPv6 packet
    }
}

TP Id | TP/IPv6GEO/MR/GVL/BV/09
--- | ---
Test objective | Checks handling of a received GeoUnicast message, containing an IPv6 packet with destination address not matching addresses associated to IUT's SGVLs and with SOPV contained in more than one geoArea associated to IUT's SGVLs and with IPv6 source address considered to be on-link on at least one of those SGVLs
Reference | ETSI EN 302 636-6-1 [1], clause 8.2.2
PICS Selection | PICS_SGVL
Initial conditions
with {
    the IUT having configured SGVLs (SGVL1 .. SGVLx)
    GVLb invalidation timer being higher than SGVLa and SGVLc invalidation timers
}
Expected behaviour
ensure that {
    when {
        the IUT receives a GeoUnicast message
        containing payload
        containing an IPv6 packet
        containing a destination address
        indicating address not associated to any SGVL
        containing Source position coordinates contained in SGVLa, SGVLb and SGVLc
    }
    then {
        the IUT transmits on the virtual interface associated to SGVLb an Ethernet packet
        containing Destination MAC address
        indicating a value derived from the Destination GN_ADDR field
        containing Source MAC address
        indicating a value derived from Source GN_ADDR field
        containing Ether Type value
        indicating IPv6
        containing the IPv6 packet
    }
}
TP Id | TP/IPv6GEO/MR/GVL/BV/10
---|---
Test objective | Checks handling of a received GeoUnicast message, containing an IPv6 packet with destination address not matching addresses associated to IUT's SGVLs and with SOPV contained in more than one geoArea associated to IUT's SGVLs and with IPv6 source address not considered to be on-link on any of those SGVLs
Reference | ETSI EN 302 636-6-1 [1], clause 8.2.2
PICS Selection | PICS_SGVL and PICS_DGVL

**Initial conditions**

with { 
  the IUT having configured SGVLs (SGVL1 .. SGVLx) 
  the IUT having configured a DGVL (DGVL1) 
  IPv6 address IPV6_SRC not considered to be on-link on SGVLa, SGVLb, and SGVLc 
}

**Expected behaviour**

ensure that { 
  when { 
    the IUT receives a GeoUnicast message 
    containing payload 
    containing an IPv6 packet 
    containing a destination address 
    indicating address not associated to any SGVL 
    containing a source address IPV6_SRC 
    containing Source position coordinates contained in SGVLa, SGVLb and SGVLc 
  } 
  then { 
    the IUT transmits on the virtual interface associated to DGVL1 an Ethernet packet 
    containing Destination MAC address 
    indicating a value derived from the Destination GN_ADDR field 
    containing Source MAC address 
    indicating a value derived from Source GN_ADDR field 
    containing Ether Type value 
    indicating IPv6 
    containing the IPv6 packet 
  } 
}

---

5.2.2.2 TVL

TP Id | TP/IPv6GEO/MR/TVL/BV/01
---|---
Test objective | Checks handling of a received link-local IPv6 Unicast message, when using a TVL associated to an NBMA type virtual interface
Reference | ETSI EN 302 636-6-1 [1], clause 8.2.2
PICS Selection | PICS_TVL

**Initial conditions**

with { 
  the IUT having a configured TVL (TVL1) 
}

**Expected behaviour**

ensure that { 
  when { 
    the IUT receives a TSB message 
    containing an IPv6 packet 
  } 
  then { 
    the IUT transmits on the virtual interface associated to TVL1 an Ethernet packet 
    containing Source MAC address 
    indicating a value derived from Source GN_ADDR field 
    containing Ether Type value 
    indicating IPv6 
    containing the IPv6 packet 
  } 
}
5.2.3 Virtual Interface Management

5.2.3.1 New virtual interfaces

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/VM/NVI/BV/01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test objective</td>
<td>Checks the Router Advertisement-triggered creation of a new SGVL associated to an Ethernet V2.0/IEEE 802.3™ [3] LAN type virtual interface</td>
</tr>
<tr>
<td>Reference</td>
<td>ETSI EN 302 636-6-1 [1], clauses 8.2.2 and 10.2.1</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PICS_SGVL and PICS_Ethernet</td>
</tr>
</tbody>
</table>

**Initial conditions**

with {
    the IUT having configured SGVLs (SGVL1 .. SGVLx)
}

**Expected behaviour**

ensure that {
    when {
        the IUT receives a GeoBroadcast message
        containing Destination Area parameters not corresponding to any GVL
        containing an ICMPv6 RA payload
    }
    then {
        the IUT creates a new SGVL and associates to it a new virtual interface (VI1)
        having a MAC address
        indicating a value derived from the IUT’s GN_ADDR (see note)
    }
}

**NOTE:** Reverse EUI-64 generation procedure.

5.2.3.2 Expired virtual interfaces

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP/IPv6GEO/VM/EVI/BV/01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test objective</td>
<td>Checks the removal of an expired SGVL and its associated virtual interface</td>
</tr>
<tr>
<td>Reference</td>
<td>ETSI EN 302 636-6-1 [1], clause 8.2.2</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PICS_SGVL and PICS_Ethernet</td>
</tr>
</tbody>
</table>

**Initial conditions**

with {
    the IUT having configured a SGVL (SGVL1) derived from a received RA
}

**Expected behaviour**

ensure that {
    when {
        every prefix entry associated to SGVL1 has expired
    }
    then {
        the IUT removes the expired SGVL SGVL1
        the IUT removes the associated virtual interface VI1
    }
}

**NOTE:** Each Prefix List entry has an expiration time.
## History

<table>
<thead>
<tr>
<th>Document history</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1.1.1 March 2011 Publication</td>
</tr>
<tr>
<td>V1.2.1 April 2014 Publication</td>
</tr>
<tr>
<td>V1.3.1 February 2022 Publication</td>
</tr>
</tbody>
</table>