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**Intelligent Transport Systems (ITS);**
**Testing;**
**Conformance test specifications for ITS Misbehaviour Reporting service;**
**Part 2: Test Suite Structure and Test Purposes (TSS & TP);**
**Release 2**

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# Contents

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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. Full details of the entire series can be found in part 1 [3].

# 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).

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# 1 Scope

The present document provides the Test Suite Structure and Test Purposes (TSS & TP) for ITS Misbehaviour Reporting service as specified in ETSI TS 103 759 [1] in accordance with the relevant guidance given in ISO/IEC 9646-7 [i.6].

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [i.3] and ISO/IEC 9646-2 [i.4]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [i.7]) 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.

[1] ETSI TS 103 759 (V2.1.1): "Intelligent Transport Systems (ITS); Security; Misbehaviour Reporting service; Release 2".

[2] ETSI TS 103 097 (V2.1.1): "Intelligent Transport Systems (ITS); Security; Security header and certificate formats; Release 2".

[3] ETSI TS 103 868-1 (V2.1.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for ITS Misbehaviour Reporting service; Part 1: Protocol Implementation Conformance Statement (PICS); Release 2".

[4] ETSI TS 102 941 (V2.2.1): "Intelligent Transport Systems (ITS); Security; Trust and Privacy Management; Release 2".

[5] ETSI EN 302 637-2 (V1.4.1): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Awareness Basic Service".

## 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".

[i.2] ETSI TS 102 965: "Intelligent Transport Systems (ITS); Application Object Identifier (ITS-AID); Registration".

[i.3] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 1: General concepts".

[i.4] ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".

[i.5] ISO/IEC 9646-6 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 6: Protocol profile test specification".

[i.6] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".

[i.7] ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

# 3 Definition of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 102 941 [4], ETSI TS 103 097 [2], ETSI TS 103 861-1 [3], ETSI TS 102 965 [i.2], ISO/IEC 9646-6 [i.5] and ISO/IEC 9646-7 [i.6] apply.

## 3.2 Symbols

Void.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 103 759 [1], ETSI TS 103 097 [2], ETSI TS 103 861-1 [3], ETSI TS 102 941 [4] and the following apply:

| | |
|---|---|
| BO | exceptional BehaviOur |
| BV | Valid Behaviour |
| CA | Co-operative Awareness |
| CERT | CERTificate |
| GN-MGMT | GeoNetworking ManaGeMenT message |
| GPC | GNSS Positioning Correction |
| IUT | Implementation Under Test |
| IVIM | Infrastructure to Vehicle Information Message |
| MAPEM | MAP (topology) Extended Message |
| NIST | National Institute of Standards and Technology |
| OBU | On-Board Unit |
| PICS | Protocol Implementation Conformance Statement |
| PIXIT | Partial Protocol Implementation eXtra Information for Testing |
| PSID | Provider Service IDentifier |
| RSU | Road-Side Unit |
| SPATEM | Signal Phase And Timing Extended Message |
| SREM | Signal Request Extended Message |
| SSEM | Signal request Status Extended Message |
| TP | Test Purposes |
| TS | Test System |
| TSS | Test Suite Structure |

# 4 Test Suite Structure (TSS)

## 4.1 Structure for Security tests

Table 1 shows the Security Test Suite Structure (TSS) defined for conformance testing.

**Table 1: TSS for MR service**

| Root | Group | Sub-Group | Category |
|---|---|---|---|
| mrs | Security | | Valid and invalid |
| | Message | General | Valid |
| | | CAM | Valid |
| | | DENM | Valid |
| | MULTIPLE | CAM | Valid |
| | | DENM | Valid |
| | Forwarding | | Valid |
| | Short Range | | Valid |

## 4.2 Test entities and states

### 4.2.1 V-ITS-S states

- State 'idle':
  - ITS-S in 'idle' state is sending CA message or beacons.

### 4.2.2 R-ITS-S states

- State 'idle':
  - RSU in 'idle' state is sending CA message or beacons.

### 4.2.3 MA states

- State 'idle':
  - MA in 'idle' state is ready to process MRs.

## 4.3 Test configurations

### 4.3.1 Overview

This clause introduces the different IUT's configurations required to execute the TPs described in clause 5.

### 4.3.2 ITS-S

#### 4.3.2.1 Configuration CFG_ITS_MRS_01

IUT: ITS-S of type V-ITS-S in the state 'idle':

- Following information elements shall be provided by IUT for the MA emulated by the TS:
  - Long range Transport.

TS: MA is emulated by TS.

#### 4.3.2.2 Configuration CFG_ITS_MRS_02

IUT: ITS-S of type V-ITS-S in the state 'idle':

- Following information elements shall be provided by IUT for the MA emulated by the TS:
  - Short range Transport.

### 4.3.3 R-ITS-S

#### 4.3.3.1 Configuration CFG_ITS_MRS_03

IUT: RSU in the state 'idle':

- Following information elements shall be provided by IUT for the MA emulated by the TS:
  - Short range Transport.
  - Long range Transport.

TS: MA and ITS-S are emulated by TS.

### 4.3.4 MA

#### 4.3.4.1 Configuration CFG_ITS_MRS_04

IUT: MA in the state 'idle':

- Following information elements shall be provided by IUT for the ITS-S emulated by the TS:
  - Long range Transport.

TS: ITS-S is emulated by TS.

# 5 Test Purposes (TP)

## 5.1 Introduction

### 5.1.1 TP definition conventions

The TP definition is built according to ETSI EG 202 798 [i.1].

### 5.1.2 TP Identifier naming conventions

The identifier of the TP is built according to Table 2.

**Table 2: TP naming convention**

| Identifier | TP_<root>_<tgt>_<gr>_<sub-gr> <sn>_<x> | Sub-Group | Category |
|---|---|---|---|
| | <root> = root | MRS | |
| | <tgt> = target | ITSS | IUT is an OBU |
| | | RSU | IUT is an RSU |
| | | MA | General behaviour |
| | <gr> = group | SEC | Security behaviour |
| | | MESSAGES | Message misbehaviour detection |
| | | FORWARDING | Message forwarding |
| | | SRT | Short Range Transport |

| Identifier | TP_<root>_<tgt>_<gr>_<sub-gr> <sn>_<x> | Sub-Group | Category |
|---|---|---|---|
| | <sub-gr> = sub-group | CLASS1 | MBR class1 |
| | | CLASS2 | MBR class2 |
| | | CLASS3 | MBR class3 |
| | | CLASS4 | MBR class4 |
| | | CLASS5 | MBR class5 |
| | | MULTIPLE | Multiple detectors of same or different classes |
| | <x> = category | BV | Valid Behaviour tests |
| | | BO | Invalid Behaviour Tests |
| | <sn> = test purpose sequential number | | 01 to 99 |

### 5.1.3 Rules for the behaviour description

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

ETSI TS 103 759 [1] does not use the finite state machine concept. As consequence, the test purposes use a generic "Initial State" that corresponds to a state where the IUT is ready for starting the test execution. Furthermore, the IUT shall be left in this "Initial State", when the test is completed.

Being in the "Initial State" refers to the starting point of the initial device configuration. There are no pending actions, no instantiated buffers or variables, which could disturb the execution of a test.

### 5.1.4 Sources of TP definitions

All TPs have been specified according to ETSI TS 103 759 [1] which shall be followed as specified in the present document

### 5.1.5 Mnemonics for PICS reference

To avoid an update of all TPs when the PICS document is changed, Table 3 introduces mnemonics name and the correspondence with the real PICS item number. The 'PICS item' as defined in tables provided in clause A.6 of ETSI TS 103 868-1 [3] shall be used to determine the test applicability.

**Table 3: Mnemonics for PICS reference**

| Mnemonic | PICS item |
|---|---|
| PICS_IUT_ITS_S | ETSI TS 103 868-1 [3], Table A.2 Item 1 |
| PICS_IUT_RSU | ETSI TS 103 868-1 [3], Table A.2 Item 2 |
| PICS_IUT_MA | ETSI TS 103 868-1 [3], Table A.3 Item 1 |
| PICS_DETECTOR_CAM_BEACON | ETSI TS 103 868-1 [3], Table A.4 Item 1 |
| PICS_DETECTOR_CAM_STATIC | ETSI TS 103 868-1 [3], Table A.4 Item 5 |
| PICS_DETECTOR_CAM_POSITION | ETSI TS 103 868-1 [3], Table A.4 Item 3 |
| PICS_DETECTOR_CAM_SPEED | ETSI TS 103 868-1 [3], Table A.4 Item 2 |
| PICS_DETECTOR_CAM_LONG_ACC | ETSI TS 103 868-1 [3], Table A.4 Item 4 |
| PICS_DETECTOR_CAM_SECURITY | ETSI TS 103 868-1 [3], Table A.4 Item 6 |
| PICS_SHORT_RANGE | ETSI TS 103 868-1 [3], Table A.4 Item 1 |

## 5.1.6 Certificates content

### 5.1.6.1 Root Certificate Authorities certificates

**Table 4: Content of the Root CA certificates with MRS ITS-AID permissions**

| RCA certificate | Content | To be installed on the IUT |
|---|---|---|
| **CERT_IUT_A_RCA** | • self-signed<br>• name "ETSI Test RCA A certificate"<br>• application permissions:<br>- CRL with SSP 0x01<br>- CTL with SSP 0x0138<br>• certificate issuing permissions:<br>- CAM with all possible SSP (0x01FFFC / 0xFF0003)<br>- DENM with all possible SSP (0x01FFFFFF / 0xFF000000)<br>- SPATEM with all possible SSP (0x01E0 / 0xFF1F)<br>- MAPEM with all possible SSP (0x01C0 / 0xFF3F)<br>- IVIM with all possible SSP (0x01000000FFF8 / 0xFF0000000007)<br>- SREM with all possible SSP (0x01FFFFE0 / 0xFF00001F)<br>- SSEM with all possible SSP (0x01 / 0xFF)<br>- GPC with all possible SSP (0x01 / 0xFF)<br>- GN-MGMT without SSP<br>- CRT-REQ with SSP (0x01FE / 0xFF01)<br>- MRS with SSP (0x01C0 / 0xFF00)<br>- MDM with SSP (0x01010201240125 / 0xFF000000000000)<br>• validation time for 3 years<br>• no region restriction<br>• assurance level 6<br>• verification key of type compressed with NIST P256R curve<br>• valid signature of type x-only with NIST P256R curve | Yes |
| NOTE 1: For MRS SSPs, all PSIDs are authorized.<br>NOTE 2: For MDM SSPs, only CAM and DENM PSIDs are authorized.<br>NOTE 3: MDM SSP are COER encoded. | | |

#### 5.1.6.2 Authorization Authorities certificate

##### 5.1.6.2.1 Authorization Authorities certificate with MRS SSPs

**Table 5: Content of the AA certificates with MRS ITS-AID permissions**

| AA certificate | Content | To be installed on the IUT |
|---|---|---|
| **CERT_IUT_A_MRS_AA** | • signer digest of the CERT_IUT_A_RCA<br>• application permissions:<br>- CRT_REQ with SSP 0x0132<br>• certificate issuing permissions:<br>- CAM with all possible SSP (0x01FFFC / 0xFF0003)<br>- DENM with all possible SSP (0x01FFFFFF / 0xFF000000)<br>- SPATEM with all possible SSP (0x01E0 / 0xFF1F)<br>- MAPEM with all possible SSP (0x01C0 / 0xFF3F)<br>- IVIM with all possible SSP (0x01000000FFF8 / 0xFF0000000007)<br>- SREM with all possible SSP (0x01FFFFE0 / 0xFF00001F)<br>- SSEM with all possible SSP (0x01 / 0xFF)<br>- GPC with all possible SSP (0x01 / 0xFF)<br>- MRS with all possible SSP (0x01 / 0xC0)<br>- GN-MGMT without SSP<br>• validation time for 3 years<br>• no region restriction<br>• assurance level 4<br>• verification key of type compressed with NIST P256R curve<br>• encryption key of type compressed with NIST P256R curve<br>• valid signature of type x-only with NIST P256R curve | Yes |

##### 5.1.6.2.2 Authorization Authorities certificate without MRS SSPs

**Table 6: Content of the AA certificates without MRS ITS-AID permissions**

| AA certificate | Content | To be installed on the IUT |
|---|---|---|
| **CERT_IUT_A_NO_MRS_AA** | • signer digest of the CERT_IUT_A_RCA<br>• application permissions:<br>- CRT_REQ with SSP 0x0132<br>• certificate issuing permissions:<br>- CAM with all possible SSP (0x01FFFC / 0xFF0003)<br>- DENM with all possible SSP (0x01FFFFFF / 0xFF000000)<br>- SPATEM with all possible SSP (0x01E0 / 0xFF1F)<br>- MAPEM with all possible SSP (0x01C0 / 0xFF3F)<br>- IVIM with all possible SSP (0x01000000FFF8 / 0xFF0000000007)<br>- SREM with all possible SSP (0x01FFFFE0 / 0xFF00001F)<br>- SSEM with all possible SSP (0x01 / 0xFF)<br>- GPC with all possible SSP (0x01 / 0xFF)<br>- GN-MGMT without SSP<br>• validation time for 3 years<br>• no region restriction<br>• assurance level 4<br>• verification key of type compressed with NIST P256R curve<br>• encryption key of type compressed with NIST P256R curve<br>• valid signature of type x-only with NIST P256R curve | Yes |

#### 5.1.6.3 Authorization Tickets

##### 5.1.6.3.1 Authorization Tickets with MRS SSPs

**Table 7: Content of the AT certificates with MRS ITS-AID**

| Authorization ticket | Content | To be installed on the IUT |
|---|---|---|
| **CERT_IUT_A_MRS_AT** | • Explicit certificate<br>• signer digest of the CERT_IUT_A_AA<br>• application permissions:<br>- CAM with all SSP (0x01FFFC)<br>- DENM with all SSP (0x01FFFFFF)<br>- MSR with all SSP (0x01C0)<br>- GN-MGMT<br>• validation time for 1 year<br>• no region restriction<br>• assurance level 3<br>• verification key of type compressed with NIST P256R curve<br>• encryption key of type compressed with NIST P256R curve<br>• valid signature of type x-only with NIST P256R curve | Yes |

##### 5.1.6.3.2 Authorization Tickets without MRS SSPs

**Table 8: Content of the AT certificates without MRS ITS-AID**

| Authorization ticket | Content | To be installed on the IUT |
|---|---|---|
| **CERT_IUT_A_NO_MRS_AT** | • Explicit certificate<br>• signer digest of the CERT_IUT_A_AA<br>• application permissions:<br>- CAM with all SSP (0x01FFFC)<br>- DENM with all SSP (0x01FFFFFF)<br>- GN-MGMT<br>• validation time for 1 year<br>• no region restriction<br>• assurance level 3<br>• verification key of type compressed with NIST P256R curve<br>• encryption key of type compressed with NIST P256R curve<br>• valid signature of type x-only with NIST P256R curve | Yes |

#### 5.1.6.4 Misbehaviour Authority

**Table 9: Content of the MA certificates**

| MA certificate | Content | To be installed on the IUT |
|---|---|---|
| **CERT_IUT_A_MA** | • signer digest of the CERT_IUT_A_RCA<br>• application permissions:<br>- CRT_REQ with SSP 0x0102<br>- MDM with SSP value 0x01010201240125<br>• validation time for 3 years<br>• no region restriction<br>• assurance level ABSENT<br>• verification key of type compressed with NIST P256R curve<br>• encryption key of type compressed with NIST P256R curve<br>• valid signature of type x-only with NIST P256R curve | Yes |
| NOTE 1: CERT_REQ SSPs contains only the CA certificate request bit set.<br>NOTE 2: MDM SSP are COER encoded. | | |

## 5.2 Misbehaviour Authority

All test purposes in the present clause may be included in the test sequence if following PICS items are set:

PICS_IUT_MA = TRUE

| **TP Id** | TP_MRS_MA_SEC_BO_01 |
|---|---|
| **Test Objective** | Check that the IUT discards an encrypted MR message when recipientId does not contain MA certificate |
| **Reference** | ETSI TS 103 759 [1], clause 7.1 |
| **Configuration** | CFG_ITS_MRS_04 |
| **PICS Selection** | PICS_IUT_MA |
| **Initial Conditions** | |

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a MR Message containing
           protocolVersion indicating value 3,
            content containing
                encryptedData containing
                    recipients containing
                        recipientInfo containing
                            certRecipInfo containing
                                recipientId indicating HashedIS8 of CERT_IUT_A_MRS_AA, // instead
of CERT_IUT_A_MA
                    cyphertext containing
                        EtsiTs103097Data_Signed containing
                            signedData containing
                                hashId indicating value HASH_ALGORITHM,
                            signer containing
                                digest indicating HashedId8 of CERT_IUT_A_MRS_AT,
                            tbsData containing
                                payload containing
                                    version indicating value 2,
                                    generationTime corresponding to CURRENT_TIME,
                                    observationLocation corresponding to CURRENT_POS,
                                    report corresponding to AidSpecificReport,
                                headerInfo containing
                                    psid indicating value PX_MRS_PSID,
                                    generationTime corresponding to CURRENT_TIME,
                            signature indicating value Signature
        from the TEST_SYSTEM entity
    } then {
        the IUT discards the message
```

```
    }
}
```

| TP Id | TP_MRS_MA_SEC_BO_02 |
|---|---|
| Test Objective | Check that the IUT discards an encrypted MR message signed with a certificate with no MRS SSPs |
| Reference | ETSI TS 103 759 [1], clause 7.1 |
| Configuration | CFG_ITS_MRS_04 |
| PICS Selection | PICS_IUT_MA |
| **Initial Conditions** | |
| with {<br>the IUT being in the initial state and<br>the IUT is authorized with **CERT_IUT_A_NO_MRS_AT**<br>} | |
| **Expected Behaviour** | |
| ensure that {<br>when {<br>the IUT receives a MR Message containing<br>protocolVersion indicating value 3,<br>content containing<br>encryptedData containing<br>recipients containing<br>recipientInfo containing<br>certRecipInfo containing<br>recipientId indicating HashedId8 of CERT_IUT_A_MA,<br>cyphertext containing<br>EtsiTs103097Data_Signed containing<br>signedData containing<br>hashId indicating value HASH_ALGORITHM,<br>signer containing<br>digest indicating HashedId8 of CERT_IUT_A_NO_MRS_AT, // No MRS SSPs<br>tbsData containing<br>payload containing<br>version indicating value 2,<br>generationTime corresponding to CURRENT_TIME,<br>observationLocation corresponding to CURRENT_POS,<br>report corresponding to AidSpecificReport,<br>headerInfo containing<br>psid indicating value PX_MRS_PSID,<br>generationTime corresponding to CURRENT_TIME,<br>signature indicating value Signature<br>from the TEST_SYSTEM entity<br>} then {<br>the IUT discards the message<br>}<br>} | |

# 5.3 ITS-S

## 5.3.1 Introduction

All test purposes in the present clause may be included in the test sequence if following PICS items are set:

PICS_IUT_ITS-S = TRUE

## 5.3.2 CA messages

### 5.3.2.1 General

| | |
|---|---|
| **TP Id** | TP_MRS_ITSS_MESSAGES_BV_01 |
| **Test Objective** | Check that the IUT provides the certificate of the reported ITS-S when the invalid secured geonetworking packet does not contain the AT certificate |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_DETECTOR_CAM_SPEED |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a SEC_GN_PACKET containing
            content containing
                signedData containing
                     signer containing
                        digest indicating value HashedId8 of CERT_REMOTE_AT,
            toBeSigned containing
                unsecuredData containing
                    CA message containing
                        StationID indicating value PX_STATION_ID,
                        Speed indicating value PX_INVALID_SPEED
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SpeedCommon,
            cause indicating value c_ObsSpeed_ValueTooLarge_VehicleType
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                 content corresponding to AsrCam,
                 content containing
                    observations,
                    v2xPduEvidence containing
                        V2xPduStream containing
                            item0 containing
                                type_ indicating value c_ObsPdu_etsiGn,
                                v2xPdus indicating value SEC_GN_PACKET,
                                certificate indicating value CERT_REMOTE_AT,
                                subjectPduIndex indicating value 0,
                    nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

### 5.3.2.2 Class1

#### 5.3.2.2.1 CAM security detector

| | |
|---|---|
| **TP Id** | TP_MRS_ITSS_SEC_BV_01 |
| **Test Objective** | Check that the IUT generates an encrypted MR message. |
| **Reference** | ETSI TS 103 759 [1], clause 7.1 |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SECURITY |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT is triggered to send a MR Message
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a message EtsiTs103097Data_SignedAndEncrypted containing
            protocolVersion indicating value 3,
            content containing
                encryptedData containing
                    recipients containing
                        recipientInfo containing
                            certRecipInfo containing
                                recipientId indicating HashedId8 of CERT_IUT_A_MA,
                    cyphertext containing
                        EtsiTs103097Data_Signed containing
                            signedData containing
                                hashId indicating value HASH_ALGORITHM,
                            signer containing
                                digest indicating HashedId8 of CERT_IUT_A_MRS_AT,
                            tbsData containing
                                payload containing
                                    version indicating value 2,
                                    generationTime corresponding to CURRENT_TIME,
                                    observationLocation corresponding to CURRENT_POS,
                                    report corresponding to AidSpecificReport,
                                headerInfo containing
                                    psid indicating value PX_MRS_PSID,
                                    generationTime corresponding to CURRENT_TIME,
                            signature indicating value Signature
        to the MA entity
    }
}
```

| **TP Id** | TP_MRS_ITSS_SEC_MESSAGES_CLASS1_CAM_BV_01 |
|---|---|
| **Test Objective** | Check that the IUT generates a security HeaderInfo with missing fields observation on a CAM MR message when requested (Class 1) - obs-Security-MessageIdIncWithHeaderInfo |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SECURITY |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
            HeaderInfo containing
                Psid indicating value AID_CAM,
                not GenerationTime // Missing field
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SecurityCommon,
            cause indicating value c_ObsSecurity_MessageIdIncWithHeaderInfo
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SecurityCommon,
                                observations containing
                                    item0 containing
```

```
                                        obsId indicating value
c_ObsSecurity_MessageIdIncWithHeaderInfo,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| **TP Id** | TP_MRS_ITSS_SEC_MESSAGES_CLASS1_CAM_BV_02 |
|---|---|
| **Test Objective** | Check that the IUT generates an inconsistent security profile observation (psid set to DENM) on a CAM MR message when requested (Class 1) - obs-Security-HeaderIncWithSecurityProfile |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SECURITY |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
            HeaderInfo containing
                Psid indicating value AID_DENM,
                GenerationTime corresponding to CURRENT_TIME
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SecurityCommon,
            cause indicating value c_ObsSecurity_HeaderIncWithSecurityProfile
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SecurityCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value
c_ObsSecurity_HeaderIncWithSecurityProfile,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| TP Id | TP_MRS_ITSS_SEC_MESSAGES_CLASS1_CAM_BV_03 |
|---|---|
| Test Objective | Check that the IUT generates an inconsistent PSID observation (invalid PSID value) on a CAM MR message when requested (Class 1) - obs-Security_HeaderPsidIncWithCertificate |
| Reference | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| Configuration | CFG_ITS_MRS_01 |
| PICS Selection | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SECURITY |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
            CAM message containing
                StationID indicating value PX_STATION_ID,
            HeaderInfo containing
                not Pisd
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SecurityCommon,
            cause indicating value c_ObsSecurity_HeaderPsidIncWithCertificate
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SecurityCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value
c_ObsSecurity_HeaderPsidIncWithCertificate,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| TP Id | TP_MRS_ITSS_SEC_MESSAGES_CLASS1_CAM_BV_04 |
|---|---|
| Test Objective | Check that the IUT generates an invalid AppPermissions observation on a CAM MR message when requested (Class 1) - obs-Security-MessageIncWithSsp |
| Reference | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| Configuration | CFG_ITS_MRS_01 |
| PICS Selection | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SECURITY |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
            CAM message containing
                StationID indicating value PX_STATION_ID,
            signer indicating value PX_INVALID_CAM_BV_SSP_CERTIFICATE
        from the TEST_SYSTEM entity
```

```
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SecurityCommon,
            cause indicating value c_ObsSecurity_MessageIncWithSsp
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SecurityCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsSecurity_MessageIncWithSsp,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| TP Id | TP_MRS_ITSS_SEC_MESSAGES_CLASS1_CAM_BV_05 |
|---|---|
| Test Objective | Check that the IUT generates an inconsistent certificate time observation on a CAM MR message when requested (Class 1) - obs-Security-HeaderTimeOutsideCertificateValidity |
| Reference | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| Configuration | CFG_ITS_MRS_01 |
| PICS Selection | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SECURITY |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
            CAM message containing
                StationID indicating value PX_STATION_ID,
            HeaderInfo containing
                GenerationTime indicating value PX_TIME_OUTSIDE_OF_CERTIFICATE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SecurityCommon,
            cause indicating value c_ObsSecurity_HeaderTimeOutsideCertificateValidity
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SecurityCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value
c_ObsSecurity_HeaderTimeOutsideCertificateValidity,
```

```
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| **TP Id** | TP_MRS_ITSS_SEC_MESSAGES_CLASS1_CAM_BV_06 |
|---|---|
| **Test Objective** | Check that the IUT generates an inconsistent certificate location outside observation on a CAM MR message when requested (Class 1) - obs-Security-MessageLocationOutsideCertificateValidity |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SECURITY |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
            CAM message containing
                StationID indicating value PX_STATION_ID,
            HeaderInfo containing
                GenerationLocation indicating value PX_LOCATION_OUTSIDE_OF_CERTIFICATE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SecurityCommon,
            cause indicating value c_ObsSecurity_MessageLocationOutsideCertificateValidity
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SecurityCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value
c_ObsSecurity_MessageLocationOutsideCertificateValidity,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

#### 5.3.2.2.2 CAM speed misbehaviour detector

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS1_CAM_BV_01 |
|---|---|
| **Test Objective** | Check that the IUT generates an invalid speed value observation on a CAM in the MR message when requested (Class 1) - obs-Speed-ValueTooLarge-VehicleType (e.g. A cycle with a speed of 100 km/h) |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SPEED |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Speed indicating value PX_SPEED_3
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SpeedCommon,
            cause indicating value c_ObsSpeed_ValueTooLarge_VehicleType
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SpeedCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value
c_ObsSpeed_ValueTooLarge_VehicleType,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to ObsPduEtsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS1_CAM_BV_02 |
|---|---|
| **Test Objective** | Check that the IUT generates an invalid speed value in reverse driving observation on a CAM in the MR message when requested (Class 1) - obs-Speed-ValueTooLarge-DriveDirectionReverse |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SPEED |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
```

```
            CA message containing
                StationID indicating value PX_STATION_ID,
                Speed indicating value PX_INVALID_SPEED_DRIVE_DIRECTION
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SpeedCommon,
            cause indicating value c_ObsSpeed_ValueTooLarge_DriveDirectionRevers
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SpeedCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value
c_ObsSpeed_ValueTooLarge_DriveDirectionRevers,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to ObsPduEtsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

### 5.3.2.2.3 CAM longitudinal acceleration misbehaviour detector

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS1_CAM_BV_03 |
|---|---|
| **Test Objective** | Check that the IUT generates an invalid acceleration value observation on a CAM in the MR message when requested (Class 1) - obs-LongAcc-ValueTooLarge |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_LONG_ACC |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Acc indicating value PX_INVALID_ACC_VALUE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_LongAccCommon,
            cause indicating value c_ObsLongAcc_ValueTooLarge
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
```

```
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_LongAccCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsLongAcc_ValueTooLarge,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus corresponding to PDU_IN_ERR,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 0,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

#### 5.3.2.2.4 CAM position misbehaviour detector

N/A.

### 5.3.2.3 Class2

#### 5.3.2.3.1 CAM speed misbehaviour detector

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_01 |
|---|---|
| **Test Objective** | Check that the IUT generates a MR message with an observation of an inconsistent speed change (regarding acceleration) in consecutive CAMs when requested (Class 2) - obs-Speed-ChangeTooLarge |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SPEED |
| **Initial Conditions** | |

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Acc indicating value PX_NORMAL_ACC_VALUE,
                Speed indicating value PX_INVALID_SPEED_CHANGE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_SpeedCommon,
            cause indicating value c_ObsSpeed_ChangeTooLarge
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SpeedCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsSpeed_ChangeTooLarge,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
```

```
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

### 5.3.2.3.2 CAM position misbehaviour detector

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_02 |
|---|---|
| **Test Objective** | Check that the IUT generates an inconsistent position changed value (calculated speed based on the new position) in consecutive CAMs MR message when requested (Class 2) - obs-Position-ChangeTooLarge |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_POSITION |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Heading indicating value PX_NORMAL_HEADING_VALUE,
                Position indicating value PX_INVALID_POSITION_CHANGE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_PositionCommon,
            cause indicating value c_ObsPosition_ChangeTooLarge
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_PositionCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsPosition_ChangeTooLarge,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

#### 5.3.2.3.3 CAM heading misbehaviour detector

N/A.

#### 5.3.2.3.4 CAM acceleration misbehaviour detector

| | |
|---|---|
| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_04 |
| **Test Objective** | Check that the IUT generates a MR message with an observation of an inconsistent acceleration change (regarding the vehicle type) in consecutive CAMs when requested (Class 2) - obs-LongAcc-ValueTooLarge |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_LONG_ACC |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Acc indicating value PX_INVALID_ACC_CHANGE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_LongAccCommon,
            cause indicating value c_ObsLongAcc_ValueTooLarge
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_LongAccCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsLongAcc_ValueTooLarge,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

#### 5.3.2.3.5 CAM beacon interval detector

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_05 |
|---|---|
| **Test Objective** | Check that the IUT generates a MR message with an observation of an inconsistent CAM frequency greater than 10 Hz(Class 2) - obs-Beacon-IntervalTooSmall |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_BEACON |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple CAM atFrequencyOf20Hz
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_BeaconCommon,
            cause indicating value c_ObsBeacon_IntervalTooSmall
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_BeaconCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsBeacon_IntervalTooSmall,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N
                                    ,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

#### 5.3.2.3.6 CAM static misbehaviour detector

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_10_1 |
|---|---|
| **Test Objective** | Check that the IUT generates an invalid static changed value in consecutive CAMs MR message when requested (Class 2) - obs-Static-Change: SpecialTransport |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A<br>ETSI EN 302 637-2 [5], clause B.40 |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_STATIC |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
```

```
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Static indicating value PX_INVALID_STATIC_CHANGE_SPECIALTRANSPORT
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_StaticCommon,
            cause indicating value c_ObsStatic_Change
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_StaticCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsStatic_Change,
                                        obs indicating value '0001'B,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N
                                    ,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_10_2 |
|---|---|
| **Test Objective** | Check that the IUT generates an invalid static changed value in consecutive CAMs MR message when requested (Class 2) - obs-Static-Change: StationType |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A<br>ETSI EN 302 637-2 [5], clause B.18 |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_STATIC |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Static indicating value PX_INVALID_STATIC_CHANGE_STATIONTYPE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_StaticCommon,
            cause indicating value c_ObsStatic_Change
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
```

```
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_StaticCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsStatic_Change,
                                        obs indicating value '0010'B,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| **TP Id** | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_10_3 |
|---|---|
| **Test Objective** | Check that the IUT generates an invalid static changed value in consecutive CAMs MR message when requested (Class 2) - obs-Static-Change: VehicleLength |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A<br>ETSI EN 302 637-2 [5], clause B.35 |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_STATIC |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Static indicating value PX_INVALID_STATIC_CHANGE_VEHICLELENGTH
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_StaticCommon,
            cause indicating value c_ObsStatic_Change
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_StaticCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsStatic_Change,
                                        obs indicating value '0011'B,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
```

```
    }
}
```

| TP Id | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_10_4 |
|---|---|
| Test Objective | Check that the IUT generates an invalid static changed value in consecutive CAMs MR message when requested (Class 2) - obs-Static-Change: VehicleRole |
| Reference | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A<br>ETSI EN 302 637-2 [5], clause B.23 |
| Configuration | CFG_ITS_MRS_01 |
| PICS Selection | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_STATIC |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Static indicating value PX_INVALID_STATIC_CHANGE_VEHICLEROLE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_StaticCommon,
            cause indicating value c_ObsStatic_Change
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_StaticCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsStatic_Change,
                                        obs indicating value '0100'B,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

| TP Id | TP_MRS_ITSS_MESSAGES_CLASS2_CAM_BV_10_5 |
|---|---|
| Test Objective | Check that the IUT generates an invalid static changed value in consecutive CAMs MR message when requested (Class 2) - obs-Static-Change: VehicleWidth |
| Reference | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A<br>ETSI EN 302 637-2 [5], clause B.36 |
| Configuration | CFG_ITS_MRS_01 |
| PICS Selection | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_STATIC |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
                Static indicating value PX_INVALID_STATIC_CHANGE_VEHICLEWIDTH
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            targetId indicating value c_CamTgt_StaticCommon,
            cause indicating value c_ObsStatic_Change
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_StaticCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsStatic_Change,
                                        obs indicating value '0101'B,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_N,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value PX_SUBJECT_PDU_IDX,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

#### 5.3.2.4 Class3

N/A.

#### 5.3.2.5 Class4

N/A.

#### 5.3.2.6 Class5

N/A.

### 5.3.2.7 Multiple CAM misbehaviour reports

#### 5.3.2.7.1 Class1

| **TP Id** | TP_MRS_ITSS_MULTIPLE_MESSAGES_CAM_01 |
|---|---|
| **Test Objective** | Check that the IUT generates a single MR message containing observations on receiving CAM messages with different class 1 inconsistencies |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_LONG_ACC and PICS_DETECTOR_CAM_SPEED and PICS_DETECTOR_CAM_POSITION |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID_1,
                Acc indicating value PX_INVALID_ACC_VALUE
        from the TEST_SYSTEM entity
        and the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID_2,
                Speed indicating value PX_SPEED_3
        from the TEST_SYSTEM entity
        and the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID_3,
                Position indicating value PX_INVALID_POSITION_VALUE_VS_COMM_COVERAGE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            item0 containing
                targetId indicating value c_CamTgt_LongAccCommon,
                cause indicating value c_ObsLongAcc_ValueTooLarge,
            item1 containing
                targetId indicating value c_CamTgt_SpeedCommon,
                cause indicating value c_ObsSpeed_ValueTooLarge_VehicleType
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_LongAccCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsLongAcc_ValueTooLarge,
                                        obs indicating value NULL,
                            item1 containing
                                tgtId indicating value c_CamTgt_SpeedCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsSpeed_ChangeTooLarge,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU1 corresponding to PDU_IN_ERR_1,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 3,
                        nonV2xPduEvidence indicating value empty
```

```
        to the MA entity
    }
}
```

#### 5.3.2.7.2 Class2

| **TP Id** | TP_MRS_ITSS_MULTIPLE_MESSAGES_CAM_02 |
|---|---|
| **Test Objective** | Check that the IUT generates a single MR message containing observations on receiving CAM messages with different class 2 inconsistencies |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_LONG_ACC and PICS_DETECTOR_CAM_SPEED and PICS_DETECTOR_CAM_POSITION |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID_1,
                Acc indicating value PX_INVALID_ACC_CHANGE
        from the TEST_SYSTEM entity
        and the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID_2,
                Acc indicating value PX_NORMAL_ACC_VALUE,
                Speed indicating value PX_INVALID_SPEED_CHANGE
        from the TEST_SYSTEM entity
        and the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID_3,
                Heading indicating value PX_NORMAL_HEADING_VALUE,
                Position indicating value PX_INVALID_POSITION_CHANGE
        from the TEST_SYSTEM entity
        and the IUT is triggered to send a MR message containing
            item0 containing
                targetId indicating value c_CamTgt_LongAccCommon,
                cause indicating value c_ObsLongAcc_ValueTooLarge,
            item1 containing
                targetId indicating value c_CamTgt_SpeedCommon,
                cause indicating value c_ObsSpeed_ValueTooLarge_VehicleType,
            item2 containing
                targetId indicating value c_CamTgt_PositionCommon,
                cause indicating value c_Position_ChangeTooLarge
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_LongAccCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsLongAcc_ValueTooLarge,
                                        obs indicating value NULL,
                            item1 containing
                                tgtId indicating value c_CamTgt_SpeedCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsSpeed_ChangeTooLarge,
                                        obs indicating value NULL,
                            item2 containing
```

```
                                tgtId indicating value c_CamTgt_PositionCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsPosition_ChangeTooLarge,
                                        obs indicating value NULL,
                            v2xPduEvidence containing
                                V2xPduStream containing
                                    item0 containing
                                        type_ indicating value c_ObsPdu_etsiGn,
                                        v2xPdus containing
                                            PDU-0 corresponding to PDU_IN_ERR_0,
                                            PDU1 corresponding to PDU_IN_ERR_1,
                                            PDU2 corresponding to PDU_IN_ERR_2,
                                        certificate indicating value omit,
                                        subjectPduIndex indicating value 3,
                            nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

#### 5.3.2.7.3 Class3

N/A.

#### 5.3.2.7.4 Class4

N/A.

#### 5.3.2.7.5 Class5

N/A.

#### 5.3.2.7.6 Multiple classes

NOTE: Upon receiving several inconsistent CA messages, the IUT can send reports separately. This decision is out of scope of ETSI TS 103 759 [1].

| **TP Id** | TP_MRS_ITSS_MULTIPLE_MESSAGES_CAM_04 |
|---|---|
| **Test Objective** | Check that the IUT generates a single MR message containing observations of an invalid speed change, an invalid position change and an invalid longitudinal acceleration value in consecutive CAMs when requested (both Class1, Class 2) |
| **Reference** | ETSI TS 103 759 [1], clauses 4.2.3, 6.2 and 7.2 and Annex A |
| **Configuration** | CFG_ITS_MRS_01 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_DETECTOR_CAM_SPEED and PICS_DETECTOR_CAM_POSITION and PICS_DETECTOR_CAM_LONG_ACC |

**Initial Conditions**

```
with {
    the IUT being in the initial state and
    the IUT is authorized with CERT_IUT_A_MRS_AT
}
```

**Expected Behaviour**

```
ensure that {
    when {
        the IUT is triggered to send a MR message containing
            item0 containing
                targetId indicating value c_CamTgt_SpeedCommon,
                cause indicating value c_ObsSpeed_ChangeTooLarge, // Class2 observation
            item1 containing
                targetId indicating value c_CamTgt_PositionCommon,
                cause indicating value c_ObsPosition_ChangeTooLarge, // Class2 observation
            item2 containing
                targetId indicating value c_CamTgt_LongAccCommon,
                cause indicating value c_ObsLongAcc_ValueTooLarge // Class1 observation

        from the TEST_SYSTEM entity
        and the IUT receives multiple PDU_IN_ERR containing
            CA message containing
                StationID indicating value PX_STATION_ID,
```

```
                Speed indicating value PX_INVALID_SPEED_CHANGE,
                Position indicating value PX_INVALID_POSITION_CHANGE
        from the TEST_SYSTEM entity
    } then {
        the IUT sends a EtsiTs103759Data containing
            version indicating value 2,
            generationTime corresponding to CURRENT_TIME,
            observationLocation corresponding to CURRENT_POS,
            report containing
                aid indicating value c_AsrCam,
                content containing
                    content corresponding to AsrCam,
                    content containing
                        observations containing
                            item0 containing
                                tgtId indicating value c_CamTgt_SpeedCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsSpeed_ChangeTooLarge,
                                        obs indicating value NULL,
                            item1 containing
                                tgtId indicating value c_CamTgt_PositionCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsPosition_ChangeTooLarge,
                                        obs indicating value NULL,
                            item2 containing
                                tgtId indicating value c_CamTgt_LongAccCommon,
                                observations containing
                                    item0 containing
                                        obsId indicating value c_ObsLongAcc_ValueTooLarge,
                                        obs indicating value NULL,
                        v2xPduEvidence containing
                            V2xPduStream containing
                                item0 containing
                                    type_ indicating value c_ObsPdu_etsiGn,
                                    v2xPdus containing
                                        PDU-0 corresponding to PDU_IN_ERR_0,
                                        PDU-N corresponding to PDU_IN_ERR_1,
                                        PDU-N corresponding to PDU_IN_ERR_2,
                                    certificate indicating value omit,
                                    subjectPduIndex indicating value 3,
                        nonV2xPduEvidence indicating value empty
        to the MA entity
    }
}
```

### 5.3.3 DEN messages

N/A.

## 5.4 Forwarding

| | |
|---|---|
| **TP Id** | TP_MRS_RSU_FORWARDING_01 |
| **Test Objective** | Check that the IUT forwards a received MR message |
| **Reference** | ETSI TS 103 759 [1], clauses 5 and 7.2 |
| **PICS Selection** | PICS_IUT_RSU and PICS_SHORT_RANGE |
| **Initial Conditions** | |
| with {<br>the IUT being in the initial state<br>} | |
| **Expected Behaviour** | |
| ensure that {<br>when {<br>the IUT received a EtsiTs103759Data<br>from the ITS_S entity<br>} then {<br>the IUT forwards the EtsiTs103759Data<br>to the MA entity | |

```
    }
}
```

## 5.5 Short range transport

All test purposes in the present clause may be included in the test sequence if following PICS items are set:

| | |
|---|---|
| **TP Id** | TP_MRS_ITSS_SRT_01 |
| **Test Objective** | Check that MR message is encapsulated in BTP type B packet |
| **Reference** | ETSI TS 103 759 [1], clauses 5 and 7.2 |
| **PICS Selection** | PICS_IUT_ITS_S and PICS_SHORT_RANGE |
| **Initial Conditions** | |
| with {<br>the IUT being in the initial state<br>} | |
| **Expected Behaviour** | |
| ensure that {<br>when {<br>the IUT is triggered to send a Misbehaviour Report<br>to the MA entity<br>} then {<br>the IUT sends a GeoNetorking packet containing<br>BTP_B packet<br><br>to the MA entity<br>}<br>} | |

# History

| Document history | | |
|---|---|---|
| V2.1.1 | May 2024 | Publication |
| | | |
| | | |
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| | | |