Methods for Testing and Specification (MTS);
Test Specification for CoAP;
Part 1: Conformance Tests
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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Methods for Testing and Specification (MTS).

The present document is part 1 of a multi-part deliverable covering the Constrained Application Protocol (CoAP), as identified below:

Part 1: "Conformance Tests";

Part 2: "Security Tests";

Part 3: "Performance Tests".

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.

Introduction

While the Internet of Things (IoT) is on the rise, the quality assurance of interconnected systems becomes an ever-increasing challenge. Within the last years, many different IoT protocols came to the fore.

The present document provides a test specification, i.e. an overall test suite structure and catalogue of test purposes for the Constrained Application Protocol (CoAP). It will be a reference base for both client-side test campaigns and server-side test campaigns addressing the conformance issues.
In the present document the conformance testing is presented. It provides a basis for interoperability testing and performance testing. The latter is presented in ETSI TS 103 536-3 [i.3].
1 Scope

The present document provides a test specification, i.e. an overall test suite structure and catalogue of test purposes for the Constrained Application Protocol (CoAP). It will be a reference base for both client-side test campaigns and server-side test campaigns addressing the conformance issues.

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.2] ETSI ES 202 951: “Methods for Testing and Specification (MTS); Model-Based Testing (MBT); Requirements for Modelling Notations”.


3 Definition of terms, symbols and abbreviations

3.1 Terms

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

conformance: extent to which an implementation of a standard satisfies the requirements expressed in that standard
conformance testing: process to verify to what extent the IUT conforms to the standard

content format: encoded format for converting a specific type of data to displayable information

NOTE: See IETF RFC 7252 [1].

implementation under test: implementation of one or more Open Systems Interconnection (OSI) protocols in an adjacent user/provider relationship, being the part of a real open system, which is to be studied by testing

NOTE: See ISO/IEC 9646-1 [i.1].

proxy: server that acts as an intermediary for requests from clients seeking resources from other servers

system under test: real open system in which the implementation under test resides

NOTE: See ETSI ES 202 951 [i.2].

test purpose: non-formal high-level description of a test, mainly using text

test suite structure: document defining (hierarchical) grouping of test cases according to some rules

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>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoAP</td>
<td>Constrained Application Protocol</td>
</tr>
<tr>
<td>ETAG</td>
<td>Entity Tag</td>
</tr>
<tr>
<td>HTTP</td>
<td>Hypertext Transfer Protocol</td>
</tr>
<tr>
<td>IUT</td>
<td>Implementation Under Test</td>
</tr>
<tr>
<td>RST</td>
<td>Reset</td>
</tr>
<tr>
<td>SD</td>
<td>Service Discover</td>
</tr>
<tr>
<td>SUT</td>
<td>System Under Test</td>
</tr>
<tr>
<td>TDL</td>
<td>Test Description Language</td>
</tr>
<tr>
<td>TDL-TO</td>
<td>Test Description Language - Test Objectives</td>
</tr>
<tr>
<td>TP</td>
<td>Test Purpose</td>
</tr>
<tr>
<td>TSS</td>
<td>Test Suite Structure</td>
</tr>
<tr>
<td>URI</td>
<td>Uniform Resource Identifier</td>
</tr>
</tbody>
</table>

4 Test Suite Structure

4.0 Introduction

The following two clauses describe the TSS. In the first one a CoAP server as SUT is considered and in the latter, a CoAP client as SUT is considered.

As the base CoAP IETF RFC 7252 [1] contain no explicit requirements for testing, neither provide concrete conformance statements, the TPs were generated because of analysis of the mentioned RFC. The structure itself is partly derived from the CoAP spec [1] but changed due to overlapping functions that cannot be tested separately.
4.1 Server as SUT

1) Message format:
   a) Support all defined method codes and understand regular and illegal or corrupted data along with them

2) Protocol features:
   a) Separate/Piggybacked
   b) Options
   c) Content format
   d) Error handling

3) Optional:
   a) Proxying

4.2 Client as SUT

1) Message format:
   a) Support all defined method codes and understand regular and illegal or corrupted data along with them

2) Protocol features:
   a) Separate/Piggybacked
   b) Options
   c) Content format
   d) Error handling

4.3 TP naming convention

TPs are numbered, starting at 001, within each main scope. The main scopes are organized according to the TSS. Some TPs may not have a second level scope.
Table 1: TP identifier naming convention scheme

| Identifier: TP_<protocol>_<_iut>_<_scope>_<_2nd lvl_scope>*_<field>_<_value>_<_number> |
|---------------------------------|---------------------------------|
| TP = Test Purpose               | Fixed to TP                     |
| <protocol> = Protocol name      | Fixed to CoAP                   |
| <iut> = Type of IUT             | Client or Server                |
| <scope> = Main scope            | Scope of the protocol (feature) |
| <2ndlvl_scope> = Second level   | Header                          |
| | scope             | CoAP Header fields             |
| | >*                | Optional                        |
| | <field>*          | Field of the scope             |
| | <value>*          | Field of the given scope to be |
| | <number>          | Value of the given field to be |
| |                   | Optional, from 001 to 999      |

*optional

4.4 TP structure

Each TP has been written in TDL-TO and thus in a structured manner which is consistent with all other TPs. The intention of this is to make the TPs more formal. In addition, a more readable format is provided by generating tables out of the TDL-TO format. The defined structure, that has been used, is illustrated in table 2. This table should be read in conjunction with any TP, i.e. please use a TP as an example to facilitate the full comprehension of table 2. All structures are defined formally in the TDL specification ETSI ES 203 119-4 [2].
Table 2: Structure of a single TP

<table>
<thead>
<tr>
<th>TP part</th>
<th>Text</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Header</td>
<td>&lt;Identifier&gt; &lt;Test objective&gt; &lt;Reference&gt; &lt;PICS reference&gt;</td>
<td>see table 1 &quot;The IUT is responding on a correctly set ...&quot; IETF RFC 7252</td>
</tr>
<tr>
<td>Initial condition</td>
<td>Free text description of the condition that the IUT has reached</td>
<td>… the IUT is in the initial state …</td>
</tr>
<tr>
<td>(optional)</td>
<td>before the test purpose applies.</td>
<td></td>
</tr>
<tr>
<td>Start point</td>
<td>Describes the full logic of the test purpose. Includes trigger and</td>
<td>Expected behaviour ensure that { … }</td>
</tr>
<tr>
<td></td>
<td>expected behaviour of the IUT.</td>
<td></td>
</tr>
<tr>
<td>Trigger</td>
<td>One or more actions that trigger an expected response of the IUT.</td>
<td>when { the IUT entity receives a request message containing version</td>
</tr>
<tr>
<td></td>
<td>Mostly a set of different messages the IUT receives.</td>
<td>indicating value 1 ...</td>
</tr>
<tr>
<td>Expected behaviour</td>
<td>Describes the response that the IUT sends after receiving a certain</td>
<td>then { the IUT entity sends a response message containing version</td>
</tr>
<tr>
<td></td>
<td>(set of) messages. This response describes the pass criteria</td>
<td>indicating value 1 ...</td>
</tr>
</tbody>
</table>

5 Test Purposes for CoAP Server

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header_Version_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding on a correctly set version number.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

Initial Conditions

Expected Behaviour

```
ensure that {
    when {
        the IUT receives a request message containing
        version indicating value 1,
        msg_type indicating value 0, //Confirmable
        token_length indicating value 0,
        code indicating value 0.00, //Empty Message
        msg_id corresponding to MSG_ID1;
    }
    then {
        the IUT sends a response message containing
        version indicating value 1,
        msg_type indicating value 3, //Reset
        token_length indicating value 0,
        code indicating value 0.00, //Empty Message
        msg_id corresponding to MSG_ID1;
        or the client times_out
    }
}
```

Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header-Version_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT silently ignores an incorrectly set version number.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

<table>
<thead>
<tr>
<th>Expected Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure that {</td>
</tr>
<tr>
<td>when {</td>
</tr>
<tr>
<td>the IUT receives a request message containing</td>
</tr>
<tr>
<td>version indicating value 3, //reserved</td>
</tr>
<tr>
<td>msg_type indicating value 0, //Confirmable</td>
</tr>
<tr>
<td>token_length indicating value 0,</td>
</tr>
<tr>
<td>code indicating value 0.00, //Empty Message</td>
</tr>
<tr>
<td>msg_id corresponding to MSG_ID1;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>then {</td>
</tr>
<tr>
<td>the client times_out</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

**Final Conditions**

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header-Type_CON_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is acknowledging on a Confirmable message correctly.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

<table>
<thead>
<tr>
<th>Expected Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure that {</td>
</tr>
<tr>
<td>when {</td>
</tr>
<tr>
<td>the IUT receives a request message containing</td>
</tr>
<tr>
<td>version indicating value 1,</td>
</tr>
<tr>
<td>msg_type indicating value 0, //Confirmable</td>
</tr>
<tr>
<td>token_length indicating value 0,</td>
</tr>
<tr>
<td>code indicating value 0.01, //GET request</td>
</tr>
<tr>
<td>msg_id corresponding to MSG_ID1;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>then {</td>
</tr>
<tr>
<td>the IUT sends a response message containing</td>
</tr>
<tr>
<td>version indicating value 1,</td>
</tr>
<tr>
<td>msg_type indicating value 2, //Acknowledge, from IETF RFC 7252 section 4.2 (a)</td>
</tr>
<tr>
<td>token_length indicating value 0,</td>
</tr>
<tr>
<td>code indicating value 2.05, //Success (Content)</td>
</tr>
<tr>
<td>msg_id corresponding to MSG_ID1;</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

**Final Conditions**
### Test Objective
The IUT is rejecting a Confirmable message that is carrying a response.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Server

### Initial Conditions

#### Expected Behaviour

```ruby
ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    token_length indicating value 0,
    code indicating value 2.03, //Valid, response code
    msg_id corresponding to MSG_ID1;
  }
  then {
    the IUT sends a response message containing
    version indicating value 1,
    msg_type indicating value 3, //Reset
    token_length indicating value 0,
    code indicating value 0.00, //Empty Message
    msg_id corresponding to MSG_ID1;
    or the client times_out
  }
}
```

### Final Conditions

### Test Objective
The IUT is rejecting a Confirmable message that lacks context to process the message properly. The message carries a reserved class.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Server

### Initial Conditions

#### Expected Behaviour

```ruby
ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    token_length indicating value 0,
    code indicating value 1.00, //reserved
    msg_id corresponding to MSG_ID1;
  }
  then {
    the IUT sends a response message containing
    version indicating value 1,
    msg_type indicating value 3, //Reset
    token_length indicating value 0,
    code indicating value 0.00, //Empty Message
    msg_id corresponding to MSG_ID1;
    or the client times_out
  }
}
```

### Final Conditions
TP Id | TP_CoAP_MessageFormat_Header_Type_NON_001
--- | ---
Test Objective | The IUT is acknowledging on a Non-confirmable message correctly.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

### Initial Conditions

**Expected Behaviour**

```
ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 1, //Non-confirmable
    token_length indicating value 0,
    code indicating value 0.01, //GET request
    msg_id corresponding to MSG_ID1;
  }
  then {
    the IUT sends a response message containing
    version indicating value 1,
    msg_type indicating value 1, //Non-confirmable
    token_length indicating value 0,
    code indicating value 2.05, //Success (Content)
    msg_id corresponding to MSG_ID2;
  }
}
```

### Final Conditions

---

TP Id | TP_CoAP_MessageFormat_Header_Type_NON_002
--- | ---
Test Objective | The IUT is rejecting a Non-confirmable message that is Empty.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

### Initial Conditions

**Expected Behaviour**

```
ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 1, //Non-confirmable
    token_length indicating value 0,
    code indicating value 0.00, //Empty Message
    msg_id corresponding to MSG_ID1;
  }
  then {
    the client times_out
  }
}
```

### Final Conditions
### TP Id  TP_CoAP_MessageFormat_Header_Type_NON_003
### Test Objective
The IUT is rejecting a Non-confirmable message that is carrying a response.
### Reference
IETF RFC 7252 [1]
### PICS Selection
PIC_Server

#### Initial Conditions

<table>
<thead>
<tr>
<th>Expected Behaviour</th>
</tr>
</thead>
</table>
| ensure that {  
  when {  
    the IUT receives a request message containing  
    version indicating value 1,  
    msg_type indicating value 1, //Non-confirmable  
    token_length indicating value 0,  
    code indicating value 2.03, //Success (Valid)  
    msg_id corresponding to MSG_ID1;  
  }  
  then {  
    the client times_out  
  }  
} |

#### Final Conditions

### TP Id  TP_CoAP_MessageFormat_Header_Type_NON_004
### Test Objective
The IUT is rejecting a NON-confirmable message that lacks context to process the message properly. The message carries a reserved class.
### Reference
IETF RFC 7252 [1]
### PICS Selection
PIC_Server

#### Initial Conditions

<table>
<thead>
<tr>
<th>Expected Behaviour</th>
</tr>
</thead>
</table>
| ensure that {  
  when {  
    the IUT receives a request message containing  
    version indicating value 1,  
    msg_type indicating value 0, //Confirmable  
    token_length indicating value 0,  
    code indicating value 6.00, //reserved  
    msg_id corresponding to MSG_ID1;  
  }  
  then {  
    the client times_out  
  }  
} |

#### Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header_Type_ACK_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is rejecting an Acknowledgement message that is carrying a request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

### Initial Conditions

```
ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 2, //Acknowledgement
    token_length indicating value 0,
    code indicating value 0.02, //POST request
    msg_id corresponding to MSG_ID1;
  }
  then {
    the client times_out
  }
}
```

### Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header_Type_ACK_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is rejecting an Acknowledgement message that carries a reserved class.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

### Initial Conditions

```
ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 2, //Acknowledgement
    token_length indicating value 0,
    code indicating value 7.00, //reserved
    msg_id corresponding to MSG_ID1;
  }
  then {
    the client times_out
  }
}
```
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header_Type_RST_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is rejecting a Reset message that is not Empty.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a request message containing
        version indicating value 1,
        msg_type indicating value 3, //Reset
        token_length indicating value 0,
        code indicating value 0.02, //PUT request
        msg_id corresponding to MSG_ID1;
    }
    then {
        the client times_out
    }
}
```

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header_TokenLength_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding on a valid token length correctly.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a request message containing
        version indicating value 1,
        msg_type indicating value 0, //Confirmable
        token_length indicating value 0,
        code indicating value 0.01, //GET request
        msg_id corresponding to MSG_ID1,
        token corresponding to TOKEN;
    }
    then {
        the IUT sends a response message containing
        version indicating value 1,
        msg_type indicating value 3, //Reset
        token_length indicating value LENGTH_TOKEN,
        code indicating value 0.00, //Empty Message
        msg_id corresponding to MSG_ID1,
        token corresponding to TOKEN;
        or the client times_out
    }
}
```

**Final Conditions**
### TP Id: TP_CoAP_MessageFormat_Header_TokenLength_002

**Test Objective:** The IUT is not responding on a set token length that is not corresponding to the length of the actual token.

**Reference:** IETF RFC 7252 [1]

**PICS Selection:** PIC_Server

#### Initial Conditions

#### Expected Behaviour

ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    token_length indicating value LENGTH_TOKEN_INVALID,
    code indicating value 0.01, //GET request
    msg_id corresponding to MSG_ID1;
  }
  then {
    the client times_out
  }
}

#### Final Conditions

### TP Id: TP_CoAP_MessageFormat_Header_TokenLength_003

**Test Objective:** The IUT is processing a message format error when receiving a reserved token length.

**Reference:** IETF RFC 7252 [1]

**PICS Selection:** PIC_Server

#### Initial Conditions

#### Expected Behaviour

ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    token_length indicating value LENGTH_TOKEN_RESERVED,
    code indicating value 0.01, //GET request
    msg_id corresponding to MSG_ID1;
  }
  then {
    the client times_out
  }
}

#### Final Conditions
Test Objective: The IUT is responding with code 2.05 correctly.

Reference: IETF RFC 7252 [1]

Expected Behaviour

```cpp
event provideResource occurs

the IUT receives a message containing
version indicating value 1,
msg_type indicating value 0, //Confirmable
code indicating value 0.01, //GET request
msg_id corresponding to MSG_ID1,
uri_path corresponding to DEFAULTRESOURCE;

the IUT sends the message containing
version indicating value 1,
msg_type indicating value 1, //Acknowledgement
token_length indicating value 0,
option corresponding to any or omitted,
msg_id corresponding to MSG_ID1,
uri_path corresponding to DEFAULTRESOURCECONTENT;
```
Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header_Code_NotFound_001.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 4.04 correctly.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

Initial Conditions

with {
  event provideResource occurs with {
    argument replaced by the resource containing
    name indicating value ANY_RESOURCE;
  }
}

Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    code indicating value 0.01, //GET request
    msg_id corresponding to MSG_ID1,
    uri_path corresponding to ANYRESOURCE;
  }
  then {
    the IUT sends the message containing
    version indicating value 1,
    msg_type indicating value 1, //Acknowledgement
    token_length indicating value 0,
    code indicating value 4.04, //Client Error (Not found)
    msg_id corresponding to MSG_ID1,
    option corresponding to any or omitted,
    payload corresponding to any or omitted;
  }
}

Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header_Code_Created_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.01 correctly.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

Initial Conditions

with {
  event provideResource occurs with {
    argument replaced by the resource containing
    name indicating value STORAGERESOURCE;
  }
}

Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    code indicating value PUT_OR_POST, //request
    msg_id corresponding to MSG_ID1,
    uri_path corresponding to STORAGERESOURCE,
    payload corresponding to any PAYLOAD;
  }
  then {
    the IUT sends the message containing
    version indicating value 1,
    msg_type indicating value 1, //Acknowledgement
    token_length indicating value 0,
code indicating value 2.01, //Success (Created)
msg_id corresponding to MSG_ID1,
option corresponding to any or omitted,
payload corresponding to any or omitted;
}
}

Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_MessageFormat_Header_Code_Changed_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.04 correctly.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

Initial Conditions

with {
  event provideResource occurs with {
    argument replaced by the resource containing
    name indicating value STORAGE_RESOURCE;
  }
}

Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    code indicating value PUT_OR_POST, //request
    msg_id corresponding to MSG_ID1,
    uri_path corresponding to STORAGE_RESOURCE,
    payload corresponding to any PAYLOAD;
  }
  then {
    the IUT sends the message containing
    version indicating value 1,
    msg_type indicating value 1, //Acknowledgement
    token_length indicating value 0,
    code indicating value 2.04, //Success (Changed)
    msg_id corresponding to MSG_ID1,
    option corresponding to any or omitted,
    payload corresponding to any or omitted;
  }
}

Final Conditions
Test Objective
The IUT is responding with code 2.02 correctly.

Reference
IETF RFC 7252 [1]

PICS Selection
PIC_Server

Initial Conditions

with {
  event provideResource occurs with {
    argument replaced by the resource containing
    name indicating value DELETE_RESOURCE;
  }
}

Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    code indicating value 0.04, //request
    msg_id corresponding to MSG_ID1,
    uri_path corresponding to DELETE_RESOURCE;
  }
  then {
    the IUT sends the message containing
    version indicating value 1,
    msg_type indicating value 1, //Acknowledgement
    token_length indicating value 0,
    code indicating value 2.02, //Success (Deleted)
    msg_id corresponding to MSG_ID1,
    option corresponding to any or omitted,
    payload corresponding to any or omitted;
  }
}

Final Conditions

Test Objective
A zero-length payload that follows the payload marker (0xFF) shall be processed as message format error.

Reference
IETF RFC 7252 [1]

PICS Selection
PIC_Server

Initial Conditions

Expected Behaviour

ensure that {
  when {
    the IUT receives a request message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    token_length indicating value 0,
    code indicating value 0.01, //GET request
    msg_id corresponding to MSG_ID1,
    payload_marker corresponding to PAYLOAD_MARKER,
    payload corresponding to EMPTY_PAYLOAD;
  }
  then {
    the client times_out
  }
}

Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Separate_Response_GET_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.05 on a GET request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {
    the IUT shall provide a resource named separate
}
```

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        uri_path corresponding to SEPARATERESOURCE;
    }
    then {
        the IUT first sends an empty message and
        the IUT sends the second message containing
        msg_type indicating value 0.00, /* Confirmable */
        code indicating value 2.01;
        and
        the client sends an empty message containing
        msg_type indicating value 2.00, /* Acknowledgement */
        code indicating value 0.00;
    }
}
```

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Separate_Response_POST_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with Confirmable and code 2.01 on a POST request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {
    the IUT shall provide a resource named separate
}
```

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.02,
        uri_path corresponding to SEPARATERESOURCE,
        payload indicating value 116 145 167 061 057 116 145 167 062;
    }
    then {
        the IUT first sends an empty message and
        the IUT sends the second message containing
        msg_type indicating value 0.00, /* Confirmable */
        code indicating value 2.01;
        and
        the client sends an empty message containing
        msg_type indicating value 2.00, /* Acknowledgement */
        code indicating value 0.00;
    }
}
```

**Final Conditions**
### TP CoAP_Server_Separate_Response_POST_002

**Test Objective**
The IUT is responding with code 2.04 on a GET request.

**Reference**
IETF RFC 7252 [1]

**PICS Selection**
PIC_Server

**Initial Conditions**
with {
  the IUT shall provide a resource named separate/new1/new2
}

**Expected Behaviour**

ensure that {
  when {
    msg_type indicating value 0, /* Confirmable */
    code indicating value 0.02,
    uri_path corresponding to SEPARATE_RESOURCE,
    uri_path corresponding to SECOND_LVL_RESOURCE,
    uri_path corresponding to THIRD_LVL_RESOURCE,
    payload indicating value 116 145 167 061 057 116 145 167 062;
  }
  then {
    the IUT first sends an empty message and
    the IUT sends the second message containing
    msg_type indicating value 0.00, /* Confirmable */
    code indicating value 2.04,
    Location_Path corresponding to SECOND_LVL_RESOURCE,
    Location_Path corresponding to THIRD_LVL_RESOURCE;
    /*Try to add two new resources named New1 and New2 which already exist.*/
    and
    the client sends an empty message containing
    msg_type indicating value 2.00, /* Acknowledgement */
    code indicating value 0.00;
  }
}

**Final Conditions**

### TP CoAP_Server_Separate_Response_POST_003

**Test Objective**
The IUT is responding with code 2.04 on a GET request.

**Reference**
IETF RFC 7252 [1]

**PICS Selection**
PIC_Server

**Initial Conditions**
with {
  the IUT shall provide a resource named separate/new1/new2
}

**Expected Behaviour**

ensure that {
  when {
    msg_type indicating value 0, /* Confirmable */
    code indicating value 0.02,
    uri_path corresponding to SEPARATE_RESOURCE,
    uri_path corresponding to SECOND_LVL_RESOURCE,
    uri_path corresponding to NEW_RESOURCE,
    payload indicating value 116 145 167 061 057 116 145 167 062;
  }
  then {
    the IUT first sends an empty message and
    the IUT sends the second message containing
    msg_type indicating value 0.00, /* Confirmable */
    code indicating value 2.04,
    Location_Path corresponding to SECOND_LVL_RESOURCE,
    Location_Path corresponding to NEW_RESOURCE;
    /*Change resource separate/New1/New2 to separate/New1/New1a.*/
    and
    the client sends an empty message containing
    msg_type indicating value 2.00, /* Acknowledgement */
    code indicating value 0.00;
Final Conditions

TP Id | TP_CoAP_Server_Separate_Response_POST_004
---|---
Test Objective | The IUT is responding with code 4.05 on a GET request.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

Initial Conditions

with {
    the IUT shall provide a resource named separate and shall not implement the POST operation
}

Expected Behaviour

ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONFirmable */
        code indicating value 0.02,
        uri_path corresponding to SEPARATE_RESOURCE;
    }
    then {
        the IUT first sends an empty message and
        the IUT sends the second message containing
        msg_type indicating value 0.00, /* CONFirmable */
        code indicating value 4.05;
        and
        the client sends an empty message containing
        msg_type indicating value 2.00, /* Acknowledgement */
        code indicating value 0.00;
    }
}

Final Conditions

TP Id | TP_CoAP_Server_Separate_Response_PUT_001
---|---
Test Objective | The IUT is responding with code 2.01 on a PUT request.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

Initial Conditions

with {
    the IUT shall provide a resource named separate
}

Expected Behaviour

ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONFirmable */
        code indicating value 0.03,
        uri_path corresponding to SEPARATERESOURCE,
        payload indicating value 116 145 167 061 057;
    }
    then {
        the IUT first sends an empty message and
        the IUT sends the second message containing
        msg_type indicating value 0.00, /* CONFirmable */
        code indicating value 2.01;
        and
        the client sends an empty message containing
        msg_type indicating value 2.00, /* Acknowledgement */
        code indicating value 0.00;
    }
}
Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Separate_Response_PUT_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.04 on a PUT request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

Initial Conditions

with {
    the IUT shall provide a resource named separate/new1
}

Expected Behaviour

ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.03,
        uri_path corresponding to SEPARATE_RESOURCE,
        uri_path corresponding to SECOND_LVL_RESOURCE;
    } then {
        the IUT first sends an empty message and
        the IUT sends the second message containing
        msg_type indicating value 0.00, /* Confirmable */
        code indicating value 2.04; /* Try to add resource New1 although it already exists */
        and
        the client sends an empty message containing
        msg_type indicating value 2.00, /* Acknowledgement */
        code indicating value 0.00;
    }
}

Final Conditions

Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Separate_Response_DELETE_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.02 on a DELETE request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

Initial Conditions

with {
    the IUT shall provide a resource named separate
}

Expected Behaviour

ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.04,
        uri_path corresponding to SEPARATE_RESOURCE;
    } then {
        the IUT first sends an empty message and
        the IUT sends the second message containing
        msg_type indicating value 0.00, /* Confirmable */
        code indicating value 2.02,
        Location_Path corresponding to SECOND_LVL_RESOURCE; /* Delete resource Separate */
        and
        the client sends an empty message containing
        msg_type indicating value 2.00, /* Acknowledgement */
        code indicating value 0.00;
    }
}

Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Separate_Response_DELETE_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.02 on a DELETE request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
   the IUT shall not provide a resource named separate
}

**Expected Behaviour**

ensure that {
   when {
      the IUT receives a message containing
      msg_type indicating value 0, /* CONfirmable */
      code indicating value 0.04,
      uri_path corresponding to SEPARATE_RESOURCE;
   }
   then {
      the IUT first sends an empty message and
      the IUT sends the second message containing
      msg_type indicating value 0.00, /* Confirmable */
      code indicating value 2.02,
      Location_Path corresponding to SECOND_LVL_RESOURCE; /*Get Response code 2.02 although the requested resource does not exist*/
      and
      the client sends an empty message containing
      msg_type indicating value 2.00, /* Acknowledgement */
      code indicating value 0.00;
   }
}

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_UriHost_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The Uri-Host Option specifies the Internet host of the resource being requested.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
   the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**

ensure that {
   when {
      the IUT receives a message containing
      msg_type indicating value 0, /* CONfirmable */
      code indicating value 0.01,
      host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1]*/
      port corresponding to DEFAULT_PORT;
   }
   then {
      the IUT sends the message containing
      msg_type indicating value 2, /* ACknowledge */
      code indicating value 2.05,
      content indicating value coap_URI;
   }
}

**Final Conditions**

---

ETSI TS 103 596-1 V1.1.1 (2021-05)
TP Id | TP_CoAP_Server_Options_UriHost_002
--- | ---
Test Objective | The Uri-Host Option specifies the Internet host of the resource being requested.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

**Initial Conditions**
with {
    the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**
ensure that {
    when {
        the IUT receives a message containing
            msg_type indicating value 0, /* CONfirmable */
            host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1] */
            port corresponding to DEFAULT_PORT, /*default e.g. 5 683 */
            option_delta indicating value 3, /*URI-Host */
            option_value indicating value "example.net";
    }
    then {
        the IUT sends the message containing
            msg_type indicating value 2, /* ACknowledgement */
            content indicating value coap_URI;
    }
}

**Final Conditions**

TP Id | TP_CoAP_Server_Options_UriPath_001
--- | ---
Test Objective | The Uri-Path Option specifies one segment of the absolute path to the resource.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

**Initial Conditions**
with {
    the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**
ensure that {
    when {
        the IUT receives a message containing
            msg_type indicating value 0, /* CONfirmable */
            host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1] */
            port corresponding to DEFAULT_PORT, /*default e.g. 5 683 */
            option_delta indicating value 3, /*URI-Host */
            option_value indicating value "example.net",
            option_delta indicating value 8, /*URI-Path */
            option_value indicating value ".well-known",
            option_delta indicating value 3, /*URI-Path */
            option_value indicating value "core";
    }
    then {
        the IUT sends the message containing
            msg_type indicating value 2, /* ACknowledgement */
            content indicating value coap_URI;
    }
}

**Final Conditions**
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_UriPath_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.05 on a GET request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
<tr>
<td><strong>Initial Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>with</td>
<td>the IUT shall provide a resource named Simple_Resource/New_Resource</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></td>
<td>the IUT receives a message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td></td>
<td>code indicating value 0.01,</td>
</tr>
<tr>
<td></td>
<td>uri_path corresponding to DEFAULT_RESOURCE,</td>
</tr>
<tr>
<td></td>
<td>uri_path corresponding to NEW_RESOURCE;</td>
</tr>
<tr>
<td></td>
<td>then</td>
</tr>
<tr>
<td></td>
<td>the IUT sends the message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 2, /* ACknowledgement */</td>
</tr>
<tr>
<td></td>
<td>code indicating value 2.05;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Final Conditions</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_UriPath_003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.04 on a POST request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
<tr>
<td><strong>Initial Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>with</td>
<td>the IUT shall provide a resource named Storage_Resource/New1/New2</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></td>
<td>the IUT receives a message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td></td>
<td>code indicating value 0.02,</td>
</tr>
<tr>
<td></td>
<td>uri_path corresponding to STORAGE_RESOURCE,</td>
</tr>
<tr>
<td></td>
<td>uri_path corresponding to SECOND_LVL_RESOURCE,</td>
</tr>
<tr>
<td></td>
<td>uri_path corresponding to NEW_RESOURCE,</td>
</tr>
<tr>
<td></td>
<td>payload indicating value 116 145 167 061 057 116 145 167 062;</td>
</tr>
<tr>
<td></td>
<td>then</td>
</tr>
<tr>
<td></td>
<td>the IUT sends the message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 2, /* ACknowledgement */</td>
</tr>
<tr>
<td></td>
<td>code indicating value 2.04,</td>
</tr>
<tr>
<td></td>
<td>LocationPath corresponding to SECOND_LVL_RESOURCE,</td>
</tr>
<tr>
<td></td>
<td>LocationPath corresponding to NEW_RESOURCE;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Final Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>TP Id</td>
<td>TP_CoAP_Server_Options_UriPath_004</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with code 2.04 on a PUT request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
    the IUT shall provide a resource named Storage_Resource/New1
}

**Expected Behaviour**

ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.03,
        uri_path corresponding to STORAGE_RESOURCE,
        uri_path corresponding to SECOND_LVL_RESOURCE;
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 2.04,
        LocationPath corresponding to SECOND_LVL_RESOURCE;
    }
}

**Final Conditions**

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_UriQuery_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The Uri-Query Option specifies one argument parameterizing the resource.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
    the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**

ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1] */
        port corresponding to DEFAULT_PORT, /*default e.g. 5 683 */
        option_delta indicating value 11, /*URI-Path */
        option_value indicating value "",
        option_delta indicating value 0, /*URI-Path */
        option_value indicating value "",
        option_delta indicating value 11, /*URI-Path */
        option_value indicating value "",
        option_delta indicating value 15, /*URI-Query */
        option_value indicating value "?&";
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 2.05,
        content indicating value coap_URI;
    }
}

**Final Conditions**
TP Id: TP_CoAP_Server_Options_ProxyUri_001
Test Objective: The Proxy-Uri Option is used to make a request to a forward-proxy.
Reference: IETF RFC 7252 [1]
PICs Selection: PIC_Server

**Initial Conditions**

with {
  the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    proxy_uri corresponding to PROXY_URI;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 2.05;
  }
}

**Final Conditions**

---

TP Id: TP_CoAP_Server_Options_ProxyUri_002
Test Objective: The Proxy-Uri Option SHALL take precedence over any of the Uri-Host, Uri-Port, Uri-Path or Uri-Query options.
Reference: IETF RFC 7252 [1]
PICs Selection: PIC_Server

**Initial Conditions**

with {
  the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    proxy_uri corresponding to PROXY_URI,
    uri_host corresponding to URI_HOST;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 4.05;
  }
}

**Final Conditions**
### Test Objective

The Content-Format Option indicates the representation format of the message payload.

### Reference

IETF RFC 7252 [1]

### PIC Selection

PIC_Server

#### Initial Conditions

with {
  the IUT shall provide a resource named coap_URI
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    content_format_options indicating value content_formats_id,
    payload indicating value 116 145 167 061 057 116 145 167 062;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.03;
  }
}

#### Final Conditions

---

### Test Objective

The Content-Format Option indicates the representation format of the message payload, in the absence of the option, no default value is assumed, i.e. the representation format of any representation message payload is indeterminate.

### Reference

IETF RFC 7252 [1]

### PIC Selection

PIC_Server

#### Initial Conditions

with {
  the IUT shall provide a resource named coap_URI
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    payload indicating value 116 145 167 061 057 116 145 167 062;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.06;
  }
}

#### Final Conditions
**Test Objective**
The Uri-Host Option specifies the Internet host of the resource being requested.

**Reference**
IETF RFC 7252 [1]

**PICS Selection**
PIC_Server

---

**Initial Conditions**

with {
  the IUT shall provide a resource named coap_URI
}

---

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1]*/
    port corresponding to DEFAULT_PORT;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    content indicating value coap_URI;
  }
}

---

**Final Conditions**

---

**Test Objective**
The Uri-Host Option specifies the Internet host of the resource being requested.

**Reference**
IETF RFC 7252 [1]

**PICS Selection**
PIC_Server

---

**Initial Conditions**

with {
  the IUT shall provide a resource named coap_URI
}

---

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1]*/
    port corresponding to DEFAULT_PORT, /*default e.g. 5 683*/
    option_delta indicating value 3, /*URI-Host*/
    option_value indicating value "example.net";
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 2.05,
    content indicating value coap_URI;
  }
}

---

**Final Conditions**
### TP Id: TP_CoAP_Server_Options_UriPath_001

**Test Objective**
The Uri-Path Option specifies one segment of the absolute path to the resource.

**Reference**
IETF RFC 7252 [1]

**PICs Selection**
PIC_Server

#### Initial Conditions

with {
  the IUT shall provide a resource named coap_URI
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    - `msg_type` indicating value 0, /* CONfirmable */
    - `code` indicating value 0.01,
    - `host` corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1] */
    - `port` corresponding to DEFAULT_PORT, /*default e.g. 5 683 */
    - `option_delta` indicating value 3, /*URI-Host */
    - `option_value` indicating value "example.net",
    - `option_delta` indicating value 8, /*URI-Path */
    - `option_value` indicating value ".well-known",
    - `option_delta` indicating value 3, /*URI-Path */
    - `option_value` indicating value "core";
  } then {
    the IUT sends the message containing
    - `msg_type` indicating value 2, /* ACknowledgement */
    - `code` indicating value 2.05,
    - `content` indicating value coap_URI;
  }
}

#### Final Conditions

### TP Id: TP_CoAP_Server_Options_UriPath_002

**Test Objective**
The IUT is responding with code 2.05 on a GET request.

**Reference**
IETF RFC 7252 [1]

**PICs Selection**
PIC_Server

#### Initial Conditions

with {
  the IUT shall provide a resource named Simple_Resource/New_Resource
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    - `msg_type` indicating value 0, /* CONfirmable */
    - `code` indicating value 0.01,
    - `uri_path` corresponding to DEFAULT_RESOURCE,
    - `uri_path` corresponding to NEW_RESOURCE;
  } then {
    the IUT sends the message containing
    - `msg_type` indicating value 2, /* ACknowledgement */
    - `code` indicating value 2.05;
  }
}

#### Final Conditions
### TP CoAP_Server_Options_UriPath_003

#### Test Objective
The IUT is responding with code 2.04 on a POST request.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Server

#### Initial Conditions

<table>
<thead>
<tr>
<th>with</th>
<th>the IUT shall provide a resource named Storage_Resource/New1/New2</th>
</tr>
</thead>
</table>

#### Expected Behaviour

```plaintext
ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.02,
    uri_path corresponding to STORAGE_RESOURCE,
    uri_path corresponding to SECOND_LVL_RESOURCE,
    uri_path corresponding to NEW_RESOURCE,
    payload indicating value 116 145 167 061 057 116 145 167 062;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.04,
    LocationPath corresponding to SECOND_LVL_RESOURCE,
    LocationPath corresponding to NEW_RESOURCE;
  }
}
```

#### Final Conditions

### TP CoAP_Server_Options_UriPath_004

#### Test Objective
The IUT is responding with code 2.04 on a PUT request.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Server

#### Initial Conditions

<table>
<thead>
<tr>
<th>with</th>
<th>the IUT shall provide a resource named Storage_Resource/New1</th>
</tr>
</thead>
</table>

#### Expected Behaviour

```plaintext
ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.03,
    uri_path corresponding to STORAGE_RESOURCE,
    uri_path corresponding to SECOND_LVL_RESOURCE;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.04,
    LocationPath corresponding to SECOND_LVL_RESOURCE;
  }
}
```

#### Final Conditions
TP Id | TP_CoAP_Server_Options_UriQuery_001
---|---
Test Objective | The Uri-Query Option specifies one argument parameterizing the resource.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

**Initial Conditions**

with {
    the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**

ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1] */
        port corresponding to DEFAULT_PORT, /*default e.g. 5 683 */
        option_delta indicating value 11, /*URI-Path */
        option_value indicating value **",
        option_delta indicating value 0, /*URI-Path */
        option_value indicating value **",
        option_delta indicating value 11, /*URI-Path */
        option_value indicating value **",
        option_delta indicating value 15, /*URI-Query */
        option_value indicating value ""/",
        option_delta indicating value 0, /*URI-Query */
        option_value indicating value "?&;
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 2.05,
        content indicating value coap_URI;
    }
}

**Final Conditions**

---

TP Id | TP_CoAP_Server_Options_ProxyUri_001
---|---
Test Objective | The Proxy-Uri Option is used to make a request to a forward-proxy.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

**Initial Conditions**

with {
    the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**

ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        proxy_uri corresponding to PROXY_URI;
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 2.05;
    }
}

**Final Conditions**

---
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ProxyUri_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The Proxy-Uri Option SHALL take precedence over any of the Uri-Host, Uri-Port, Uri-Path or Uri-Query options.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
  the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    proxy_uri corresponding to PROXY_URI,
    uri_host corresponding to URI_HOST;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.05;
  }
}

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ContentAccept_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The CoAP Accept option can be used to indicate which Content-Format is acceptable to the client.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
  the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    content_format_options indicating value content_formats_id,
    accept_options indicating value content_formats_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.03;
  }
}

**Final Conditions**
### TP Id
TP_CoAP_Server_Options_ContentAccept_002

### Test Objective
The CoAP Accept option can be used to indicate which Content-Format is acceptable to the client. If the preferred Content-Format cannot be returned, then a 4.06 SHALL be sent as a response, unless another error code takes precedence for this response.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Server

#### Initial Conditions
with {
  the IUT shall provide a resource named coap_URI
}

#### Expected Behaviour
ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    content_format_options indicating value content_formats_id,
    accept_options indicating value content_formats_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 4.06;
  }
}

#### Final Conditions

---

### TP Id
TP_CoAP_Server_Options_MaxAgeFresh_001

### Test Objective
The Max-Age Option indicates the maximum time a response may be cached before it is considered not fresh.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Server

#### Initial Conditions
with {
  the IUT shall provide a response
}

#### Expected Behaviour
ensure that {
  when {
    the IUT receives the message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 2.04;
  }
}

#### Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ETagResponse_001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>The ETag Option in a response provides the current value (i.e. after the request was processed) of the entity-tag for the 'tagged representation'.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {  
    the IUT shall provide a response
}
```

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT receives the message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01;
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 2.04,
        etag indicating value integer;
    }
}
```

**Final Conditions**

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_EtagRequest_001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>In a GET request, an endpoint that has one or more representations previously obtained from the resource, and has obtained ETag response options with these, can specify an instance of the ETag Option for one or more of these stored responses.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {  
    the IUT shall provide a response
}
```

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT receives the message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        etag indicating value integer;
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 2.03;
    }
}
```

**Final Conditions**
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_LocationPathLocationQuery_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The Location-Path and Location-Query Options together indicate a relative URI that consists either of an absolute path, a query string, or both.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

#### Initial Conditions

with {
  the IUT shall provide a response
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives the message containing
      msg_type indicating value 0, /* CONfirmable */
      code indicating value 0.02;
  }
  then {
    the IUT sends the message containing
      msg_type indicating value 2, /* ACknowledgement */
      code indicating value 2.01,
      location_path indicating value string,
      location_query indicating value string;
  }
}

#### Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_LocationPathLocationQuery_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The Location-Path and Location-Query Options together indicate a relative URI that consists either of an absolute path, a query string, or both.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

#### Initial Conditions

with {
  the IUT shall provide a response
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives the message containing
      msg_type indicating value 0, /* CONfirmable */
      code indicating value 0.01,
      options indicating value 128;
  }
  then {
    the IUT sends the message containing
      msg_type indicating value 2, /* ACknowledgement */
      code indicating value 4.02;
  }
}

#### Final Conditions
Test Objective
The If-Match Option MAY be used to make a request conditional on the current existence or value of an ETag for one or more representations of the target resource.

Reference
IETF RFC 7252 [1]

PICS Selection
PIC_Server

<table>
<thead>
<tr>
<th>Initial Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>with</td>
</tr>
<tr>
<td>the IUT shall provide a response</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expected Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure that</td>
</tr>
<tr>
<td>when</td>
</tr>
<tr>
<td>the IUT receives the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td>code indicating value 0.03,</td>
</tr>
<tr>
<td>ifMatch indicating value ETag;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>then</td>
</tr>
<tr>
<td>the IUT sends the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 2, /* ACKnowledgement */</td>
</tr>
<tr>
<td>code indicating value 2.03;</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP_Id TP_CoAP_Server_Options_ifMatch_001</td>
</tr>
</tbody>
</table>

---

Test Objective
The If-Match Option MAY be used to make a request conditional on the current existence or value of an ETag for one or more representations of the target resource.

Reference
IETF RFC 7252 [1]

PICS Selection
PIC_Server

<table>
<thead>
<tr>
<th>Initial Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>with</td>
</tr>
<tr>
<td>the IUT shall provide a response</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expected Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure that</td>
</tr>
<tr>
<td>when</td>
</tr>
<tr>
<td>the IUT receives the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td>code indicating value 0.03,</td>
</tr>
<tr>
<td>ifMatch indicating value integer representing etag;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>then</td>
</tr>
<tr>
<td>the IUT sends the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 2, /* ACKnowledgement */</td>
</tr>
<tr>
<td>code indicating value 4.04;</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP_Id TP_CoAP_Server_Options_ifMatch_002</td>
</tr>
</tbody>
</table>
### TP Id: TP_CoAP_Server_Options.IfNoneMatch_001

**Test Objective**: The If-None-Match Option MAY be used to make a request conditional on the nonexistence of the target resource.

**Reference**: IETF RFC 7252 [1]

**PICS Selection**: PIC_Server

<table>
<thead>
<tr>
<th><strong>Initial Conditions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>with {}</td>
</tr>
<tr>
<td>the IUT shall provide a response</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Expected Behaviour</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure that {}</td>
</tr>
<tr>
<td>when {}</td>
</tr>
<tr>
<td>the IUT receives the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td>code indicating value 0.03,</td>
</tr>
<tr>
<td>ifNoneMatch indicating value integer;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>then {}</td>
</tr>
<tr>
<td>the IUT sends the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 2, /* ACKnowledgement */</td>
</tr>
<tr>
<td>code indicating value 2.03;</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

| **Final Conditions** |

### TP Id: TP_CoAP_Server_Options.IfNoneMatch_002

**Test Objective**: The If-None-Match Option MAY be used to make a request conditional on the nonexistence of the target resource.

**Reference**: IETF RFC 7252 [1]

**PICS Selection**: PIC_Server

<table>
<thead>
<tr>
<th><strong>Initial Conditions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>with {}</td>
</tr>
<tr>
<td>the IUT shall provide a response</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Expected Behaviour</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure that {}</td>
</tr>
<tr>
<td>when {}</td>
</tr>
<tr>
<td>the IUT receives the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td>code indicating value 0.03,</td>
</tr>
<tr>
<td>ifNoneMatch indicating value integer;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>then {}</td>
</tr>
<tr>
<td>the IUT sends the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 2, /* ACKnowledgement */</td>
</tr>
<tr>
<td>code indicating value 4.00;</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<p>| <strong>Final Conditions</strong> |</p>
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ETagResponse_001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>An ETag response option can be included with any response for which there is a tagged representation.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_ServerPIC_ETag_support</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
  the IUT shall provide an options named ETag
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives the message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    accept_options indicating value accept_options_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.04,
    etag indicating value integer;
  }
}

**Final Conditions**

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ETagResponse_002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>The ETag Option SHALL NOT occur more than once in a response.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
  the IUT shall provide an options named ETag
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives the message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.04,
    etag1 indicating value integer;
    and another etag2 shall not be present
  }
}

**Final Conditions**
## TP CoAP_Server_Options_ETagRequest_001

### Test Objective
The IUT is responding with 2.03 valid response to the multiple ETag request.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Server

#### Initial Conditions

with {
  the IUT shall provide an option named ETag
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives the message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    etag_options_1 indicating value etag_options_id_1,
    etag_options_2 indicating value etag_options_id_2;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledge */
    code indicating value 2.03,
    etag indicating value integer;
  }
}

#### Final Conditions

## TP CoAP_Server_Options_ProxyUri_001

### Test Objective
An endpoint receiving a request with a Proxy-Uri Option that is unable or unwilling to act as a forward-proxy for the request SHALL cause the return of a 5.05 (Proxying Not Supported) response.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Server

#### Initial Conditions

with {
  the IUT shall provide an option named proxy_uri_options and the IUT fails to respond
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives the message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    proxy_uri_options indicating value proxy_uri_options_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledge */
    code indicating value 5.05;
  }
}

#### Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_LocationPath_LocationQuery_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with Bad Option for a location_path_option.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

**Expected Behaviour**

```plaintext
eventually {
    when {
        the IUT receives the message containing
            msg_type indicating value 0 /* CONfirmable */
            code indicating value 0.01,
            location_path_options indicating value ".:;",
    }
    then {
        the IUT sends the message containing
            msg_type indicating value 2 /* ACknowledge */
            code indicating value 4.02;
    }
}
```

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_LocationPath_LocationQuery_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>Ensure that any reserved option numbers occurs in addition to Location-Path and/or Location-Query and are not supported, then a 4.02 (Bad Option) error SHALL be returned.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

**Expected Behaviour**

```plaintext
eventually {
    when {
        the IUT receives the message containing
            msg_type indicating value 0 /* CONfirmable */
            code indicating value 0.01,
            location_path_options indicating value location_path_options_id,
            location_reserved_options indicating value location_reserved_options_id;
    }
    then {
        the IUT sends the message containing
            msg_type indicating value 2 /* ACknowledge */
            code indicating value 4.02;
    }
}
```

**Final Conditions**
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ConditionalRequest_001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>If the if-match condition given is not fulfilled, then the server SHALL NOT perform the requested method. Instead, the server SHALL respond with the 4.12 (Precondition Failed) Response Code.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {
    the IUT specify if_Match conditions
}
```

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT receives the message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        if_match_options indicating value if_match_options_id,
        accept_options indicating value accept_options_id;
        and the client fails to fulfill conditions
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 4.12;
    }
}
```

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ConditionalRequest_002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>If the if-match condition given is fulfilled, then the server SHALL perform the requested method.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {
    the IUT specify if_Match conditions
}
```

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT sends the message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        if_match_options indicating value if_match_options_id,
        accept_options indicating value accept_options_id;
        and the client fulfills conditions
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 2.03;
    }
}
```

**Final Conditions**
### TP Id: TP_CoAP_Server_Options_ConditionalRequest_003
#### Test Objective
The IUT responds with a 2.03 code when an If-Match condition on the ETag option is fulfilled.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Server

#### Initial Conditions

| with | the IUT specify if_match conditions |

#### Expected Behaviour

| ensure that | when | the IUT sends the message containing |
| | | msg_type indicating value 0, /* CONfirmable */ |
| | | code indicating value 0.01, |
| | | if_match_options indicating value if_match_options_id, |
| | | etag_options indicating value etag_options_id; |
| | then | and the client fulfil if_match conditions |
| | | the IUT sends the message containing |
| | | msg_type indicating value 2, /* ACKnowledgement */ |
| | | code indicating value 2.03; |

#### Final Conditions

### TP Id: TP_CoAP_Server_Options_Size1_001
#### Test Objective
The Size1 option provides size information about the resource representation in a request.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Server

#### Initial Conditions

| with | the IUT shall provide an options named Size1 |

#### Expected Behaviour

| ensure that | when | the IUT receives the message containing |
| | | msg_type indicating value 0, /* CONfirmable */ |
| | | code indicating value 0.01, |
| | | size1_options indicating value size1_options_id; |
| | then | the IUT sends the message containing |
| | | msg_type indicating value 2, /* ACKnowledgement */ |
| | | code indicating value 4.13, |
| | | size_option indicating value size_max_value; |

#### Final Conditions
**TP Id** | TP_CoAP_Server_Options_IfMatch_001
---|---
**Test Objective** | The IUT is responding with 2.03 response when treating multiple IfMatch_options request.
**Reference** | IETF RFC 7252 [1]
**PICS Selection** | PIC_Server

### Initial Conditions

with {
  the IUT shall provide an IfMatch_options
}

### Expected Behaviour

ensure that {
  when {
    the IUT receives the message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01, // Get
    ifMatch_options indicating value ifMatch_options_id_1,
    ifMatch_options indicating value ifMatch_options_id_2;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.03;
  }
}

### Final Conditions

---

**TP Id** | TP_CoAP_Server_Options_NonRepeatable_001
---|---
**Test Objective** | An option that is not repeatable SHALL NOT be included more than once in a message.
**Reference** | IETF RFC 7252 [1]
**PICS Selection** | PIC_Server

### Initial Conditions

with {
  the IUT shall provide an IfNoneMatch_options
}

### Expected Behaviour

ensure that {
  when {
    the IUT receives the message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01, // Get
    ifNoneMatch_options indicating value ifNoneMatch_options_id1,
    ifNoneMatch_options indicating value ifNoneMatch_options_id2;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.02;
  }
}

### Final Conditions
TP Id | TP_CoAP_Server_Options_CriticalOptions_001
--- | ---
Test Objective | A Request with unrecognized options of class critical that occur in a Confirmable request shall cause the return of 4.02.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

Initial Conditions

with {
  the IUT shall provide an option named if_match
}

Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01, /* Unrecognized options */
    if_match_options indicating value if_match_options_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 4.02;
  }
}

Final Conditions

TP Id | TP_CoAP_Server_Options_CriticalOptions_002
--- | ---
Test Objective | A Request with unrecognized options of class critical that occur in a Confirmable request shall cause the return of 4.02.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

Initial Conditions

Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.03,
    msg_id corresponding to MSG_ID1,
    accept_option indicating value content_format;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 4.02;
  }
}

Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_CriticalOptions_003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>A Request with unrecognized options of class critical that occur in a Confirmable request shall cause the return of 4.02.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Server</td>
</tr>
<tr>
<td><strong>Initial Conditions</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.04,
    msg_id corresponding to MSG_ID1,
    host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1]*/
    port corresponding to DEFAULT_PORT;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.02;
  }
}

**Final Conditions**

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_CriticalOptions_004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>A Request with unrecognized options of class critical that occur in a Confirmable request shall cause the return of 4.02.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Server</td>
</tr>
<tr>
<td><strong>Initial Conditions</strong></td>
<td></td>
</tr>
</tbody>
</table>

with {
  the IUT shall provide a UriHost
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.003,
    msg_id corresponding to MSG_ID1,
    host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1]*/
    port corresponding to DEFAULT_PORT;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.02;
  }
}

**Final Conditions**
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_CriticalOptions_005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>An option that is not repeatable SHALL NOT be included more than once in a message.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

### Initial Conditions

```plaintext
with {
    the IUT shall provide a content_format
}
```

### Expected Behaviour

```plaintext
ensure that {
    when {
        the IUT receives a message containing
        version indicating value 1,
        msg_type indicating value 0, /* CONfirmable */
        token_length indicating value 0,
        code indicating value 0.01,
        msg_id corresponding to MSG_ID1,
        content_format_option indicating value content_formats_id,
        link_format_option indicating value link_format,
        content_format_option indicating value content_formats_options_id,
        octet_stream_content_format indicating value octet_stream_content_format_id;
    } then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 4.02;
    }
}
```

### Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_CriticalOptions_006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT responds with Bad_Option for messages containing options that are repeated more than once.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

### Initial Conditions

```plaintext
with {
    the IUT shall provide a UriHost
}
```

### Expected Behaviour

```plaintext
ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1]*/
        port corresponding to DEFAULT_PORT, /*default e.g. 5 683 */
        host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1]*/
        port corresponding to DEFAULT_PORT;
    } then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 4.02;
    }
}
```

### Final Conditions
### TP CoAP_Server_Options_CriticalOptions_007

<table>
<thead>
<tr>
<th>Test Objective</th>
<th>A request with multiple IfNoMatchOptions responds with Bad_Options code.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

| with | the IUT shall provide a IfNoMatchOptions |

**Expected Behaviour**

```text
ensure that {
  when {
    the IUT receives the message containing
    msg_type indicating value 0, /* CONfirmable */
    ifNoneMatch_options indicating value integer,
    ifNoneMatch_options indicating value integer;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.02;
  }
}  
```

**Final Conditions**

---

### TP CoAP_Server_Options_CriticalOptions_008

<table>
<thead>
<tr>
<th>Test Objective</th>
<th>A request with multiple AcceptOptions responds with Bad_Options code.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

**Expected Behaviour**

```text
ensure that {
  when {
    the IUT receives a message containing
    msg_type indicating value 0, /* CONfirmable */
    accept_options indicating value accept_options_id,
    accept_options indicating value accept_options_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.02;
  }
}  
```

**Final Conditions**
### TP Id: TP_CoAP_Server_Options_ContentFormat_Text_001

#### Test Objective
The IUT is responding with 2.05 code on receiving message containing text/plain of content_format_options.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Server

<table>
<thead>
<tr>
<th>Initial Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>with {</td>
</tr>
<tr>
<td>the IUT shall provide a content_format_options named text_plain_content_format</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expected Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure that {</td>
</tr>
<tr>
<td>when {</td>
</tr>
<tr>
<td>the IUT receives a message containing version indicating value 1,</td>
</tr>
<tr>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td>token_length indicating value 0,</td>
</tr>
<tr>
<td>code indicating value 0.01,</td>
</tr>
<tr>
<td>msg_id corresponding to MSG_ID1,</td>
</tr>
<tr>
<td>content_format_options indicating value content_format_options_id,</td>
</tr>
<tr>
<td>text_plain_content_format indicating value text_plain_content_format_id;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>then {</td>
</tr>
<tr>
<td>the IUT sends the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 2, /* ACknowledgement */</td>
</tr>
<tr>
<td>code indicating value 2.05;</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

| Final Conditions |

---

### TP Id: TP_CoAP_Server_Options_ContentFormat_Application_001

#### Test Objective
The IUT is responding to a message containing link-format of content_format_options correctly.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Server

<table>
<thead>
<tr>
<th>Initial Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>with {</td>
</tr>
<tr>
<td>the IUT shall provide a content_format_options named link_format_content_format</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expected Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure that {</td>
</tr>
<tr>
<td>when {</td>
</tr>
<tr>
<td>the IUT receives a message containing version indicating value 1,</td>
</tr>
<tr>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td>token_length indicating value 0,</td>
</tr>
<tr>
<td>code indicating value 0.01,</td>
</tr>
<tr>
<td>msg_id corresponding to MSG_ID1,</td>
</tr>
<tr>
<td>content_format_options indicating value content_format_options_id,</td>
</tr>
<tr>
<td>link_format_content_format indicating value link_format_content_format_id;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>then {</td>
</tr>
<tr>
<td>the IUT sends the message containing</td>
</tr>
<tr>
<td>msg_type indicating value 2, /* ACknowledgement */</td>
</tr>
<tr>
<td>code indicating value 2.05;</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

| Final Conditions |
TP Id | TP_CoAP_Server_Options_ContentFormat_Application_002
---|---
Test Objective | The IUT is processing to a xml_content_format message correctly.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

### Initial Conditions

with {
   the IUT shall provide a content_format_options named xml_content_format
}

### Expected Behaviour

ensure that {
   when {
      the IUT receives a message containing
      version indicating value 1,
      msg_type indicating value 0, /* CONfirmable */
      token_length indicating value 0,
      code indicating value 0.01,
      msg_id corresponding to MSG_ID1,
      content_format_options indicating value content_format_options_id,
      xml_content_format indicating value xml_content_format_id;
   }
   then {
      the IUT sends the message containing
      msg_type indicating value 2, /* ACKnowledgement */
      code indicating value 2.05;
   }
}

### Final Conditions

---

TP Id | TP_CoAP_Server_Options_ContentFormat_Application_003
---|---
Test Objective | The IUT is responding with 2.05 code on receiving message containing content_format_options named octetstream.
Reference | IETF RFC 7252 [1]
PICS Selection | PIC_Server

### Initial Conditions

with {
   the IUT shall provide a content_format_options named octetstream_content_format
}

### Expected Behaviour

ensure that {
   when {
      the IUT receives a message containing
      version indicating value 1,
      msg_type indicating value 0, /* CONfirmable */
      token_length indicating value 0,
      code indicating value 0.01,
      msg_id corresponding to MSG_ID1,
      content_format_options indicating value content_format_options_id,
      octetstream_content_format indicating value octetstream_content_format_id;
   }
   then {
      the IUT sends the message containing
      msg_type indicating value 2, /* ACKnowledgement */
      code indicating value 2.05;
   }
}

### Final Conditions
### Test Objective
The IUT is processing a message containing content_format_options named `xml_content_format` correctly.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Server

#### Initial Conditions

<table>
<thead>
<tr>
<th>with</th>
</tr>
</thead>
<tbody>
<tr>
<td>the IUT shall provide a content_format_options named <code>exi_content_format</code></td>
</tr>
</tbody>
</table>

#### Expected Behaviour

```plaintext
ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01,
    msg_id corresponding to MSG_ID1,
    content_format_options indicating value content_format_options_id,
    exi_content_format indicating value exi_content_format_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.05;
  }
}
```

#### Final Conditions

### Test Objective
The IUT is processing a content_format_options correctly.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Server

#### Initial Conditions

<table>
<thead>
<tr>
<th>with</th>
</tr>
</thead>
<tbody>
<tr>
<td>the IUT shall provide a content_format_options named <code>json_content_format</code></td>
</tr>
</tbody>
</table>

#### Expected Behaviour

```plaintext
ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01,
    msg_id corresponding to MSG_ID1,
    content_format_options indicating value content_format_options_id,
    json_content_format indicating value json_content_format_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.05;
  }
}
```

#### Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ContentFormat_Application_006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding with 4.15 code to a message containing content_format_options.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
  the IUT does not provide a content_format_options named json_content_format
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01,
    msg_id corresponding to MSG_ID1,
    content_format_options indicating value content_format_options_id,
    json_content_format indicating value json_content_format_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 4.15;
  }
}

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Options_ContentFormat_Application_007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is responding to content_format_options with 4.02 response code.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with {
  the IUT shall provide a content_format_options
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01,
    msg_id corresponding to MSG_ID1,
    content_format_options indicating value content_format_options_id,
    json_content_format indicating value json_content_format_id,
    text_plain_content_format indicating value text_plain_content_format_id;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 4.02;
  }
}

**Final Conditions**
### TP Id TP_CoAP_Server_Options_ContentFormat_Application_008

#### Test Objective
The IUT is responding with Bad_Options to the message containing content_format_options.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Server

#### Initial Conditions

with {
  the IUT shall provide a content_format_options content
}

#### Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01,
    msg_id corresponding to MSG_ID1,
    content_format_options indicating value content_formats_id,
    json indicating value json,
    content_format_options indicating value content_formats_id,
    xml indicating value xml;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.02;
  }
}

#### Final Conditions

---

### TP Id TP_CoAP_Server_Options_ContentFormat_Application_010

#### Test Objective
The IUT is processing to a content_format_options with a 4.02 code.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Server

#### Initial Conditions

#### Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01,
    msg_id corresponding to MSG_ID1,
    content_format_options indicating value content_formats_id,
    link_format_options indicating value link_format,
    content_format_options indicating value content_formats_id,
    octet_stream indicating value octet_stream;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 4.02;
  }
}

#### Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Payload_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>If a Method or Response Code is not defined to have a payload, then a sender SHALL NOT include one, and a recipient SHALL ignore it.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

### Initial Conditions

#### Expected Behaviour

```plaintext
test ensure that {  
    when {    
        the IUT receives the message containing    
        msg_type indicating value 0, /* CONfirmable */    
        code indicating value 0.01, // Get    
        ifNoneMatch_options indicating value ifNoneMatch_options_id1,    
        payload indicating value 116 145 167 061 057 116 145 167 062;    
    }  
    then {  
        the IUT rejects the message  
    }  
}  
```

### Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Payload_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The Content-Format Option indicates the representation format of the message payload.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

### Initial Conditions

```plaintext
with {  
    the IUT shall provide a resource named coap_URI  
}  
```

#### Expected Behaviour

```plaintext
test ensure that {  
    when {    
        the IUT receives a message containing    
        msg_type indicating value 0, /* CONfirmable */    
        code indicating value 0.01,    
        content_format_options indicating value content_formats_id,    
        payload indicating value 116 145 167 061 057 116 145 167 062;    
    }  
    then {  
        the IUT sends the message containing    
        msg_type indicating value 2, /* ACknowledgement */    
        code indicating value 2.03;    
    }  
}  
```

### Final Conditions
**TP Id**  
TP_CoAP_Server_Payload_003

**Test Objective**  
The Content-Format Option indicates the representation format of the message payload, in the absence of the option, no default value is assumed, i.e. the representation format of any representation message payload is indeterminate.

**Reference**  
IETF RFC 7252 [1]

**PICS Selection**  
PIC_Server

**Initial Conditions**
with {
    the IUT shall provide a resource named coap_URI
}

**Expected Behaviour**
ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        payload indicating value 116 145 167 061 057 116 145 167 062;
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 4.06;
    }
}

**Final Conditions**

---

**TP Id**  
TP_CoAP_Server_Proxy_HTTPUri_001

**Test Objective**  
If the proxy is unable to service a request with an HTTP URI, a 5.05 (Proxying Not Supported) response is returned.

**Reference**  
IETF RFC 7252 [1]

**PICS Selection**  
PIC_Server

**Initial Conditions**
with {
    the IUT shall provide a response
}

**Expected Behaviour**
ensure that {
    when {
        the IUT receives a message containing
        version indicating value 1,
        msg_type indicating value 0, /* CONfirmable */
        token_length indicating value 0,
        code indicating value 0.01,
        msg_id corresponding to MSG_ID1,
        proxy_uri corresponding to HTTP_URI;
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 5.05;
    }
}

**Final Conditions**
**Test Objective**
If the proxy is unable to service a request within a reasonable time frame, a 5.04 (Gateway Timeout) response is returned.

**Reference**
IETF RFC 7252 [1]

**PICS Selection**
PIC_Server

---

**Initial Conditions**

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a message containing
        version indicating value 1,
        msg_type indicating value 0, /* CONfirmable */
        token_length indicating value 0,
        code indicating value 0.01,
        msg_id corresponding to MSG_ID1,
        proxy_uri corresponding to HTTP_URI;
        and the client times_out
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 5.04;
    }
}
```

---

**Final Conditions**

---

**Test Objective**
If the result can be obtained but is not understood, a 5.02 (Bad Gateway) response is returned.

**Reference**
IETF RFC 7252 [1]

**PICS Selection**
PIC_Server

---

**Initial Conditions**

**Expected Behaviour**

```
ensure that {
    when {
        the IUT receives a message containing
        version indicating value 1,
        msg_type indicating value 0, /* CONfirmable */
        token_length indicating value 0,
        code indicating value 0.01,
        msg_id corresponding to MSG_ID1,
        proxy_uri corresponding to HTTP_URI;
    }
    then {
        the IUT sends the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 5.02;
    }
}
```

---

**Final Conditions**
Test Objective
The GET method requests the proxy to return a representation of the HTTP resource identified by the request URI. Upon success, 2.05 should be returned.

Reference
IETF RFC 7252 [1]

<table>
<thead>
<tr>
<th>PIC Selection</th>
<th>PIC_Server</th>
</tr>
</thead>
</table>

**Initial Conditions**

with {
  the IUT shall provide a response
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01,
    msg_id corresponding to MSG_ID1,
    content_format_options indicating value content_formats_id,
    proxy_uri_options corresponding to HTTP_URI;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.05;
  }
}

**Final Conditions**

Test Objective
A client can influence the processing of a GET request to the proxy by including Accept and ETAG.

Reference
IETF RFC 7252 [1]

<table>
<thead>
<tr>
<th>PIC Selection</th>
<th>PIC_Server</th>
</tr>
</thead>
</table>

**Initial Conditions**

with {
  the IUT shall provide a response
}

**Expected Behaviour**

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01,
    msg_id corresponding to MSG_ID1,
    accept_options indicating value content_formats_id,
    etag_options indicating value content_formats_id,
    proxy_uri_options corresponding to HTTP_URI;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.03;
  }
}

**Final Conditions**
TP Id: TP_CoAP_Server_Proxy_HTTPUri_006
Test Objective: The PUT method requests the proxy to create the HTTP resource identified by the request URI.
Reference: IETF RFC 7252 [1]
PICS Selection: PIC_Server

Initial Conditions

with {
  the IUT shall provide a response
}

Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.03,
    msg_id corresponding to MSG_ID1,
    proxy_uri corresponding to HTTP_URI;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.01;
  }
}

Final Conditions

TP Id: TP_CoAP_Server_Proxy_HTTPUri_007
Test Objective: The PUT method requests the proxy to update the HTTP resource identified by the request URI.
Reference: IETF RFC 7252 [1]
PICS Selection: PIC_Server

Initial Conditions

with {
  the IUT shall provide a response
}

Expected Behaviour

ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.03,
    msg_id corresponding to MSG_ID1,
    proxy_uri corresponding to HTTP_URI;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.04;
  }
}

Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Proxy_HTTPUri_008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The DELETE method requests the proxy to delete the HTTP resource identified by the request URI.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {
  the IUT shall provide a response
}
```

**Expected Behaviour**

```plaintext
ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.04,
    msg_id corresponding to MSG_ID1,
    proxy_uri corresponding to HTTP_URI;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.02;
  }
}
```

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Proxy_HTTPUri_009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The POST method requests the proxy to create a resource on the origin server.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {
  the IUT shall provide a response
}
```

**Expected Behaviour**

```plaintext
ensure that {
  when {
    the IUT receives a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.02,
    msg_id corresponding to MSG_ID1,
    proxy_uri corresponding to HTTP_URI;
  }
  then {
    the IUT sends the message containing
    msg_type indicating value 2, /* ACKnowledgement */
    code indicating value 2.01;
  }
}
```

**Final Conditions**
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_Proxy_HTTPUri_010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The POST method requests the proxy to change a resource on the origin server.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with 

the IUT shall provide a response

**Expected Behaviour**

effect that 

when 

the IUT receives a message containing 

version indicating value 1, 

msg_type indicating value 0, /* CONfirmable */ 

token_length indicating value 0, 

code indicating value 0.02, 

msg_id corresponding to MSG_ID1, 

proxy_uri corresponding to HTTP_URI;

then 

the IUT sends the message containing 

msg_type indicating value 2, /* ACKnowledgement */ 

code indicating value 2.04;

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Server_ServiceDiscovery_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT is able to provide all endpoints to the client.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Server</td>
</tr>
</tbody>
</table>

**Initial Conditions**

with 

the IUT shall provide a response

**Expected Behaviour**

effect that 

when 

the IUT receives a message containing 

version indicating value 1, 

msg_type indicating value 0, /* CONfirmable */ 

token_length indicating value 0, 

code indicating value 0.01, 

msg_id corresponding to MSG_ID1;

then 

the IUT sends the message containing 

msg_type indicating value 2, /* ACKnowledgement */ 

code indicating value 2.05;

**Final Conditions**

---
## 6 Test Purposes for CoAP Client

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_TokenLength_001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>Token Length 9-15 bytes are reserved SHALL NOT be sent, and SHALL be processed as a message format error.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

### Initial Conditions

**Expected Behaviour**

```
ensure that {
    when {
        the IUT sends the message containing
        version indicating value 1,
        msg_type indicating value 0, //Confirmable
        token_length indicating value 0,
        code indicating value 0.00, //Empty Message
        msg_id corresponding to MSG_ID1;
    }
    then {
        the IUT receives the message containing
        status indicating value "message format error";
    }
}
```

### Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_TokenLength_002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>A request with Token Length 9-15 bytes SHALL be processed as a message format error.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

### Initial Conditions

**Expected Behaviour**

```
ensure that {
    when {
        the IUT sends the message containing
        version indicating value 1,
        msg_type indicating value 0, //Confirmable
        token_length indicating value 0,
        code indicating value 0.00, //Empty Message
        msg_id corresponding to MSG_ID1;
    }
    then {
        the IUT receives the message containing
        status indicating value "message format error";
    }
}
```

### Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_NON_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The Client SHALL be able to receive Confirmable response in reply to a Non-confirmable request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

**Initial Conditions**

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT sends a message containing
        msg_type indicating value 1, /* NON-CONFirmable */
        token_length indicating value 0,
        code indicating value 0.01,
        payload indicating value 116 145 167 061 057 116 145 167 062;
    } then {
        the IUT receives the message containing
        msg_type indicating value 0;
    }
}
```

**Final Conditions**

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_NON_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The Client SHALL be able to receive Non-Confirmable response in reply to a confirmable request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

**Initial Conditions**

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT receives a message containing
        msg_type indicating value 0,
        token_length indicating value 0,
        code indicating value 0.01,
        payload indicating value 116 145 167 061 057 116 145 167 062;
    } then {
        the IUT sends the message containing
        msg_type indicating value 1;
    }
}
```

**Final Conditions**

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_NON_003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>IUT is able to send a Non-Confirmable GET request to a multicast address.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
with {
    the IUT shall provide the multicast
}
```

**Expected Behaviour**

```plaintext
ensure that {
    when {
        the IUT sends the messages containing
        version indicating value 1,
        msg_type indicating value 1, /* Non-CONFirmable */
        token_length indicating value 0,
        code indicating value 0.01;
    } then {
```
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_NON_004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>IUT tries to send a Confirmable GET request to a multicast address.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

### Initial Conditions

```plaintext
with {
  the IUT shall provide the multicast
}
```

### Expected Behaviour

```plaintext
ensure that {
  when {
    the IUT sends a message containing
    version indicating value 1,
    msg_type indicating value 0, /* CONfirmable */
    token_length indicating value 0,
    code indicating value 0.01;
  } then {
    the IUT times_out
  }
}
```

### Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_NON_005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>IUT is able to send a Non-Confirmable request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

### Initial Conditions

```
```

### Expected Behaviour

```
ensure that {
  when {
    the IUT sends a request message containing
    version indicating value 1,
    msg_type indicating value 1, //Non-confirmable
    token_length indicating value 0,
    code indicating value 0.01, //GET request
    msg_id corresponding to MSG_ID1;
  } then {
    the IUT receives a response message containing
    version indicating value 1,
    msg_type indicating value 1, //Non-confirmable
    token_length indicating value 0,
    code indicating value 2.05, //Success (Content)
    msg_id corresponding to MSG_ID2;
  }
}
```

### Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_NON_006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>IUT shall be able to send a non-confirmable request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

### Initial Conditions

```
ensure that {
  when {
    the IUT sends a request message containing
    version indicating value 1,
    msg_type indicating value 1, //Non-confirmable
    token_length indicating value 0,
    code indicating value 0.01, //GET request
    msg_id corresponding to MSG_ID1;
  }
  then {
    the IUT receives a response message containing
    version indicating value 1,
    msg_type indicating value 1, //Non-confirmable
    token_length indicating value 0,
    code indicating value 2.05, //Success (Content)
    msg_id corresponding to MSG_ID2;
  }
}
```

### Final Conditions

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_NON_007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>IUT can receive Reset message (RST) when it is not able to process a Non-confirmable message.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

### Initial Conditions

```
with {
  the IUT does not respond
}
```

### Expected Behaviour

```
ensure that {
  when {
    the IUT sends a message containing
    msg_type indicating value 1, //Non-confirmable
    code indicating value 0.01,
    payload indicating value 116 145 167 061 057 116 145 167 062;
    and the IUT does not provide a suitable acknowledgment response
  }
  then {
    the IUT receives the message containing
    msg_type indicating value 3;
  }
}
```
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_ACK_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT SHALL be able to retransmit if acknowledgement is not received.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
ensure that {
when {
    the IUT sends a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    payload indicating value 116 145 167 061 057 116 145 167 062;
    and after ACK_TIMEOUT
}
then {
    the IUT shall retransmit the same message
}
}
```

**Final Conditions**

---

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_ACK_002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>The IUT sends a request only up to MAX_RETRANSMIT if acknowledgement is not received.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```plaintext
ensure that {
when {
    the IUT sends a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    payload indicating value 116 145 167 061 057 116 145 167 062;
    and after ACK_TIMEOUT
    and the IUT retransmit the same message until reaches MAX_RETRANSMIT
    and does not receives the response_message
}
then {
    the IUT process a failure
}
}
```

**Final Conditions**

---
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_ACK_003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>IUT tries to send an Ack message as a request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```
ensure that {
  when {
    the IUT sends a message containing
    msg_type indicating value 2, /* Ack */
    code indicating value 0.1;
  }
  then {
    the IUT times_out
  }
}
```

**Final Conditions**

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_CON_001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Objective</td>
<td>IUT receives a 2.05 status code for a Confirmable request.</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

**Initial Conditions**

```
ensure that {
  when {
    the IUT sends a request message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    token_length indicating value 0,
    code indicating value 0.01;
  }
  then {
    the IUT receives a response message containing
    msg_type indicating value 2, //Acknowledge, from IETF RFC 7252 section 4.2 (a)
    code indicating value 2.05, //Success (Content)
    msg_id corresponding to MSG_ID1;
  }
}
```

**Final Conditions**
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_CON_002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>IUT is able to receive a 4.04 status code for a GET request.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Client</td>
</tr>
<tr>
<td><strong>Initial Conditions</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with {</td>
</tr>
<tr>
<td></td>
<td>the IUT is not able to process the resource</td>
</tr>
<tr>
<td></td>
<td>}</td>
</tr>
<tr>
<td><strong>Expected Behaviour</strong></td>
<td>ensure that {</td>
</tr>
<tr>
<td></td>
<td>when {</td>
</tr>
<tr>
<td></td>
<td>the IUT sends a request message containing</td>
</tr>
<tr>
<td></td>
<td>version indicating value 1,</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 0, //Confirmable</td>
</tr>
<tr>
<td></td>
<td>token_length indicating value 0,</td>
</tr>
<tr>
<td></td>
<td>code indicating value 0.01, //GET request</td>
</tr>
<tr>
<td></td>
<td>payload indicating value 116 145 167 061 057 116 145 167 062;</td>
</tr>
<tr>
<td></td>
<td>}</td>
</tr>
<tr>
<td></td>
<td>the IUT receives a response message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 2, //Acknowledge, from IETF RFC 7252 section 4.2 (a)</td>
</tr>
<tr>
<td></td>
<td>code indicating value 4.04;</td>
</tr>
<tr>
<td></td>
<td>}</td>
</tr>
<tr>
<td><strong>Final Conditions</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_Header_Type_CON_003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>IUT can times_out after sending an empty message as request.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Client</td>
</tr>
<tr>
<td><strong>Initial Conditions</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Expected Behaviour</strong></td>
<td>ensure that {</td>
</tr>
<tr>
<td></td>
<td>when {</td>
</tr>
<tr>
<td></td>
<td>the IUT sends a message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 3, /* Ack */</td>
</tr>
<tr>
<td></td>
<td>code indicating value 0.1;</td>
</tr>
<tr>
<td></td>
<td>}</td>
</tr>
<tr>
<td></td>
<td>the IUT times_out</td>
</tr>
<tr>
<td></td>
<td>}</td>
</tr>
<tr>
<td><strong>Final Conditions</strong></td>
<td></td>
</tr>
</tbody>
</table>
### TP Id TP_CoAP_Client_MessageFormat_Header_Type_CON_004

#### Test Objective
The IUT is able to send an empty message with a correct set version number.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Client

#### Initial Conditions

**Expected Behaviour**

```
ensure that {
  when {
    the IUT sends a request message containing
    version indicating value 1,
    msg_type indicating value 0, //Confirmable
    token_length indicating value 0,
    code indicating value 0.00, //Empty Message
    msg_id corresponding to MSG_ID1;
  }
  then {
    the IUT sends a response message containing
    version indicating value 1,
    msg_type indicating value 3, //Reset
    token_length indicating value 0,
    code indicating value 0.00, //Empty Message
    msg_id corresponding to MSG_ID1;
    or the client times_out
  }
}
```

#### Final Conditions

### TP Id TP_CoAP_Client_MessageFormat_Header_Type_CON_005

#### Test Objective
IUT can send a message containing Option Content-Format.

#### Reference
IETF RFC 7252 [1]

#### PICS Selection
PIC_Client

#### Initial Conditions

```
with {
  the IUT shall provide a resource named coap_URI
}
```

**Expected Behaviour**

```
ensure that {
  when {
    the IUT sends a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.02,
    content_format_options indicating value content_formats_id,
    payload indicating value 116 145 167 061 057 116 145 167 062;
  }
  then {
    the IUT receives the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 2.03;
  }
}
```

#### Final Conditions
<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_MessageFormat_PayloadMarker_001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>The presence of a Payload marker followed by a zero-length payload SHALL be processed as a message format error.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Client</td>
</tr>
<tr>
<td><strong>Initial Conditions</strong></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 sends the message containing</td>
<td></td>
</tr>
<tr>
<td>header indicating value header,</td>
<td></td>
</tr>
<tr>
<td>msg_type indicating value 0, /* CONfirmable */</td>
<td></td>
</tr>
<tr>
<td>token_length indicating value 0,</td>
<td></td>
</tr>
<tr>
<td>host corresponding to DEFAULT_HOST, /*default e.g. [2.001:db8::2:1] */</td>
<td></td>
</tr>
<tr>
<td>port corresponding to DEFAULT_PORT, /*default e.g. 5 683 */</td>
<td></td>
</tr>
<tr>
<td>option_delta indicating value 15,</td>
<td></td>
</tr>
<tr>
<td>payload indicating value 0;</td>
<td></td>
</tr>
<tr>
<td>} then {</td>
<td></td>
</tr>
<tr>
<td>the IUT receives the message containing</td>
<td></td>
</tr>
<tr>
<td>status indicating value &quot;message format error&quot;;</td>
<td></td>
</tr>
<tr>
<td>}</td>
<td></td>
</tr>
<tr>
<td><strong>Final Conditions</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TP Id</th>
<th>TP_CoAP_Client_Separate_Response_001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Objective</strong></td>
<td>The IUT SHALL be able to send an Acknowledgment in a Separate Response.</td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td><strong>PICS Selection</strong></td>
<td>PIC_Client</td>
</tr>
<tr>
<td><strong>Initial Conditions</strong></td>
<td>with {</td>
</tr>
<tr>
<td></td>
<td>the server shall provide a resource named separate</td>
</tr>
<tr>
<td><strong>Expected Behaviour</strong></td>
<td>ensure that {</td>
</tr>
<tr>
<td></td>
<td>when {</td>
</tr>
<tr>
<td></td>
<td>the IUT sends a message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 0, /* CONfirmable */</td>
</tr>
<tr>
<td></td>
<td>code indicating value 0.01,</td>
</tr>
<tr>
<td></td>
<td>uri_path corresponding to SEPARATE_RESOURCE;</td>
</tr>
<tr>
<td></td>
<td>and the server is not able to respond</td>
</tr>
<tr>
<td></td>
<td>} then {</td>
</tr>
<tr>
<td></td>
<td>the IUT first receives an empty message and</td>
</tr>
<tr>
<td></td>
<td>the IUT receives the second message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 0.00, /* Confirmable */</td>
</tr>
<tr>
<td></td>
<td>code indicating value 2.01;</td>
</tr>
<tr>
<td></td>
<td>and</td>
</tr>
<tr>
<td></td>
<td>the IUT sends an empty message containing</td>
</tr>
<tr>
<td></td>
<td>msg_type indicating value 2.00, /* Acknowledgement */</td>
</tr>
<tr>
<td></td>
<td>code indicating value 0.00;</td>
</tr>
<tr>
<td></td>
<td>}</td>
</tr>
<tr>
<td><strong>Final Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Test Objective</td>
<td>The IUT is successfully sending a POST request.</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Reference</td>
<td>IETF RFC 7252 [1]</td>
</tr>
<tr>
<td>PICS Selection</td>
<td>PIC_Client</td>
</tr>
</tbody>
</table>

### Initial Conditions

```mermaid
sequenceDiagram
  actor IUT
  IUT -> Message: msg_type indicating value 0, /* CONfirmable */
  Message -> IUT: code indicating value 0.02,
  IUT -> Message: uri_path corresponding to SEPARATE_RESOURCE,
  Message -> IUT: payload indicating value 116 145 167 061 057 116 145 167 062;
  IUT -> Message: msg_type indicating value 2, /* ACknowledgement */
  Message -> IUT: code indicating value 2.01;
```

### Final Conditions

### Test Objective
The IUT is able to receive response code 2.04 on a POST request.

### Reference
IETF RFC 7252 [1]

### PICS Selection
PIC_Client

### Initial Conditions

```mermaid
sequenceDiagram
  actor IUT
  IUT -> Message: msg_type indicating value 0, /* CONfirmable */
  Message -> IUT: code indicating value 0.02,
  IUT -> Message: uri_path corresponding to SEPARATE_RESOURCE,
  Message -> IUT: payload indicating value 116 145 167 061 057 116 145 167 062;
  IUT -> Message: msg_type indicating value 2, /* ACknowledgement */
  Message -> IUT: code indicating value 2.04;
```

### Final Conditions
TP Id: TP_CoAP_Client_Separate_Response_004

Test Objective: IUT sends a message with a PUT request.

Reference: IETF RFC 7252 [1]

PICS Selection: PIC_Client

---

**Initial Conditions**

```
ensure that {
    when {
        the IUT sends a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.03,
        uri_path corresponding to SEPARATE_RESOURCE,
        payload indicating value 116 145 167 061 057 116 145 167 062;
    }
    then {
        the IUT receives the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 2.04;
    }
}
```

---

**Expected Behaviour**

**Final Conditions**

---

TP Id: TP_CoAP_Client_Separate_Response_005

Test Objective: The IUT is able to send a Get Request with a Separate Response.

Reference: IETF RFC 7252 [1]

PICS Selection: PIC_Client

---

**Initial Conditions**

with {
    the IUT shall provide a resource named separate/new1/new2
}

---

**Expected Behaviour**

```
ensure that {
    when {
        the IUT sends a message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.02,
        uri_path corresponding to SEPARATE_RESOURCE,
        uri_path corresponding to SECOND_LVLRESOURCE,
        uri_path corresponding to THIRD_LVLRESOURCE,
        payload indicating value 116 145 167 061 057 116 145 167 062;
    }
    then {
        the IUT first receives an empty message and
        the IUT receives the second message containing
        msg_type indicating value 0.00, /* Confirmable */
        code indicating value 2.04,
        Location_Path corresponding to SECOND_LVLRESOURCE,
        Location_Path corresponding to THIRD_LVLRESOURCE; /*Try to add two new resources named New1 and New2 which already exist.*/
        and
        the IUT sends an empty message containing
        msg_type indicating value 2.00, /* Acknowledgement */
        code indicating value 0.00;
    }
}
```

---

**Final Conditions**
**TP Id** | TP_CoAP_Client_Separate_Response_006  
**Test Objective** | IUT can receive 2.01 response code for a PUT request.  
**Reference** | IETF RFC 7252 [1]  
**PICS Selection** | PIC_Client

### Initial Conditions

**Expected Behaviour**

ensure that {
  when {
    the IUT sends a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.03,
    uri_path corresponding to SEPARATE_RESOURCE,
    payload indicating value 116 145 167 061 057 116 145 167 062;
  }
  then {
    the IUT receives the message containing
    msg_type indicating value 2, /* ACknowledgement */
    code indicating value 2.01;
  }
}

### Final Conditions

---

**TP Id** | TP_CoAP_Client_Options_OptionLength_001  
**Test Objective** | If the Option Length field is set to 15, it SHALL be processed as a message format error.  
**Reference** | IETF RFC 7252 [1]  
**PICS Selection** | PIC_Client

### Initial Conditions

**Expected Behaviour**

ensure that {
  when {
    the IUT sends a message containing
    msg_type indicating value 0, /* CONfirmable */
    code indicating value 0.01,
    host corresponding to DEFAULT_HOST, /*default e.g. [2 001:db8::2:1] */
    port corresponding to DEFAULT_PORT, /*default e.g. 5 683 */
    option_delta indicating value 3, /*URI-Host */
    option_length indicating value 15;
  }
  then {
    the IUT receives the message containing
    status indicating value "message format error";
  }
}

### Final Conditions
### TP Id: TP_CoAP_Client_Options_URIHost_001

**Test Objective:** IUT is able to receive a BAD_OPTION response code for sending an unrecognized critical option.

**Reference:** [IETF RFC 7252](https://tools.ietf.org/html/rfc7252) [1]

#### Initial Conditions

```plaintext
with {
    the IUT shall provide an option named uri_host_options
}
```

#### Expected Behaviour

```plaintext
ensure that {
    when {
        the IUT sends a message containing
        version indicating value 1,
        msg_type indicating value 0, /* CONfirmable */
        token_length indicating value 0,
        code indicating value 0.03, /* Unrecognized options */
        host corresponding to DEFAULT_HOST,
        port corresponding to DEFAULT_PORT;
    }
    then {
        the IUT receives the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 4.02;
    }
}
```

### TP Id: TP_CoAP_Client_Options_ContentFormat_001

**Test Objective:** IUT receives a 4.15 error code for sending an unsupported content-format.

**Reference:** [IETF RFC 7252](https://tools.ietf.org/html/rfc7252) [1]

#### Initial Conditions

```plaintext
with {
    the IUT shall not provide a text_plain_content_format
}
```

#### Expected Behaviour

```plaintext
ensure that {
    when {
        the IUT sends the message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01, //Get
        content_format_options indicating value content_format_options_id,
        text_plain_content_format indicating value text_plain_content_format_id;
    }
    then {
        the IUT receives the message containing
        msg_type indicating value 2, /* ACknowledgement */
        code indicating value 4.15;
    }
}
```

### Final Conditions
**TP Id** | TP_CoAP_Client_Options_Accept_001  
---|---  
**Test Objective** | The IUT receives a 5.01 response code to an unimplemented options request.  
**Reference** | IETF RFC 7252 [1]  
**PICS Selection** | PIC_Client  

### Initial Conditions

with

the IUT shall not provide a accept_options

### Expected Behaviour

ensure that

when

the IUT sends the message containing

| msg_type indicating value 0, /* CONfirmable */  
| code indicating value 0.01, //Get  
| accept_options indicating value accept_options_id;  

then

the IUT receives the message containing

| msg_type indicating value 2, /* ACknowledgement */  
| code indicating value 5.01;

### Final Conditions

---

---

**TP Id** | TP_CoAP_Client_Options_ConditionalRequest_001  
---|---  
**Test Objective** | The IUT is able to send multiple IfMatch_options in a message request.  
**Reference** | IETF RFC 7252 [1]  
**PICS Selection** | PIC_Client  

### Initial Conditions

with

the IUT shall provide an ifMatch_options

### Expected Behaviour

ensure that

when

the IUT receives the message containing

| msg_type indicating value 0, /* CONfirmable */  
| code indicating value 0.01, // Get  
| ifMatch_options indicating value ifMatch_options_id_1,  
| ifMatch_options indicating value ifMatch_options_id_2;  

then

the IUT sends the message containing

| msg_type indicating value 2, /* ACknowledgement */  
| code indicating value 2.03;

### Final Conditions
### TP CoAP Client Options ConditionalRequest_002

**Test Objective**
IUT is able to send a message containing if-match condition in the request.

**Reference**
IETF RFC 7252 [1]

**PICS Selection**
PIC_Client

#### Initial Conditions

```plaintext
with {
    the IUT specify if_match conditions
}
```

#### Expected Behaviour

```plaintext
ensure that {
    when {
        the IUT sends the message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        if_match_options indicating value if_match_options_id,
        accept_options indicating value accept_options_id;
        and the client fails to fulfil conditions
    }
    then {
        the IUT receives the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 4.12;
    }
}
```

#### Final Conditions

### TP CoAP Client Options ETagRequest_001

**Test Objective**
The IUT is verifying if multiple options can be sent in a request.

**Reference**
IETF RFC 7252 [1]

**PICS Selection**
PIC_Client

#### Initial Conditions

```plaintext
with {
    the IUT shall provide an options named ETag
}
```

#### Expected Behaviour

```plaintext
ensure that {
    when {
        the IUT sends the message containing
        msg_type indicating value 0, /* CONfirmable */
        code indicating value 0.01,
        etag_options_1 indicating value etag_options_id_1,
        etag_options_2 indicating value etag_options_id_2;
    }
    then {
        the IUT receives the message containing
        msg_type indicating value 2, /* ACKnowledgement */
        code indicating value 2.03,
        etag indicating value integer;
    }
}
```

#### Final Conditions
Annex A (normative):
CoAP Test Purposes (TPs)

A.1 Introduction

This Test purpose catalogue has been produced using the Test Description Language (TDL-TO) according to ETSI ES 203 119-4 [2]. The TDL-TO library modules corresponding to the Test purpose catalogue are contained in archive ts_10359601v010101p0.zip which accompanies the present document.
## History

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