Protocol Implementation eXtra Information for Testing (PIXIT) for the IEC 61850 interface in SEL-787-2,-3,-4

Date:
April 19, 2018

Schweitzer Engineering Laboratories, Inc.
PIXIT template for Server

Introduction

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SEL-787-2,-3,-4 with firmware version R200, LIB61850ID=3DB89FD6, and hardware board 1525-1-03. The following are variants of the SEL-787-2,-3,-4: The SEL-710-5 with firmware version R200 and the SEL-700G with firmware version R200. All variants have LIB61850ID=3DB89FD6.

Note: To verify the firmware for multi-variant testing designation, using an ASCII terminal from any access level, issue the following command: ID <cr>. The relay will return information similar to the following:

```plaintext
=>>ID
"FID=SEL-787-4-X347-V0-Z003002-D20180405","091F"
"BFID=BOOTLDR-R501-V0-Z000000-D20140224","0947"
"CID=7FFD","0284"
"DEVID=SEL-787-2E","0474"
"DEVCODE=79","0317"
"PARTNO=07872EE1A0X1D79850670","072C"
"CONFIG=111112010","041B"
"SEL DISPLAY PACKAGE=1.0.40787.3460","0895"
"CUSTOMER DISPLAY PACKAGE=1.575719065","099D"
"iedName=SEL_7XX","058A"
"type=SEL_787d4","04F0"
"configVersion=ICD-787-4-X203-V0-Z200006-D20180403","0D8C"
"LIB61850ID=3DB89FD6","04FF"
```

Where FID is the relay firmware, iedName is the device name for IEC61850, and LIB61850ID is the checksum indicating the 61850 library. LIB61850ID response is the same on products that use the same 61850 library and are variants.

Together with the PICS and the MICS the PIXIT forms the basis for a conformance test according to IEC 61850-10. The PIXIT entries contain information which is not available in the PICS, MICS, TICS documents or SCL file.
Each table specifies the PIXIT for applicable ACSI service model as structured in IEC 61850-10. The “Ed” column indicates if the entry is applicable for IEC 61850 Edition 1 and/or Edition 2.

### PIXIT for Association model

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>As1</td>
<td>1</td>
<td>Maximum number of clients that can set-up an association simultaneously</td>
<td>7</td>
</tr>
<tr>
<td>As2</td>
<td>1,2</td>
<td>TCP_KEEPALIVE value. The recommended range is 1..20s</td>
<td>1-20 seconds</td>
</tr>
<tr>
<td>As3</td>
<td>1,2</td>
<td>Lost connection detection time</td>
<td>1-20 seconds</td>
</tr>
<tr>
<td>As4</td>
<td>-</td>
<td>Authentication is not supported yet</td>
<td>N</td>
</tr>
<tr>
<td>As5</td>
<td>1,2</td>
<td>What association parameters are necessary for successful association</td>
<td>Transport selector Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Session selector  Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Presentation selector  Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AP Title  N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AE Qualifier  N</td>
</tr>
<tr>
<td>As6</td>
<td>1,2</td>
<td>If association parameters are necessary for association, describe the correct values e.g.</td>
<td>Transport selector 0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Session selector 0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Presentation selector 00000001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AP Title  NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AE Qualifier  NA</td>
</tr>
<tr>
<td>As7</td>
<td>1,2</td>
<td>What is the maximum and minimum MMS PDU size</td>
<td>Max MMS PDU size 12000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min MMS PDU size 512</td>
</tr>
<tr>
<td>As8</td>
<td>1,2</td>
<td>What is the maximum starting up time after a power supply interrupt</td>
<td>~15 seconds</td>
</tr>
<tr>
<td>As9</td>
<td>1,2</td>
<td>Does this device function only as test equipment? (test equipment need not have a non-volatile configuration; but it cannot be part of the substation automation system)</td>
<td>N</td>
</tr>
</tbody>
</table>
## PIXIIT for Server model

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
</table>
| Sr1 | 1,2 | Which analogue value (MX) quality bits are supported (can be set by server) | Validity:  
Y Good,  
Y Invalid,  
N Reserved,  
N Questionable  
N Overflow  
N OutOfRange  
N BadReference  
N Oscillatory  
Y Failure  
N OldData  
N Inconsistent  
N Inaccurate  
Source:  
Y Process  
Y Substituted  
Y Test  
N OperatorBlocked |

| Sr2 | 1,2 | Which status value (ST) quality bits are supported (can be set by server) | Validity:  
Y Good,  
Y Invalid,  
N Reserved,  
N Questionable  
N BadReference  
N Oscillatory  
Y Failure  
N OldData  
N Inconsistent  
N Inaccurate  
Source:  
Y Process  
Y Substituted  
Y Test  
N OperatorBlocked |
### PIXIT for Data set model

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ds1</td>
<td>1</td>
<td>What is the maximum number of data elements in one data set (compare ICD setting)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ds2</td>
<td>1</td>
<td>How many persistent data sets can be created by one or more clients (this number includes predefined datasets)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ds3</td>
<td>1</td>
<td>How many non-persistent data sets can be created by one or more clients</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

### PIXIT for Substitution model

Service Not Supported

### PIXIT for Setting group control model

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sg1</td>
<td>1</td>
<td>What is the number of supported setting groups for each logical device</td>
<td>4</td>
</tr>
</tbody>
</table>

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1 IEC 61850-6:2009 clause 9.5.6 states that if only a subrange of the enumeration value set is supported, this shall be indicated within an ICD file by an enumeration type, where the unsupported values are missing.
<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sg2 1,2</td>
<td>What is the effect of when and how the non-volatile storage is updated (compare IEC 61850-8-1 $16.2.4)</td>
<td>Settings group edit not supported</td>
<td></td>
</tr>
<tr>
<td>Sg3 1</td>
<td>Can multiple clients edit the same setting group</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Sg4 1</td>
<td>What happens if the association is lost while editing a setting group</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Sg5 1</td>
<td>Is EditSG value 0 allowed</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Sg6 2</td>
<td>When ResvTms is not present how long is an edit setting group locked</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**PIXIT for Reporting model**

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rp1 1</td>
<td>The supported trigger conditions are (compare PICS)</td>
<td>Not Applicable</td>
<td></td>
</tr>
<tr>
<td>Rp2 1</td>
<td>The supported optional fields are</td>
<td>Not Applicable</td>
<td></td>
</tr>
<tr>
<td>Rp3 1,2</td>
<td>Can the server send segmented reports (when not supported it is allowed to refuse an association with a smaller than minimum PDU size)</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Rp4 1,2</td>
<td>Mechanism on second internal data change notification of the same analogue data value within buffer period (Compare IEC 61850-7-2 $14.2.2.9)</td>
<td>Send report immediately</td>
<td></td>
</tr>
<tr>
<td>Rp5 1</td>
<td>Multi client URCB approach (compare IEC 61850-7-2:2003 $14.2.1)</td>
<td>Not Applicable</td>
<td></td>
</tr>
<tr>
<td>Rp6 -</td>
<td>What is the format of EntryID</td>
<td>Deprecated</td>
<td></td>
</tr>
<tr>
<td>Rp7 1,2</td>
<td>What is the buffer size for each BRCB or how many reports can be buffered</td>
<td>120k bytes or 200 reports, whichever limit is reached first.</td>
<td></td>
</tr>
<tr>
<td>Rp8 -</td>
<td>Pre-configured RCB attributes that are dynamic, compare SCL report settings</td>
<td>Deprecated</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rp9</td>
<td>1</td>
<td>May the reported data set contain: - structured data objects - data attributes</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Rp10</td>
<td>1,2</td>
<td>What is the scan cycle for binary events Is this fixed, configurable</td>
<td>500 ms Fixed</td>
</tr>
<tr>
<td>Rp11</td>
<td>1</td>
<td>Does the device support to pre-assign a RCB to a specific client in the SCL</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Rp12</td>
<td>2</td>
<td>After restart of the server is the value of ConfRev restored from the original configuration or retained prior to restart</td>
<td>Restored from original configuration</td>
</tr>
<tr>
<td>Rp13</td>
<td>1,2</td>
<td>Does the server accept any client to configure / enable a BRCB with ResvTms=-1? What fields are used to do the identification?</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

**PIXIT for Logging model**
Service Not Supported

**PIXIT for GOOSE publish model**

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gp1</td>
<td>1,2</td>
<td>Can the test (Ed1) / simulation (Ed2) flag in the published GOOSE be set</td>
<td>Y To enable the simulation bit in a GOOSE publication, set the value of SEL_7XXCFG/DevIDLPHD1 $CO$PubSim$Oper to True. To disable the simulation bit, set the value of the reference to False.</td>
</tr>
<tr>
<td>Gp2</td>
<td>1</td>
<td>What is the behaviour when the GOOSE publish configuration is incorrect</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>ID</td>
<td>Ed</td>
<td>Description</td>
<td>Value / Clarification</td>
</tr>
<tr>
<td>----</td>
<td>----</td>
<td>-------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Gp3</td>
<td>1,2</td>
<td>Published FCD supported common data classes are</td>
<td>ACD, ACT, CMV, DEL, DPC, DPL, INC, INS, LPL, MV, SEQ, SPC, SPS, and WYE</td>
</tr>
<tr>
<td>Gp4</td>
<td>1,2</td>
<td>What is the slow retransmission time Is it fixed or configurable</td>
<td>60000 ms Configured by SCL</td>
</tr>
<tr>
<td>Gp5</td>
<td>1,2</td>
<td>What is the fastest retransmission time Is it fixed or configurable</td>
<td>4 ms Configured by SCL</td>
</tr>
<tr>
<td>Gp6</td>
<td>-</td>
<td>Can the GOOSE publish be turned on / off by using SetGoCBValues(GoEna)</td>
<td>Deprecated See PICS - SetGoCBValues</td>
</tr>
<tr>
<td>Gp7</td>
<td>1,2</td>
<td>What is the initial GOOSE sqNum after restart</td>
<td>sqNum = 0</td>
</tr>
<tr>
<td>Gp8</td>
<td>1</td>
<td>May the GOOSE data set contain: - structured data objects (FCD) - timestamp data attributes</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
### PIXIT for GOOSE subscribe model

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
</table>
| Gs1 | 1,2| What elements of a subscribed GOOSE message are checked to decide the message is valid and the allData values are accepted? If yes, describe the conditions. Notes:  
  - the VLAN tag may be removed by a ethernet switch and shall not be checked  
  - the simulation flag shall always be checked (Ed2) | Y destination MAC address= as configured in the CID file.  
  Y APPID  
  Y gocbRef = length must be as configured in the CID file.  
  N timeAllowedtoLive  
  Y dataSet= length must be as configured in the CID file.  
  Y If goID is present in the message then length must be as configured in the CID file.  
  N, If goID is not present.  
  N t  
  N stNum  
  N sqNum  
  Y simulation / test = false  
  Y confRev = as configured in the CID  
  Y ndsCom all data accepted if false  
  Y numDatSetEntries as configured in the CID file |
| Gs2 | 1,2| When is a subscribed GOOSE marked as lost?  
(TAL = time allowed to live value from the last received GOOSE message) | GOOSE messages are not accepted or rejected based on TAL from the last received GOOSE message. The device sets an error status for the subscription if a GOOSE message is not received within the TAL interval. The device can be configured to transmit the error status in a GOOSE publication. |
<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gs3</td>
<td>1,2</td>
<td>What is the behaviour when one or more subscribed GOOSE messages isn’t received or syntactically incorrect (missing GOOSE)</td>
<td>If GOOSE messages are skipped, the GOOSE subscriber will issue an out-of-sequence error and wait for the next message to update the status. For syntax errors, the GOOSE subscriber will issue message-corrupted error and wait for the next message to update the status.</td>
</tr>
<tr>
<td>Gs4</td>
<td>1,2</td>
<td>What is the behaviour when a subscribed GOOSE message is out-of-order</td>
<td>The GOOSE subscriber will issue an out-of-sequence error and process the received GOOSE message.</td>
</tr>
<tr>
<td>Gs5</td>
<td>1,2</td>
<td>What is the behaviour when a subscribed GOOSE message is duplicated</td>
<td>The duplicate GOOSE message will be ignored.</td>
</tr>
<tr>
<td>Gs6</td>
<td>1</td>
<td>Does the device subscribe to GOOSE messages with/without the VLAN tag</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Gs7</td>
<td>1</td>
<td>May the GOOSE data set contain: - structured data objects (FCD) - timestamp data attributes</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Gs8</td>
<td>1,2</td>
<td>Subscribed FCD supported common data classes are</td>
<td>All CDCs except these: HMV, HWYE, HDEL, and CSD</td>
</tr>
<tr>
<td>Gs9</td>
<td>1,2</td>
<td>Are subscribed GOOSE with test=T (Ed1) / simulation=T (Ed2) accepted in test/simulation mode</td>
<td>Y, the LGOS Logical Node type is not implemented, so acceptance or rejection of GOOSE messages in simulation mode must be determined by evaluating an associated data object, e.g. by using a GOOSE ping-pong technique.</td>
</tr>
<tr>
<td>Gs10</td>
<td>1,2</td>
<td>Max number of dataset members</td>
<td>Count = 200</td>
</tr>
</tbody>
</table>
### PIXIT for GOOSE performance

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gf1</td>
<td>1,2</td>
<td>Performance class</td>
<td>P2/P3</td>
</tr>
<tr>
<td>Gf2</td>
<td>1,2</td>
<td>GOOSE ping-pong processing method</td>
<td>Scan cycle based</td>
</tr>
<tr>
<td>Gf3</td>
<td>1,2</td>
<td>Application logic scan cycle (ms)</td>
<td>Max. 500 ms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min. 4 ms</td>
</tr>
<tr>
<td>Gf4</td>
<td>1</td>
<td>Maximum number of data attributes in GOOSE dataset (value and quality has to be counted as separate attributes)</td>
<td>Based on maximum Ethernet frame size</td>
</tr>
</tbody>
</table>

### PIXIT for Control model

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ct1</td>
<td>1</td>
<td>What control models are supported (compare PICSICD file enums for Ed2)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ct2</td>
<td>1,2</td>
<td>Is the control model fixed, configurable and/or dynamic</td>
<td>Configurable in the CID file</td>
</tr>
<tr>
<td>Ct3</td>
<td>-</td>
<td>Is TimeActivatedOperate supported (compare PICS or SCL)</td>
<td>Deprecated</td>
</tr>
<tr>
<td>Ct4</td>
<td>-</td>
<td>Is &quot;operate-many&quot; supported (compare sboClass)</td>
<td>Deprecated, see sboClass in datamodel (ICD)</td>
</tr>
<tr>
<td>Ct5</td>
<td>1</td>
<td>Will the DUT activate the control output when the test attribute is set in the SelectWithValue and/or Operate request (when N test procedure Ctl2 is applicable)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ct6</td>
<td>-</td>
<td>What are the conditions for the time (T) attribute in the SelectWithValue and/or Operate request</td>
<td>Deprecated</td>
</tr>
<tr>
<td>Ct7</td>
<td>-</td>
<td>Is pulse configuration supported (compare pulseConfig)</td>
<td>Deprecated</td>
</tr>
<tr>
<td>ID</td>
<td>Ed</td>
<td>Description</td>
<td>Value / Clarification</td>
</tr>
<tr>
<td>----</td>
<td>----</td>
<td>-------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Ct8</td>
<td>1</td>
<td>What is the behaviour of the DUT when the check conditions are set</td>
<td>Not Applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is this behaviour fixed, configurable, online changeable</td>
<td></td>
</tr>
<tr>
<td>Ct9</td>
<td>1,2</td>
<td>Which additional cause diagnosis are supported</td>
<td>N Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Not-supported for Ed1, Y for Ed2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Blocked-by-switching-hierarchy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Select-failed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Invalid-position</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Position-reached</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Parameter-change-in-execution</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Step-limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Blocked-by-Mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Blocked-by-process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Blocked-by-interlocking</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Blocked-by-synchrocheck</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Command-already-in-execution</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Blocked-by-health</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N 1-of-n-control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Abortion-by-cancel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Time-limit-over</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Abortion-by-trip</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Object-not-selected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Object-already-selected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N No-access-authority</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Inconsistent-parameters</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Locked-by-other-client</td>
</tr>
<tr>
<td>Ct10</td>
<td>1,2</td>
<td>How to force a “test-not-ok” respond with SelectWithValue request</td>
<td>Send the SelectWithValue request with an orCat value greater than 8</td>
</tr>
<tr>
<td>ID</td>
<td>Ed</td>
<td>Description</td>
<td>Value / Clarification</td>
</tr>
<tr>
<td>------</td>
<td>----</td>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Ct11</td>
<td>1,2</td>
<td>How to force a “test-not-ok” respond with Select request</td>
<td>The control service Select is not supported.</td>
</tr>
</tbody>
</table>
| Ct12 | 1,2| How to force a “test-not-ok” respond with Operate request                     | DOns: 
SBOns: not supported 
DOes: 
SBOes: 
Send the Operate request with an orCat value greater than 8. |
| Ct13 | 1,2| Which origin categories are supported / accepted                              | Y bay-control 
Y station-control 
Y remote-control 
Y automatic-bay 
Y automatic-station 
Y automatic-remote 
Y maintenance 
Y process |
| Ct14 | 1,2| What happens if the orCat value is not supported or invalid                  | DOns: 
SBOns: Not supported 
DOes: 
SBOes: 
DUT issues “test-not-ok” response with AddCause value “Not-supported” |
| Ct15 | 1,2| Does the IED accept a SelectWithValue / Operate with the same control value as the current status value | DOns: Y 
SBOns: NA 
DOes: N 
SBOes: N 
Configurable N |
| Ct16 | 1  | Does the IED accept a select/operate on the same control object from 2 different clients at the same time | DOns: Y 
SBOns: Not Applicable 
DOes: DOes does not accept oper from second client. 
SBOes: Y |
<table>
<thead>
<tr>
<th>ID</th>
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<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ct17</td>
<td>1</td>
<td>Does the IED accept a Select/SelectWithValue from the same client when the control object is already selected (Tissue #334)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ct18</td>
<td>1,2</td>
<td>Is for SBOes the internal validation performed during the SelectWithValue and/or Operate step</td>
<td>Mod=Off check performed at Operate</td>
</tr>
<tr>
<td>Ct19</td>
<td></td>
<td>Can a control operation be blocked by Mod=Off or [On-]Blocked (Compare PIXIT-Sr5)</td>
<td>Deprecated</td>
</tr>
<tr>
<td>Ct20</td>
<td>1,2</td>
<td>Does the IED support local / remote operation</td>
<td>Y</td>
</tr>
<tr>
<td>Ct21</td>
<td>1,2</td>
<td>Does the IED send an InformationReport with LastApplError as part of the Operate response- for control with normal security</td>
<td>SBOns: Not applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DOns: Y</td>
</tr>
<tr>
<td>Ct22</td>
<td>2</td>
<td>How to force a “parameter-change-in-execution”</td>
<td>SBOns: Not Applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SBOes: Not Applicable</td>
</tr>
<tr>
<td>Ct23</td>
<td>1,2</td>
<td>How many SBOns/SBOes control objects can be selected at the same time?</td>
<td>SBOns: N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SBOes: multiple = 10</td>
</tr>
<tr>
<td>Ct24</td>
<td>1,2</td>
<td>Can a controllable object be forced to keep its old state e.g. Internal Controllable Objects may not be accessible to force this, whereas a switch like Circuit Breaker outside the DUT can?</td>
<td>Y</td>
</tr>
<tr>
<td>Ct25</td>
<td>1,2</td>
<td>When CDC=DPC is supported, is it possible to have DPC (Controllable Double Point) go to the intermediate state? (00)</td>
<td>Y</td>
</tr>
<tr>
<td>ID</td>
<td>Ed</td>
<td>Description</td>
<td>Value / Clarification</td>
</tr>
<tr>
<td>-----</td>
<td>----</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ct26</td>
<td>1,2</td>
<td>Name a DOes point (if any) with a finite operate timeout and specify the timeout (in milliseconds)</td>
<td>SEL_7XXPRO/DC1CSWI1, DOes: Configurable in the CID file SBOes: Configurable in the CID file Default: 10seconds</td>
</tr>
<tr>
<td>Ct27</td>
<td>2</td>
<td>Does the IED support control objects with external signals?</td>
<td>DOns: Y SBOns: Not Applicable DOes: Y SBOes: Y</td>
</tr>
<tr>
<td>Ct28</td>
<td>2</td>
<td>Does the IED support DPC control objects with external signals?</td>
<td>DOns: Y SBOns: Not Applicable DOes: Y SBOes: Y</td>
</tr>
</tbody>
</table>
## PIXIT for Time synchronisation model

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tm1</td>
<td>1</td>
<td>What time quality bits are supported (may be set by the IED)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Tm2</td>
<td>1,2</td>
<td>Describe the behaviour when the time server(s) ceases to respond</td>
<td>On one time server: Time is received from remaining server</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What is the time server lost detection time</td>
<td>On all time servers: The IED sets ClockNotSynchronized</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5-20 seconds depending on relay settings. Default is 5 secs.</td>
</tr>
<tr>
<td>Tm3</td>
<td>1,2</td>
<td>How long does it take to take over the new time from time server</td>
<td>15-3600 seconds depending on relay settings. Default is 60 secs.</td>
</tr>
<tr>
<td>Tm4</td>
<td>1,2</td>
<td>When is the time quality bit “ClockFailure” set</td>
<td>The IED sets ClockFailure when the relay is in a “Disabled” state</td>
</tr>
<tr>
<td>Tm5</td>
<td>1,2</td>
<td>When is the time quality bit “Clock not Synchronized” set</td>
<td>When connection to all time servers is lost (see PIXIT-Tm2)</td>
</tr>
<tr>
<td>Tm6</td>
<td></td>
<td>Is the timestamp of a binary event adjusted to the configured scan cycle</td>
<td>Deprecated</td>
</tr>
<tr>
<td>Tm7</td>
<td>1</td>
<td>Does the device support time zone and daylight saving</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Tm8</td>
<td>1,2</td>
<td>Which attributes of the SNTP response packet are validated</td>
<td>Y Leap indicator not equal to 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y Mode is equal to SERVER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y OriginateTimestamp is equal to value sent by the SNTP client as Transmit Timestamp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N RX/TX timestamp fields are checked for reasonableness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y SNTP version 3 and/or 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N other (describe)</td>
</tr>
<tr>
<td>Tm9</td>
<td>1,2</td>
<td>Do the COMTRADE files have local time or UTC time and is this configurable</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N Configurable</td>
</tr>
</tbody>
</table>
### PIXIT for File transfer model

<table>
<thead>
<tr>
<th>ID</th>
<th>Ed</th>
<th>Description</th>
<th>Value / Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ft1</td>
<td>1</td>
<td>What is structure of files and directories</td>
<td>Not Applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Where are the COMTRADE files stored</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Are comtrade files zipped and what files are included in each zip file</td>
<td></td>
</tr>
<tr>
<td>Ft2</td>
<td>1,2</td>
<td>Directory names are separated from the file name by “/”</td>
<td></td>
</tr>
<tr>
<td>Ft3</td>
<td>1</td>
<td>The maximum file name size including path (recommended 64 chars)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ft4</td>
<td>1,2</td>
<td>Are directory/file name case sensitive</td>
<td>Not Case sensitive</td>
</tr>
<tr>
<td>Ft5</td>
<td>1,2</td>
<td>Maximum file size for SetFile</td>
<td>Not limited. Depends on available memory.</td>
</tr>
<tr>
<td>Ft6</td>
<td>1</td>
<td>Is the requested file path included in the MMS fileDirectory respond file name</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ft7</td>
<td>1</td>
<td>Is the wild char supported MMS fileDirectory request</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Ft8</td>
<td>1,2</td>
<td>Is it allowed that 2 clients get a file at the same time</td>
<td>N same file</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Y different files</td>
</tr>
<tr>
<td>Ft9</td>
<td>1,2</td>
<td>Which files can be deleted</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

### PIXIT for Service tracking model

Service Not Supported