Solution to redmine 6724

### GOOSE subscribe without publish

July 26, 2024

The expected result of mandatory sGos12 demands that DUT sends (so, it publishes) a GOOSE message. What if DUT does not have Publisher services, or its GoCB do not refer dataset with the subscribed state change?

Some devices only support GOOSE subscribe. To verify the subscription is working it can’t send GOOSE nor a report. For example it may display the value on a webpage. This requires a general change:

To perform the DUT subscribe test procedures in a client device (without GOOSE publish nor report) the DUT shall display the values from the dataset in some method.

To proof a subscribed GOOSE message is processed the test engineer can compare GOOSE value versus the displayed value.

Updated: Change "display" to "exposes as described in PIXIT"

Add to the condition table

| 9b: GOOSE subscribe | sGos1, sGos2, sGos3, sGos5, sGos6a, sGos7, sGos8, sGos9, sGos10, sGos11, sGos12, sGos14, sGos15, sGos16, sGos17, sGos20, sGos21, sGos22, sGos23, sGosN1, sGosN2, sGosN3, sGosN4, sGosN5, sGosN6, sGosN7 | SCL-LPHD.Sim=T: sGos6b  SCL-McSecurity not supported: sGos13 |
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| **Test case** | **Test case description** |
| sGos1 | Send GOOSE messages with/without the VLAN tag, VLANID=0, resp. with Reserved1 R>0 with new data and check if the message is received and the data has the new value by e.g. check binary output, event list, logging or MMI |
| sGos2 | Send GOOSE messages with the ndsCom parameter set. Verify that on a status change the values are not used for operational purposes (IEC 61850-7-2 Subclause 18.2.3.8) |
| sGos3 | Proper detection and action roll-over of sqNum with no status change (sqNum=max -> sqNum = 1) and with status change (sqNum=max -> sqNum = 0) |
| sGos4 | <not applicable> |
| sGos5 | Verify that the server can subscribe to GOOSE messages with structured data (FCD) and destination MAC-address outside recommended range |
| sGos6 | Send subscribed GOOSE messages with the Simulation parameter set (IEC 61850-7-2 Subclause 18.2.3.8).  Verify that   1. when the subscriber is not in simulation mode (LPHD.Sim.stVal=false or not present) the   simulated values are ignored. The subscriber shall keep on using the "real" GOOSE messages   1. when the subscriber is in simulation mode (LPHD.Sim.stVal=true) the simulated values are used for operational purposes. The subscriber shall ignore the "real" GOOSE messages **after a first simulated one has been received.** The corresponding LGOS.SimSt shall be set when the first simulated message is received and cleared when LPHD.Sim.stVal is set to false. |
| sGos7 | Verify that the server can subscribe GOOSE messages with maximum name length for DatSet, GoCBRef and GoID (IEC 61850-7-2 Subclause 22.2) |
| sGos8 | Subscribe GOOSE messages with non-1 boolean “true” value |
| sGos9 | Subscribe GOOSE messages with “fixed length” GOOSE |
| sGos10 | Subscribe GOOSE messages with ldName |
| sGos11 | Subscribe GOOSE messages with private DO |
| sGos12 | Process first GOOSE message after state change |
| sGos13 | Subscribe GOOSE messages with security bits and trailer and non-zero Reserved 1 R |
| sGos14 | Subscribe to Ed1 GOOSE message without goID |
| sGos15 | Subscribe to 2 different GOOSE streams with the same AppID value |
| sGos16 | Subscribe GOOSE message with enum value >127 and negative |
| sGos17 | Subscribe GOOSE message from ServerAt access point |
| sGos20 | Subscribe GOOSE with existing CDC extended with DA with new FC (K2.2) |
| sGos21 | Subscribe GOOSE with existing CDC with renamed DA, subDO or subDA (K2.7) |
| sGos22 | Subscribe GOOSE with existing CDC with extended PACKEDLIST (K2.17) |
| sGos23 | Verify processing of GOOSE data values with quality.test |

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| **cGos1** | **Subscribe GOOSE message with/without VLAN and Reserverd1 R>0** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1, Annex B  PIXIT: Gs8 | | |
| Expected result  1,2,3,4. DUT exposes the new value (PIXIT) | | |
| Test description  Test engineer configures the DUT with subscribed GOOSE (ping-pong mechanism) with destination MAC-Address in the recommended range and Reserved fields all zero  1. Publisher sends GOOSE message with new data value with the VLAN tag  2. Publisher sends GOOSE message with new data value without the VLAN tag  3. Publisher sends GOOSE message with new data value with VLAN ID = 0  4. Publisher sends GOOSE message with new data value with the VLAN tag and Reserved1 R not zero | | |
| Comment | | |

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| **cGos2** | **Subscribe GOOSE with ndsCom set** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1 | | |
| Expected result  4. DUT does NOT expose the new value (PIXIT) | | |
| Test description   1. Test engineer configures the DUT as specified (without a "safe position" mechanism) 2. Publisher sends GOOSE message with old data value with NdsCom=F 3. Publisher sends GOOSE message with old data value with NdsCom=T 4. Publisher sends GOOSE message with new data value with NdsCom=T | | |
| Comment  Note: The GOOSE subscribe test procedures can only be performed when the device under test does not set a GOOSE subscribe depending value to a safe position in case GOOSE message is lost | | |

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| **cGos3** | **SqNum roll-over with/without status change** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1  PIXIT: Gs4 | | |
| Expected result   1. DUT indicates no error 2. DUT indicates no error 3. DUT exposes the new value (PIXIT) | | |
| Test description   1. Publisher sends GOOSE message with sqNum = max–1, max and 1 without status change 2. Publisher sends GOOSE message with sqNum = max–1, max 3. Publisher forces a status change stNum and sends a GOOSE message with incremented stNum and sqNum=0 | | |
| Comment | | |

Note: sGos4 LGOS is not applicable for client device

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| **cGos5** | **Subscribe to data set with structured data (FCD) and destination MAC-address outside recommended range** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1  PIXIT: Gs8 | | |
| Expected result  2. DUT exposes the new value (PIXIT) | | |
| Test description  Test engineer configures the DUT with subscribed GOOSE ping-pong mechanism with destination MAC-Address outside the recommended range   1. Publisher sends GOOSE message with structured data 2. Publisher sends GOOSE message with a data change in a data attribute in the structured data | | |
| Comment | | |

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| **cGos6** | **Subscribe GOOSE with simulation parameter set** | Passed  Failed  Inconclusive |
| IEC 61850-7-1 Subclause 7.8.2  IEC 61850-7-2 Subclause 18.2.3.8  IEC 61850-8-1 Subclause 18.1  PIXIT: Gs9 | | |
| Expected result   1. LPHD.Sim.stVal = FALSE or not present 2. DUT accepts the normal GOOSE messages 3. DUT ignores the simulated data value change 4. DUT indicates missing GOOSE 5. LPHD.Sim.stVal = TRUE 6. DUT accepts the Publisher 1 GOOSE messages because no simulated GOOSE messages have been received yet, state: subscription normal goose as long as no simulated goose received. DUT accepts GOOSE messages from Publisher 3, LGOS3.St=TRUE and does not change in following steps 7. DUT changes state: subscription simulated GOOSE 8. DUT accepts the simulated data value change 9. DUT state: wait for simulated GOOSE 10. DUT ignores the normal GOOSE messages 11. DUT continues to accept GOOSE messages from Publisher 3 12. DUT wait for normal GOOSE 13. DUT state: subscription normal GOOSE | | |
| Test description  Below, Publisher 1 and Publisher 2 send same GOOSE differing only in Simulation bits. Publisher 3 sends different GOOSE messages. Publisher 1/2 are supervised by LGOS, publisher 3 is supervised by LGOS3.   1. LPHD.Sim=FALSE or not present 2. Force the DUT to ignore simulated GOOSE messages when LPHD.Sim is present 3. Publisher1 sends GOOSE message with a new data value with Simulation off 4. Publisher2 sends GOOSE message with a new data value with Simulation set 5. Publisher1 stops sending GOOSE message, Publisher2 stops sending GOOSE messages 6. LPHD.Sim=TRUE 7. Force the DUT to accept simulated GOOSE messages 8. Publisher1 and Publisher 3 sends GOOSE message with a new data value with Simulation off 9. Then publisher2 starts sending GOOSE message with Simulation set 10. Publisher2 sends GOOSE message with a new data value with Simulation set 11. Publisher2 stops sending GOOSE messages with Simulation set 12. Publisher1 sends GOOSE message with a new data value with Simulation off 13. Publisher1 stops sending GOOSE message with Simulation off 14. Force DUT to accept normal GOOSE messages 15. Publisher1 sends GOOSE message with a new data value with Simulation off | | |
| Comment  Part a) is mandatory; part b) is required only if LPHD.Sim can ever be reported as TRUE | | |

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| **cGos7** | **GOOSE with maximum name length for DatSet, GoCBRef and GoID** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3.8  IEC 61850-8-1 Subclause 18.1 | | |
| Expected result  1. The DUT accepts the GOOSE messages and exposes data changes | | |
| Test description   1. Configure the DUT to accept GOOSE messages with maximum name length for DatSet (32), GoCBRef (containing a GoCB of   32) and GoID (129) | | |
| Comment | | |

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| **cGos8** | **Subscribe GOOSE message with non-1 as boolean “true” value** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1 | | |
| Expected result   1. DUT exposes the new value (PIXIT) | | |
| Test description  Test engineer configures the DUT with subscribed GOOSE (ping-pong mechanism)   1. Publisher sends GOOSE message with boolean “false” as value 0x00 2. Publisher sends GOOSE message withboolean “true” as value 0x02 | | |
| Comment  Note the goal is to verify that the subscriber accepts any boolean value >0 as “true” | | |

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| **cGos9** | **Subscribe GOOSE message with “fixed length” GOOSE** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause A.3  PIXIT Gs8 | | |
| Expected result   1. DUT exposes the new integer value (PIXIT)   4. DUT exposes the new boolean value (PIXIT) | | |
| Test description  Test engineer configures the DUT with subscribed GOOSE (ping-pong mechanism) containing a “Beh” structure and an integer value and a boolean value. The pong dataset need not need to contain every ping attribute.  When INS or ENS subscribe is supported (PIXIT Gs8)   1. Publisher sends “fixed length” GOOSE with initial integer value 2. Publisher sends “fixed length” GOOSE with other integer value   When INS subscribe is not supported  3. Publisher sends “fixed length” GOOSE with initial boolean value  4. Publisher sends “fixed length” GOOSE with other boolean value | | |

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| **cGos10** | **Subscribe GOOSE message with ldName** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1 | | |
| Expected result   1. DUT exposes the new value (PIXIT) | | |
| Test description  Test engineer configures the DUT with subscribed GOOSE (ping-pong mechanism) from a GoCB with dataset elements from a logical device with a configured ldName.   1. Publisher sends GOOSE messages with boolean “false” value 2. Publisher sends GOOSE messages with boolean “true” value | | |
| Comment | | |

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| **cGos11** | **Subscribe GOOSE message with private DO** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1 | | |
| Expected result   1. DUT exposes the new value(PIXIT) | | |
| Test description  Test engineer configures the DUT with subscribed GOOSE (ping-pong mechanism) from a GoCB with dataset elements from a private logical node and private DO.   1. Publisher sends GOOSE messages with boolean “false” value 2. Publisher sends GOOSE messages with boolean “true” value | | |
| Comment | | |

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| **cGos12** | **Process first GOOSE message after state change** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3.6 | | |
| Expected result   1. DUT exposes the new value within 1 second (PIXIT) | | |
| Test description  Test engineer configures the DUT with subscribed GOOSE (ping-pong mechanism)   1. Publisher sends multiple GOOSE messages with incremented sqNum, timeAllowedToLive=2000 milliseconds 2. Publisher sends one GOOSE message with incremented stNum, sqNum=0, timeAllowedToLive=2000 milliseconds and wait for 2 seconds (the publisher does not re-transmit the GOOSE message in these 2 seconds) | | |
| Comment | | |

Similar for sGos13 to sGos23

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| **cGosN1** | **Missing GOOSE message** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1  PIXIT: Gs3 | | |
| Expected result  3. DUT may indicate a missing GOOSE and exposes the new value (PIXIT) | | |
| Test description   1. Test engineer configures the DUT as specified 2. Publisher sends correct GOOSE message with no value changes (same stNum) 3. Publisher sends GOOSE message with data value change with incremented stNum, starting with sqNum=1 (simulating a   missing sqNum=0) | | |
| Comment | | |

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| **cGosN5** | **No GOOSE message** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.3  IEC 61850-8-1 Subclause 18.1, PIXIT: Gs2 | | |
| Expected result   1. DUT indicates that subscribed GOOSE message isn’t received (PIXIT) 2. DUT indicates that subscribed GOOSE message is received again (PIXIT) 3. DUT indicates that subscribed GOOSE message isn’t received (PIXIT) 4. DUT shall expose the new value(s) (PIXIT) | | |
| Test description   1. Test engineer configures the DUT as specified 2. Publisher sends correct GOOSE message with no value changes (same stNum) 3. Publisher is disconnected from the network, continues to send GOOSE messages for 30 seconds with no state change   (e.g. same stNum as step 2).   1. Publisher is reconnected to the network and continues to send GOOSE messages (same stNum) 2. Publisher is disconnected from the network, continues to send GOOSE messages for 30 seconds with no state change   (e.g. same stNum as step 2).   1. Publisher is reconnected to the network and continues sends GOOSE messages indicating a state change (incremented   stNum, sqNum other than 0) | | |
| Comment | | |

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| **cGosN6** | **Invalid GOOSE message** | Passed  Failed  Inconclusive |
| IEC 61850-7-2 Subclause 18.2.1, 18.2.3  IEC 61850-8-1 Subclause 18.1, Annex C, PIXIT: Gs1 | | |
| Expected result  DUT processes the GOOSE message values as specified in the PIXIT | | |
| Test description  Test engineer configures the DUT as specified below and Publisher sends several GOOSE message with data value change with correct status & sequence numbers with:   1. GoCB reference = mismatch with SCL, NULL 2. timeAllowedtoLive = 0 3. datSet reference = mismatch with GoCB from SCL, NULL 4. goID reference = mismatch with GoCB from SCL, NULL 5. timestamp of status change = plus one hour, minus one hour, 0 6. confRev = mismatching with GoCB from SCL 7. numDatSetEntries = mismatch with the expected number of DataSet element members from SCL. The confRev remains as expected, but the numDatSetEntries changes +1 and then -1 and the allData matches the number of numDatSetEntries (+1 add one value at the end and -1 remove last value) 8. values of allData entries (same DatSetReference, same expected ConfRev) = data type values out-of-order 9. APPID = mismatch from GoCB from SCL and 0 | | |
| Comment | | |

PIXIT Entry

Describe how the values in a GOOSE message are visible to the test engineer

Describe how the GOOSE message errors are visible to the test engineer

**PIXIT for GOOSE subscribe model**

| **ID** | **Ed** | **Description** | | **Value / Clarification** |
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| 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 an Ethernet switch and shall not be checked * the simulation flag shall always be checked (Ed2) * the ndsCom shall always be checked | | Y/N destination MAC address as  configured in SCL  Y/N APPID  Y/N gocbRef  Y/N timeAllowedtoLive  Y/N datSet  Y/N goID  Y/N T  Y/N stNum  Y/N sqNum  Y simulation / test  Y/N confRev  Y/N numDatSetEntries  Y/N out-of-order dataset  members |
| Gs2 | 1,2 | When is a subscribed GOOSE marked as lost  (TAL = time allowed to live value from the last received GOOSE message) | a) message does not arrive prior to TAL  b) message does not arrive by 2x TAL  c) message does not arrive by TAL plus configurable time  d) other (describe) | |
| Gs3 | 1,2 | What is the behaviour when one or more subscribed GOOSE messages is not received or syntactically incorrect (missing GOOSE) | |  |
| Gs4 | 1,2 | What is the behaviour when a subscribed GOOSE message is out-of-order | |  |
| Gs5 | - | What is the behaviour when a subscribed GOOSE message is duplicated | | This entry has never been used. sGosN2 specifies to ignore duplicates without any choice of behaviours |
| Gs7 | 1 | May the GOOSE data set contain:  - structured data objects (FCD)  - timestamp data attributes | | Y/N  Y/N |
| Gs8 | 1,2 | Subscribed FCD supported common data classes are | | <list of common data classes>  Arrays are [not] supported |
| Gs10 | 1,2 | Max number of dataset members | | Unlimited or count |
| Gs12 | Amd1 | Is the “processing data as invalid” configurable?  When not configurable how does the subscriber “process data as invalid”? | | Y/N  Keep last non test value Y/N  Substitute to a configured value Y/N  Set derived quality to invalid: Y/N  Other: <describe> |
| Gs13 | Amd1 | Describe how the client exposes the value received in a GOOSE message | | <description> |
| Gs14 | Amd1 | Describe how the client exposes GOOSE receive errors | | <description> |
|  |  | <additional items> | |  |