

**DRAFT**  
**Highlights of the Testing Teleconference**  
**Held on 7 April 2009 (14:00 to 16:14 UTC)**

## **Introductions**

This was a teleconference to review the draft Client Testing Procedures, discuss recent proposals for GOOSE performance testing, cover some details on Server Test Cases and possible updates to the Test Procedures Change List (TPCL), and discuss action items and pending future activities for Testing. The agenda and invitation to participate was sent out to all the individuals on the Testing E-Mail List on 30 March 2009. Draft reference documents had been sent out and/or posted earlier. The Teleconference was held on April 7 starting at 14:00 UTC (10:00 AM US East Coast, 7:00 AM West Coast and 16:00 Europe Time). The Teleconference lasted just over 2 hours and was adjourned at 16:14 UTC. Jack Robinson prepared the minutes (this document).

## **Participants**

The following people participated in the Teleconference:

- Tan, JC --- Kinectrics
- Janssen, Marco --- Utinovation, UCAIug QAP Editor
- Muschlitz, Bruce --- Chair Testing SubCommittee
- Falk, Herb --- SISCO
- Cottrell, Eric --- Doble
- Steinhauser, Fred --- ABB
- Flohil, Marijn --- KEMA
- Sanders, Miriam --- Amertek
- Wycinka, Marcin --- AREVA-TD
- Robinson, Jack --- UCAIug and Testing SubCommittee Secretary
- Schimmel, Richard --- KEMA, IEC 61850 Test Procedures/ Issues Editor

## **REFERENCES:**

- A. Teleconference 3 March 2009 Minutes, Jack Robinson, Dated 3 March 2009
- B. E-Mail Teleconference 7 April Announcement/ Agenda, Posted 30 March 2009, Bruce Muschlitz
- C. PIXIT Template Version 1.1, Richard and Bruce, Posted 24 March 2009
- D. GOOSE Performance Testing, References/ E-Mails November 2008 through 5 April 2009
- E. Draft Test Procedures Approved Change List (TPCL) against Server Version 2.2 (version 1.1), Richard Schimmel Editor, Dated 4 March 2009
- F. Draft Client Test Procedures Version 1.05/ With Comment Record, Richard Schimmel Editor, Dated 1 April 2009

## Opening Remarks

Bruce Muschlitz, Testing Subcommittee Co-Chair, conducted the teleconference. We first reviewed the agenda (see Reference B). We changed the agenda order to first cover coordination for our May meeting. Jack Robinson agreed to take the minutes.

## Testing Meeting: May 2009

Our next face-to-face Testing Meeting will be after the Pittsburgh IEEE PSRC meeting 14-15 May, 2009. Bruce noted that there is a conflict with an EPRI meeting scheduled for Thursday 14 May, Noon to 4 PM, after the PSRC ends. Several people, including Bruce and Marco, desire to go to both the EPRI and the Testing meeting. After some discussion, we agreed to start the formal Testing meeting at 3 PM and end at 6 PM. We will schedule the room earlier for anyone who wants to meet informally. On Friday, May 15, Testing will meet from 8 AM to 1 PM. We will hold the room through Friday afternoon for anyone who may want to continue. Kay Clinard is working with Bruce to setup the meeting room.

## Approval of 3 March 2009 Minutes

Bruce asked about several of the outstanding action items in the minutes.

Item #5: The Server TPCL has been updated and posted as Version 1.1 (Reference E).

Item #7: Christof Pastors to check with Henry Dawidczak on the status of the Siemens SCL Conformance Check Tool and how we could make it available for UCAIug Members. This remains open.

Item #8: Richard to draft a letter to Christoph Brunner, Convener TC 57/WG 10, requesting that Christoph and Pascal Tantin, Convener of TC 38, discuss the possibility of joint coordination and the possibility of UCAIug publishing the Merging Unit test procedures. Richard reported that the letter was sent and there was a positive response. TC 38 is receptive to having the WG10 and UCAIug prepare the abstract respectively detailed test procedures. We need to assign a working group and get formal approval to move forward.

Item #9: Handling of Clock Failure to be included in the PIXIT. Richard sent out the draft changes on 24 March for review and comment. The final recommendations are included in the latest PIXIT (Reference C). No further action needed.

There were no recommended changes to the March 3 minutes, Reference A, and they are approved.

## Client Testing Procedures

The Client Test Procedures were originally released as Version 1.0, dated March 2008. KEMA submitted a formal request in accordance with the UCAIug Testing Quality Assurance Program and has been accredited as an IEC 61850 Client Tester. The associated Client Device Certificate was accepted and posted on the UCAIug Site along with an announcement about the Client Testing Milestone.

KEMA had created a relatively long list of changes, about 70 pages, to the Client Test Procedures based upon the first specimen test. As discussed at our last teleconference, the changes clarify the text in the procedures and do not impact the content or scope of the test cases. Richard prepared an updated draft of the Client Test Procedure (Version 1.05) with all the changes and this was sent out 24 March. There were several review comments. The comments and pending updates were sent out in a ZIP file on April 1 (see Reference F). The group has not had time to check the recent update.

Marco noted that these latest April 1 Client Test Procedure documents are not on the Web Site. Jack will upload these to the Testing Subcommittee/ Working Group Directory. (This has been completed.) Bruce took an action item to send the Client Test Procedure Documents to Miriam. (This has been completed.)

We agreed to review this latest version and send written comments back to Richard in 2 weeks. Richard will then respond in one week and we will discuss by teleconference on April 28. Our goal is to approve and release the final Client Test Procedures as Version 1.1.

## **Server Test Procedure Changes**

Richard will edit the Server TPCL to remove SBOs1 because of the following 2 problems:

- Abstract test is for check of access rights but concrete test is for unknown object
- Test for unknown object is flawed (MMS must return access-result=failure, but test mandates a response of "zero length visible string".

On the FtN1 unknown file test (Item #8 in our agenda). The TPCL Version 1.1 is correct. No further action is needed on this specific test case.

KEMA has found several more issues in the Server Test Procedures 2.2 and proposes to start an action item for a major update on the Server TPCL.

## **PIXIT Template**

The PIXIT Template Version 1.1 (Reference C) had been posted after our most recent teleconference and the review of the clock issue proposed changes. Richard said that there are no pending comments against Version 1.1.

## **GOOSE Performance Testing**

We spent considerable time discussing how we might conduct GOOSE performance testing. We had exchanged E-mails on this starting in early 2008 and KEMA (Richard) has suggested we consider adding a third page to the Device Certificate to summarize performance test results. Richard said KEMA is getting requests from IED vendors for GOOSE performance testing and the UCAIug should move this to a high priority task considering the increased industry interest.

Highlights of our discussion today are given below.

We spent some time discussing WHAT should be tested. The device (IED)? The LAN and/or switches? Ethernet? What is the test configuration and loading? Richard, Herb and Bruce argued that testing should be limited to the given device and not the substation configuration. We agreed that focus should be on the device (DUT).

Richard: Performance testing for a specific DUT could be based on sending and receiving a GOOSE message. Fred: The question now is how should we introduce some loading to check for impact on performance.

Herb: Forcing worst case response does not give a true picture of the average response and some will then claim that GOOSE does not work. Bruce: Consider a performance index generated for simple comparison.

Miriam: Amertek's pilot relaying communications boxes specify a curve for error-rate vs. comm-channel-noise. A curve would be a good way to report results.

Richard: As outlined in the recent E-Mail, a ping-pong test requires no special test points in the IED. It was noted that the ping-pong does not allow separation of the GOOSE transmit latencies from the GOOSE receive latencies. So the only statement which can be made is that transmit time is  $\leq$  ping-pong time and receive time is  $\leq$  ping-pong time.

We spent some time discussing how to generate some meaningful loading scenarios.

Richard: Consider GOOSE background traffic of identical packets except with different GoID (this is the worst-case scenario of a mis-configured GOOSE system). Herb suggested GOOSE background traffic with 256 different MAC addresses. This allows devices with hardware filtering (either perfect or hash) to exhibit lower communication processor loads compared to devices which run in promiscuous mode. A curve could be generated with latency vs. number of previously received "wrong" GOOSE packets with 0-20 wrong packets received. JC then asked why all other "matching characteristics" needed to remain the same; for example, the VLAN ID or APPID could be changed for the "wrong" GOOSEs.

We discussed some test cases and possible ways to generate background traffic:

- Background GOOSE with same destination MAC address same VLAN, same priority as the subscribed GOOSE, but original gocbRef+"XXX" ,
- 1 state change per 10 milliseconds with 2 repetitions after 2ms and 4ms = total of 300 GOOSE msgs/second continuously
- The length of all GOOSE datasets shall be 10 attributes: 5 [switch] states + 5 quality.
- 1000 test repetitions, 1 test cycle per second
- Report (tNet out - tNet in) results: min, max, average with 0.1msec accuracy

Some open questions: Should the background GOOSE have the exact same destination MAC address? Herb: No, because IEDs (should) implement a MAC address filter. Should we measure one point or multiple points to create a curve? And should it be 10, 100, 300? What is the sequence of the background load GOOSE and the ping GOOSE? This may impact the performance in some way - a random kind of sequence and repeating the measurement 1000 times will incorporate this effect.

Bruce asked the group to forward comments, with attached proposals, to Richard within the next 2 weeks. Richard will summarize and send out to all. We will discuss further after review of the suggestions from all interested parties. This would be a major topic for our next face-to-face meeting.

## **Time Sync Accuracy Testing**

Bruce: Vendors placing "10" in their timestamp quality fields may not actually generate timestamps accurate to 1 millisecond relative to GPS time. An NTP clock far better than 1 millisecond would be needed to synchronize the time sync client within the IED prior to testing the timestamp. We agreed to consider time sync accuracy testing with GOOSE performance testing.

## **GOOSE Subscriber Testing**

At this time, we do not have test procedures to check if a GOOSE subscriber can process all valid GOOSE elements. Richard asked "What about arrays in GOOSE elements?" Perhaps we need to consider adding a free form text entry in the PIXIT defining what the device will provide to subscribers. Cover both binary and quality attributes. Any other mandatory inclusions? For further clarification. Jack: If we start to include key information on device specifications in the PIXIT then we need to make sure users have access to the template and are aware of the contents.

Richard: Note: The PIXIT templates for client and server will/may be added to IEC 61850-10 Edition 2.

## **Other Issues/ Next Meetings/ Conclusion**

We set a date for our next teleconference: 28 April 2009 at 14:00 UTC for two hours. Focus will be on the Client Test Procedures. Bruce suggested that we spend the first 10 minutes to cover any general issues. Bruce will send out a notice for this teleconference as soon as possible.

Our next face-to-face Testing Meeting will be after the Pittsburgh IEEE PSRC meeting 14-15 May, 2009. This meeting will begin at 3 PM on Thursday 14 May to allow for those who want to meet with EPRI earlier. EPRI will meet from Noon to 4 PM. Testing will finish by 6 PM on 14 May and continue on 15 May 8 AM to Noon. We will schedule the meeting room so that we can continue through the afternoon of 15 May for those participants who can travel later.

The teleconference was adjourned at 16:14 UTC.

## Teleconference Action Items

*Includes open action items from our 3 March Teleconference.*

1. Continue Client Test Procedures Activity. All to provide written comments against Version 1.05 by 21 April. Richard will respond. To be reviewed and released as Version 1.1 after our teleconference on 28 April.
2. GOOSE Performance Testing. Forward proposals to Richard by 21 April. Richard will summarize and send out for further review. To be discussed at the May Meeting.
3. Consider preparation of GOOSE Implementation Agreement. Need for user document.
4. Update of the Testing QAP Documents is needed to cover Client Testing, the Client Certificate, and the use of the Test Procedure Change List (TPCL).
5. Review the draft Strict SCL Check Document. Vendors agreed to run their SCL instance files against the schema and provide feedback. All to review the content and recommendations in the ReadMe Document.
6. Christof Pastors to check with Henry Dawidczak on the status of the Siemens SCL Conformance Check Tool and how we could make it available for UCAlug Members.
7. Letter sent to Christoph Brunner, Convener TC 57/WG 10, requesting that Christoph and Pascal Tantin, Convener of TC 38, discuss joint coordination and the possibility of UCAlug publishing the Merging Unit test procedures. Initial response indicates that the UCAlug will have authorization. Need formal agreement and working group assignments to move forward.
8. Setup next Testing teleconference to review Client documents. Schedule for 28 April 2009 starting at 14:00 UTC (10 AM US East Coast, 7 AM West Coast and 16:00 Europe Time). Bruce to coordinate and send out agenda in the next several days. (Agenda has been sent out along with a telecon announcement.)
9. Setup next Testing Meeting after the PSRC May 2009 Meeting. We will meet the afternoon of May 14, starting at 3 PM, and the morning of May 15. Possible continue meeting through the afternoon of May 15 depending on interest. Bruce will coordinate and send out agenda in the next several days (agenda has been sent). Kay Clinard has the action to setup the meeting room.
10. Richard to update the Server TPCL.