CLASS ICCP Link

CLASS Project

Produced by: Electricity North West
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CONTENTS

VERSION HISTORY

Version	Date	Author	Status (draft, etc)	Comments
1	*19 April 2014*	*Electricity North West*	*Final*	

GLOSSARY OF TERMS

Abbreviation	Term
ASC	*Autonomous Substation Controller*
AVC	*Automatic Voltage Control*
APFR	*Automatic Primary Frequency Response (set to 49.7Hz in ASC)*
ASFR	*Automatic Secondary Frequency Response (Set to 49.8Hz in ASC)*
CLASS	*Customer Load Active System Services*
CRMS	*Control Room Management System (Electricity North West)*
DBF Full	*Demand Boost Function Maximum (ASC taps up by 5% of nominal)*
DBF Half	*Demand Boost Function Half (ASC taps up by 3% of nominal)*
DMS	*Distribution Management System*
DRF Full	*Demand Reduction Function (ASC taps down by 5% of nominal)*
DRF Half	*Demand Reduction Function (ASC taps down by 3% of nominal)*
DRF NRD	*Demand Reduction Function for Network Reinforcement Deferral*
DG	*Distribution Generation*
ICCP	*Inter-control center Communications Protocol or IEC 60870-6/TASE.2*
MPFR	*Manual Primary Frequency Response (makes ASC act as if 49.7Hz)*
NG	*National Grid*
GSP	*Grid Supply Point*
HV	*High Voltage*
Ofgem	*Office of the Gas and Electricity Markets*
PC	*Profile Class*
PoF	*Power on Fusion (GE)*
SDRC	*Successful Delivery Reward Criteria*
TSF – ONE	*Tap Stagger Function – a one tap stagger for Var absorption*
TSF – TWO	*Tap Stagger Function – a two tap stagger for Var absorption*
TSF - THREE	*Tap Stagger Function – a three tap stagger for Var absorption*

All other definitions shown starting with a Capital letter are as per LCN Fund Governance Document v6.

1 EXECUTIVE SUMMARY

The Ofgem Project Direction issued on 21St December 2012 outlines certain Successful Delivery Reward Criteria (SDRC), against which the success of the Customer Load Active System Services (CLASS) project will be assessed. For each criterion, the Project Direction defines the evidence that is required to demonstrate successful delivery.

There are seven discrete SDRC evidence required for the Technology Build Work stream of the CLASS project (as per the list below).

This report is the document to deliver evidence 4 on the list.

1. Publish the design of the regulation scheme for substation Voltage Controllers by February 2014
2. Publish the site selection report including the methodology by August 2013
3. Network monitoring equipment installed and commissioned by March 2014
4. Publish the commissioning reports by April 2014
5. Technology go-live by April 2014
6. ICCP installed and commissioned by March 2014
7. ***Publish the ICCP commissioning reports by April 2014***

This report describes the methodology for the commissioning of the ICCP link.

APPLICABLE DOCUMENTS

Document	Reference
ICCP FDS	D012-02-03-04-01-01
Inter-Control Centre Protocol (ICCP) User Guide	G021-02-03-07 v507
Inter-Control Centre Protocol (ICCP) Configuration Guide	G021-03-03-06 v507
ENW ICCP Configuration	P12977-07-01-05

1 INTRODUCTION

The Customer Load Active System Services (CLASS) project is funded via Ofgem's Low Carbon Networks (LCN) second tier funding mechanism. Electricity North West received formal notification of selection for funding on 21 December 2012. The project is due for completion by 30 September 2015.

CLASS is investigating how reactive power flow and demand response change when voltage is varied through Primary transformer taps. It is assessing opportunities for:-

i. reducing network peak demand and so defer network reinforcement
ii. providing frequency control though demand response
iii. managing National Grid network voltages through reactive power absorption

Extensive CLASS trials are planned to assess the relationship between voltage and demand. During these trials, tap positions of parallel primary transformers will be changed simultaneously and staggered to observe the response of loads at different times of the day and throughout the annual load cycle. Trial results will enable the evaluation of the application of the CLASS principles.

1.1 The role of the ICCP link in CLASS

Inter-Control Centre Protocol (ICCP) is a standard real-time data exchange protocol which provides a mechanism for real-time data exchange between utility control centres. The control centres may have different network management systems provided by different vendors, therefore ICCP provides provision for a standard means of exchanging data between the systems.

A typical ICCP implementation can be used to exchange data between regional control centres, distribution and transmission systems, boundary areas (areas between two utilities).

These control centres may be over wide area (WAN) or local networks (LAN). In Power on Fusion (PoF) data exchange typically covers:

- Digital Changes (Alarms and Plant State)
- Analogue Values
- Control Requests
- Applying/Removing Documents

The ICCP specifications define a standardised method of using the Manufacturing Messaging Specification (MMS) services to implement the exchange of data.

The PoF software interfaced with Electrcity North West's CRMS, is currently being utilised by the CLASS project to present availability data and dispatch capability for all CLASS functionality. The ICCP link provides National Grid with the ability to access this functionality.

1.2 Purpose of this document

The scope of this document is to outline the results of the test of the requirements for data passing between the CRMS and ICCP PoF implementation and National Grids XA21 system. The aim behind the tests was to verify that the correct digital state and analogue value are passed along with the correct quality for each point.

2 PREREQUISITES

The test environment was configured and set up as follows:

- ICCP Scan task was running on the PoF server
- Server was connected to an ICCP FEP
- Each of the scenarios in sections 3, 4, & 5 configured in the system
- Tester was on both National Grid & Electricity North West sites to drive the qualifier tags and set values.

2.1 PoF Values

For the purposes of testing, the following values were used between the two dashboards:

#	**Description**
0	Disabled
1	Enabled
2	Active
3	Activated

2.2 ICCP Values

ICCP values are the same across the data link and are as follows:

#	**Description**
0	Disabled
1	Enabled
2	Active
3	Activated

2.3 Transfer Set Parameters and Condition Monitoring

Depending on the configuration of transfer set parameters and condition monitoring, the ICCP points can be transferred from server to client in two ways.

i. Periodic transmission – The ICCP client would receive point information (Digital & Analogue, along with quality) at predefined periodic intervals.

ii. Event driven transmission – The ICCP client receives point information (Digital & Analogue, along with quality) as soon as the ICCP server point changes state (value and/or quality change).

To maximise reslilience, the test environment was configured the two different types of transfer sets.

It should be noted however, that these communication methods are not mutually exclusive. Event driven transmission can be supplemented with periodic integrity check, say for every 10 minutes, ensuring that the ICCP client does not miss any of the messages from ICCP server due to network problems.

3 TESTS UNDERTAKENTHE SECTIONS BELOW DESCRIBE THE TESTS THAT WERE UNDERTAKING DURING THE COMMISSIONING PROCESS, AND THE ASSOCIATED RESULTS.TEST 1: START-UP SCENARIOS – DIGITAL POINTS

3.1 Tests of Start-up from Q_OK (Good Quality)

Table 1 describes the outcomes from the tests of Start-ups from Q-OK.

Table 1: Tests of Start-up from Q-OK

Test Action (and expected outcome)	**Test Outcome (Pass/Fail)**
1. Set the Automatic Primary Frequency Response to Enabled with a Q_OK quality. *The change of state should then be reflected in the National Grid dashboard as 'Enabled' and PT_VALID* 2. Stop the ICCP Scan Task *The National Grid dashboard should then indicate the point as Enabled and PT_SUSPECT* 3. Change the state of the National Grid dashboard to Disabled 4. Start the ICCP Scan Task *The* National Grid dashboard indicates the point as Disabled and PT_VALID	Pass (all expected outcomes were achieved)
1. Set the Automatic Primary Frequency Response to Disabled with a Q_OK quality. *The change of state should be reflected in the National Grid dashboard as 'Disabled' and PT_VALID* 2. Stop the ICCP Scan Task *The National Grid dashboard should indicate the point as Disabled and PT_SUSPECT*	Pass (all expected outcomes were achieved)

3. Change the state of the National Grid dashboard to Enabled 4. Start the ICCP Scan Task *The National Grid dashboard should indicate the point as Enabled and PT_VALID*	
1. Set the Automatic Primary Frequency Response to Activate with a Q_OK quality. *The change of state should be reflected in the National Grid dashboard as 'Activate' and PT_VALID* 2. Stop the ICCP Scan Task *The National Grid dashboard should indicate the point as Activate and PT_SUSPECT* 3. Change the state of the National Grid dashboard to Enabled 4. Start the ICCP Scan Task The National Grid dashboard should indicate the point as Enabled and PT_VALID	Pass (all expected outcomes were achieved)

3.2 Start-up from Q_BADSCAN (Bad Quality)

Table 2 describes the outcomes from the tests of Start-ups from Q-BADSCAN.

Table 2: Tests of start-up from Q-BADSCAN

Test Action and expected outcomes	**Test Outcome** **(Pass/Fail)**
1. Set the Automatic Primary Frequency Response to Enabled with a Q_BADSCAN quality. *The change of state should be reflected in the National Grid dashboard as 'Enabled' and PT_VALID* 2. Stop the ICCP Scan Task *The National Grid dashboard should indicate the point as Enabled and PT_SUSPECT* 3. Change the state of the National Grid dashboard to Disabled 4. Start the ICCP Scan Task *The National Grid dashboard should indicate the point as Disabled and PT_VALID*	Pass (all expected outcomes were achieved)
1. Set the Automatic Primary Frequency Response to Disabled with a Q_BADSCAN quality. *The change of state should be reflected in the National Grid*	Pass (all expected outcomes were

dashboard as 'Disabled' and PT_VALID 2. Stop the ICCP Scan Task *The National Grid dashboard should indicate the point as Disabled and PT_SUSPECT* 3. Change the state of the National Grid dashboard to Enabled 4. Start the ICCP Scan Task *The National Grid dashboard should indicate the point as Enabled and PT_VALID*	achieved)
1. Set the Automatic Primary Frequency Response to Activate with a Q_BADSCAN quality. *The change of state should be reflected in the National Grid dashboard as 'Activate' and PT_VALID* 2. Stop the ICCP Scan Task *The National Grid dashboard should indicate the point as Activate and PT_SUSPECT* 3. Change the state of the National Grid dashboard to Enabled 4. Start the ICCP Scan Task *The National Grid dashboard should indicate the point as Enabled and PT_VALID*	Pass (all expected outcomes were achieved)

4 TEST 2: START UP SCENARIOS – ANALOGUE POINTS

4.1 Analogue Start-up from Q_OK (Good Quality)

Table 3 below describes the outcomes from the tests of analogue Start-ups from Q-OK.

Table 3: Tests of Analogue Start-up from Q-OK

Test Action (and expected outcome)	**Test Outcome** **(Pass/Fail)**
PowerOn indicates the analogue plant item value is (for example) 0.22, Q_OK. *National Grid should indicate the analogue plant item value to be 0.22, PT_VALID.* 1. Now stop the ICCP Scan task. *National Grid should indicate that the plant value is 0.22, with Q_SUSEPCT.*	Pass (all expected outcomes were achieved)

2. Change the value of plant item to (for example) 0.55, Q_OK in PowerOn. 3. Start the ICCP Scan task *PowerOn should refresh with the new value.*	

4.2 Analougue Start-up from Q_BADSCAN (Bad Quality)

Table 5 describes the outcomes from the tests of Analogue Start-ups from Q-BADSCAN.

Table 4: Tests of analogue start-up from Q-BADSCAN

Test Action (and expected outcomes)	**Test outcome** **(Pass/Fail)**
PoF indicates the analogue plant item value is 0.22, Q_OK. National Grid indicates the analogue plant item value to be 0.22, PT_VALID. 1. Now stop the ICCP Scan task. *National Grid should indicate that the plant value is 0.22, with PT_SUSPECT.* 2. Change the value of plant item to (for example) 0.55, Q_BADSCAN in PoF. 3. Start the ICCP Scan task National Grid's Dashboard should be refreshed with the new value. The value entered into the database is 0.55, PT_SUSPECT.	Pass (all expected outcomes were achieved)

5 TEST 3: STARTUP – POF TO CRMS SYNC

5.1 Startup

Table 5: Test of start-up, POF to CRMS Sync

Test Action (and expeted outcomes)	Test Outcome (Pass/Fail)
Stop the PoF Server and verify there is no incoming messages in the SOAP log *CRMS should acknowledge the SOAP server being down and raise an appropriate alarm*	Pass (all expected outcomes were achieved)

5.2 Sync

Table 6: Test of Sync, POF to CRMS

Test Action (and expected outcome)	Test Outcome (Pass/Fail)
Start PowerOn An initial Sync of all Analogue/Breaker states should be carried out. The logs that the dashboard states should be read into CRMS.	Pass (all expected outcomes were achieved)

6 PERIODIC COMMUNICATION

The following tests were undertaken to confirm that the points are being sent to the National Grid control centre at regular periodic intervals ('**T**' seconds). This is configured in the client side transfer sets (National Grid's end but not in PoF). The client is responsible for requesting the changes of the server plant items and the server only responds to the requests by sending the information relating to the requested points. '**T'** should be set to a suitably large value (e.g. 20s) to ensure the change is visibly delivered via the periodic mechanism. The value of '**T**' will be altered to prove the performance of the link.

6.1 Good Telemetry Changes – Digital Points

Table 7 below describes the outcomes of the test of good telemetry changes for the digital points.

Table 7: Test of good telemetry changes – digital points

Test Action (and expected outcomes)	**Test Outcome** **(Pass/Fail)**
1. ICCP Scan task Started The value in the National Grid Dashboard should be Disabled, PT_SUSPECT *The value in PoF should be Disabled, Q_BADSCAN* 2. Change the value in PoF to Disabled, Q_OK *Within **'T'** seconds, the button should be updated in the National Grid dashboard as Disabled, PT_VALID.* *The button in the dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to Enabled, Q_OK *Within **'T'** seconds, the button should be updated in the National Grid dashboard as Enabled, PT_VALID* *The button in the dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to Activate, Q_OK *Within **'T'** seconds, the button should be updated in the National Grid dashboard as Activate, PT_VALID* *The button in the dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to Activated, Q_OK *Within **'T'** seconds, the button should be updated in the National Grid dashboard as Activated, PT_VALID* *The button in the dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)

6.2 Bad Telemetry Changes – Digital Points

Table 8 below describes the outcomes of the test of good telemetry changes for the digital points.

Table 8: Test of bad telemetry changes – Digital Points

Test Action (and expected outcomes)	**Test outcome** **Pass/Fail**
PoF ICCP Scan task Started The value in the National Grid Dashboard is Disabled, PT_VALID The value in PoF is Disabled, Q_OK Change the value in PoF to Disabled, Q_POINT_DISABLED *Within **'T'** seconds, the value should be updated in the National Grid dashboard to Disabled, PT_HELD* *The dressing on the dashboard item should be changed accordingly.*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to Enabled, Q_BADSCAN *Within **'T'** seconds, the value should be updated in the National Grid dashboard to ICCP Enabled, PT_SUSPECT* *The dressing on the dashboard item should be changed accordingly.*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to Activate, Q_BADSCAN *Within **'T'** seconds, the value should be updated in the National Grid dashboard to ICCP Activate, PT_SUSPECT* *The dressing on the dashboard item should be changed accordingly.*	Pass (all expected outcomes were achieved)

6.3 Good Telemetry Changes – Analogue Points

Table 9 below describes the outcomes of the test of good telemetry changes for the analogue points.

Table 9: Test of good telemetry changes – analogue points

Test Action (and expected outcomes)	**Outcome** **(Pass/Fail)**
ICCP Scan task Started	Pass

The value on the National Grid dashboard is (for example) 0.77, PT_SUSPECT The value in PoF is 0.77, Q_BADSCAN Change the value in PoF to (for example) 0.77, Q_OK *Within **'T'** seconds, the analogue should be updated in the National Grid Dashboard as 0.77, PT_VALID*	(all expected outcomes were achieved)
Change the value in PoF to (for example) -0.88, Q_OK *Within **'T'** seconds, the analogue should be updated in the National Grid dashboard as -0.88, PT_VALID*	Pass (all expected outcomes were achieved)

6.4 Bad Telemetry Changes – Analogue Points

Table 10 below describes the outcomes of the test of good telemetry changes for the analogue points.

Table 10: Test of bad telemetry changes – Analogue Points

Test Action (and expected outcomes)	**Outcome** **(Pass/Fail)**
ICCP Scan task Started The value in the National Grid dashboard is (for example) 0.99, PT_VALID The value in PoF is 0.99, Q_OK Change the value in PoF to (for example) 0.99, Q_POINT_DISABLED *Within **'T'** seconds, the value should be updated in the National Grid dashboard to 0.99, PT_HELD*	Pass (all expected outcomes were achieved)
Change the value in PoF to (for example) 100, Q_OK *Within **'T'** seconds, the value should be updated in the National Grid dashboard to 100, PT_VALID*	Pass (all expected outcomes were achieved)
Change the value in PoF to (for example) 0.99, Q_BADSCAN *Within **'T'** seconds, the value should be updated in the National Grid dashboard to 0.99, PT_SUSPECT*	Pass (all expected outcomes were

	achieved)

6.5 Multiple Changes within time period 'T'

Table 11 below describes the outcomes of the test of good telemetry changes for the analogue points.

Table 11: Test of multiple changes within a given time period

Test Action (and expected outcomes)	**Outcome** **(Pass/Fail)**
ICCP Scan task Started The value in the National Grid dashboard is Disabled, PT_SUSPECT The value in PoF is Disabled, Q_BADSCAN Within the time period 'T', change the state & quality of component in PoF multiple times from Disabled to : i. Enabled, Q_OK; ii. Activate, Q_BADSCAN; iii. Activated, Q_POINT_DISABLED *After completion of the next cycle of '**T**' seconds, the then current value and quality of the ICCP point in PoF should be displayed in the National Grid dashboard for the same point.* *The time stamp shown in the simulator should be identical to the time stamp visible for this action in PoF.*	Pass (all expected outcomes were achieved)
ICCP Scan task Started The value in the PowerOn for an analogue point is (for example) 0.77, Q_BADSCAN The value in the National Grid dashboard is 0.77, PT_SUSPECT Within the time period '**T**', change the value and quality in PoF multiple times from (for example) 0.77, Q_SUSPECT to : i. 100, Q_OK ii. 0.002, Q_BADSCAN iii. -100000, Q_POINT_DISABLED iv. –0.00002, Q_OK. *Within **'T'** seconds, the analogue should be updated in the National Grid Dashboard*	Pass (all expected outcomes were achieved)

7 EVENT DRIVEN COMMUNICATION

The following tests were undertaken to confirm that the points have been configured to be sent from PoF control system only when the point changes its state (or quality), but not at periodic intervals. This is configured in the 'Object Change' condition monitoring parameter of the contained transfer set (National Grid side configuration parameter may differ). The test assumes that the equivalent of this parameter is set so that the changes are sent immediately by PoF system to National Grid. This can be in conjunction with the 'Integrity Check' parameter for the respective transfer set, which, if set generates a full integrity report that includes all the server plant items and sends it to the National Grid system. For the purposes of testing, the 'Integrity Check' parameter is assumed to be set to one hour.

7.1 Good Telemetry Changes – Digital Points

Table 12 below describes the outcomes of the test of good telemetry changes for the Digital points.

Table 12: Test of Good Telemetry Changes – Digital Points

Test Action (and expected outcomes)	**Outcome (Pass/Fail)**
ICCP Scan task Started The value in the National Grid dashboard is Disabled, PT_SUSPECT The value in PoF is Disabled, Q_BADSCAN 1. Change the value in PoF to Disabled, Q_OK *The button should then be immediately updated in the National Grid dashboard as Disabled, PT_VALID* *The button item in the PoF and National Grid dashboard should then be dressed accordingly.*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to Enabled, Q_OK *The button should be immediately updated in the National Grid dashboard as Enabled, PT_VALID* *The button item in the PoF and National Grid dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)

1.	Change the value in PoF to Activate, Q_OK *The button should be immediately updated in the National Grid dashboard as Activate, PT_VALID* *The button item in the PoF and National Grid dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)

7.2 Bad Telemetry Changes – Digital Points

Table 13 below describes the outcomes of the test of bad telemetry changes for the Digital points.

Table 13: Tests of Bad Telemetry Changes – Digital Points

Test Action (and expected outcomes)	**Outcome** **(Pass/Fail)**
ICCP Scan task Started The value in the National Grid dashboard is Disabled, PT_VALID The value in PoF is Disabled, Q_OK 1. Change the value in PoF to Disabled, Q_POINT_DISABLED *The button should immediately be updated in the PoF and National Grid dashboard to Disabled, PT_HELD* *The button item in the PoF and National Grid dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to Enabled, Q_OK *The button should immediately be updated in the National Grid dashboard to Enabled, PT_VALID* *The button item in the PoF and National Grid dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to Activate, Q_BADSCAN *The button should immediately be updated in the National Grid dashboard to Activate, PT_SUSPECT* *The button item in the PoF and National Grid dashboard should be dressed accordingly.*	Pass (all expected outcomes were achieved)

7.3 Good Telemetry Changes – Analogue Points

Table 14 below describes the outcomes of the test of good telemetry changes for the analogue points.

Table 14: Tests of good telemetry changes – analogue points

Test Action (and expected outcomes)	**Outcome** **(Pass/Fail)**
ICCP Scan task Started The value in the National Grid dashboard is (for example) 0.77, PT_SUSPECT The value in PoF is 0.77, Q_BADSCAN 1. Change the value in PoF to (for example) 0.77, Q_POINT_DISABLED *The analogue point should immediately be updated in the National Grid dashboard as 0.77, PT_HELD*	Pass (all expected outcomes were achieved)
Change the value in PoF to (for example) -0.88, Q_OK *The analogueshould immediately be updated in the National Grid dashboard as -0.88, PT_VALID*	Pass (all expected outcomes were achieved)
1. Change the value in PoF to 0.99, Q_BADSCAN *The value should update immediately in the National Grid dashboard to 0.99, PT_SUSPECT*	Pass (all expected outcomes were achieved)

7.4 Multiple Changes in Quick Succession

Table 15 below describes the outcomes of the test of of the impacts of making multiple changes in quick succession.

Table 15: Tests of the impacts of rapid multiple changes

Test Action (and expected outcomes)	**Outcome**

	(Pass/Fail)
ICCP Scan task Started The value in the simulator is Disabled, PT_SUSPECT State attribute of the ICCP Point in PoF, indicates the plant item state is 0, Q_BADSCAN (i.e. Disabled, Q_BADSCAN). Change the state & quality in PoF in quick succession to the following values: i. Disabled, Q_OK ii. Enabled, Q_OK iii. Activate, Q_BADSCAN iv. Activated, Q_OK *Almost immediately, the component in the National Grid dashboard should change state and quality in accordance with the changes in PowerOn.* *Ensure that all the COS's & qualities are captured by National Grid system without missing any change.* *The time stamp shown in the PoF, state attribute, should be identical to the time stamp visible for the corresponding action in the National Grid dashboard.* *The button item in PoF should be dressed accordingly for each COS* *Alarms should be raised in PoF Current Alarms window for each COS (If configured).*	Pass (all expected outcomes were achieved)

8 ICCP LINK FAILURE SCENARIOS

This section details the outcome of the tests of the ICCP Link failure scenarios.

8.1 Main PowerOn FEP Breakdown

Table 16 below describes the outcomes of the test of of the Mail PowerOn FEP Breakdown.

Table 16: Tests of the Main PowerOn FEP Breakdown

Test Action (and expected outcomes)	**Outcome** **(Pass/Fail)**
PoF Main ICCP FEP in association handshake with NG (A). NG (B) is in standby. ICCP FEP component shows that it is connected to Main FEP.	Pass (all expected outcomes

ICCP FEP component shows the current connected NMS server. 1. Shutdown ICCP Main FEP. *PoF ICCP Standby FEP should take on the responsibility of communicating with the ICCP and the NMS server group.* *A new association handshake should be established between PoF ICCP Standby FEP and NG (A).* *An alarm should be raised saying that ICCP task has been taken over by the standby FEP from the main FEP. (If Configured)*	were achieved)
1. Send a COS across the ICCP from PoF to National Grid. *The COS message should be received by the National Grid.* 2. Send a COS message across the ICCP from National Grid to PoF *The COS message should be received by the PoF and the corresponding point is dressed accordingly.*	Pass (all expected outcomes were achieved)

8.2 Standby PowerOn FEP Breakdown

Table 17 below describes the outcomes of the test of the Standby PowerOn FEP Breakdown.

Table 17: Tests of the Standby PowerOn FEP Breakdown

Test Action (and expected outcomes)	Outcome (Pass/Fail)
PoF Standby ICCP FEP is in association handshake with NG (A). NG (B) is in standby. ICCP FEP shows that it is connected to Standby FEP. ICCP FEP component shows the current connected NMS server. 1. Shutdown PoF ICCP Standby FEP. *PoF ICCP Main FEP should take on the responsibility of communicating with the ICCP and the NMS server group.* *A new association handshake should be established between PoF ICCP Main FEP and NG (A).* *An alarm should be raised saying that ICCP task has been taken over by the Main FEP from the Standby FEP. (If configured)*	Pass (all expected outcomes were achieved)

8.3 Controlled PoF ICCP FEP Switching

Table 18 below describes the outcomes of the test controlled PoF ICCP FEP Switching.

Table 18: Tests of controlled PoF ICCP FEP Switching

Test Action (and expected outcomes)	Outcome (Pass/Fail)
PoF Main ICCP FEP is in association handshake with NG (A). NG (B) is in standby. ICCP FEP shows that it is connected to Main ICCP FEP. ICCP FEP component shows the current connected NMS server. From the ICCP FEP component, right click and select popup option for switching the ICCP Scan task control from Main to Standby FEP's. *PowerOn ICCP Standby FEP should take on the responsibility of communicating with the ICCP and the NMS server group.* *A new association handshake should be established between PoF ICCP Standby FEP and NG (A).*	Pass (all expected outcomes were achieved)

An alarm should be raised saying that ICCP task has been taken over by the Standby FEP from the Main FEP. (If configured)	

8.4 Restart of both PowerOn ICCP FEP's

Table 19 below describes the outcomes of the test relating to restart of both PoF ICCP FEPs.

Table 19: Outcomes of tests relating to restart of both PoF ICCP FEPs

Test Action (and expected outcomes)	**Outcome (Pass/Fail)**
PoF Main ICCP FEP is in association handshake with NG (A). NG (B) is in standby. *ICCP FEP component should show that it is connected to Main ICCP FEP.* *ICCP FEP component should show the current connected NMS server.* 1. Shutdown both the PoF ICCP FEP's. *An alarm should be raised saying that Main ICCP FEP is down (If configured).* *An alarm should be raised saying that Standby ICCP FEP is down (If configured).* *ICCP task should not beconnected to any of the National Grid FEPs* *Qualities of all the ICCP client points in PoF should show Q_POINT_DISABLED.* *Qualities of all the ICCP client points in the National Grid dashboard should show PT_NOT_VALID.*	Pass (all expected outcomes were achieved)
1. Start up the PoF Main ICCP FEP and then Standby ICCP FEP. *An alarm should be raised stating that the Main ICCP FEP is up and has established an association handshake with NG (A).* *All the PoF ICCP client points should receive the current state and quality data from the ICCP server* *All PoF server points should send current state and quality information to National Grid.*	Pass (all expected outcomes were achieved)