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European Network of
Transmission System Operators
for Electricity

INTEROPERABILITY TEST "CIM FOR SYSTEM DEVELOPMENT AND OPERATIONS" 2010

APPENDIX C: TEST RECORD FORMS

PART 2

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TOOL SUMMARY FORM (PER TOOL)

Vendor: Open Grid Systems		Tool: Cimphony	

Witnessed by		Name	Signature
Name	**Signature**	9.	
1. Tomasz Rogowski	Rogowski T.	10.	
2.		11.	
3.		12.	
4.		13.	
5.		14.	
6.		15.	
7.		16.	
8.			

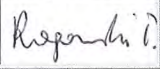| Performed tests		Test No	Score	Test No	Score
Test No	**Score**				
1_1	Pass				
1_2	Pass				
2_1	Pass				
3_1	Pass				
4_1	Issues Detected				
4_2	Pass				
5_1	Pass				
7_1	Pass				
9_1	Pass				
11_1	Pass				
12_1	Pass				
13_1	Pass				
27_1	Pass				
31_1	Pass				

Comments:

An issue regarding SV Injections was detected on the SV solution export in 4_1, this was corrected and the test was re-run successfully as 4_2.

For Test 11_1 and 13_1 the issues of how dependencies work for difference models and state variables needs to be discussed further within ENTSO-E and the IEC however it was felt that the purpose of the test was to demonstrate the production of the Difference Models so the tests passed this section without any issues.

Test 11_1 required regeneration of some files to include additional header information that was not being re-exported and was required by DigSilent. There are multiple Difference Files for the same increment to reflect the ambiguity in the standard over the way PTI interprets the format and how other vendors do (and bi-directional associations are included as OGS thinks they could be useful but acknowledges they are not required and thus optional)

Date	Vendor OPEN GRID SYSTEMS		ENTSO-E	Signature
	Name	**Signature**	**Name**	
16/7/2010	ALAN McMORRAN	ML	Cheurdar Ivanov	

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for Electricity
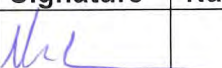
entsoe

SINGLE TEST RECORD FORM

Test No: 1_1	Tool: Cimphony	Score: Pass

Test files

Import	Export
1. ENTSOE_16_BE_EQ.xml	1.
2. ENTSOE_16_BE_TP.xml	2.
3. ENTSOE_16_BE_SV.xml	3.
4. ENTSOE_16_EU_EQ.xml	4.
5. ENTSOE_16_EQ_TP.xml	5.

Comments/Results/Issues:

Verified instance data:

BaseVoltage instance 21.0 and association to VoltageLevel PPBRUG21 and containing equipment (inc. Synchronous Machine, Busbar Section and Generation Unit)

State Variable (SvVoltage, SvPowerFlow, SvShunCompensatorSections, SvTapStep, SvVoltage) instance counts and SvVoltage instance data for Node 2

Successfully load-flow and produced results consistent with 16 Bus model single line diagram (see Screenshot of results uploaded to server)

Supplementary files:

OGS 1.2.1 Full Import ENTSO-E 16 BE MAS+EU MAS Browser.png
OGS 1.2.1 Full Import ENTSO-E 16 BE MAS+EU MAS Load Flow.png

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
12th July 2010	**Name**	**Signature**	**Name**	**Signature**
	ALAN McMORRAN			
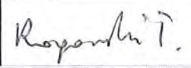
entsoe

SINGLE TEST RECORD FORM

Test No: 1_2	Tool: Cimphony	Score: Pass

Test files

Import	Export
1. ENTSOE_21K_EQ.xml	1.
2. ENTSOE_21K_TP.xml	2.
3. ENTSOE_21k_SV.xml	3.
	4.
	5.

Comments/Results/Issues:

The 3 files were selected and loaded as an integrated set, loading into the Cimphony browser in ~2 minutes.

The instance counts were verified against the base document provided and the discrepancy in Topological nodes (21,177 in Cimphony versus 21,117 reported in document) was found to be an error in the document as CIMSpy also showed it as having 21,177.

All other instance counts verified successfully.

A load flow was not attempted on this model.

Supplementary files:
ENTSOE 21K Instances Cimphony.png – screenshot of instance data in Cimphony Browser
ENTSO-E 21K_TP_TopoloyNode_count.PNG – Topological node count from CIMSpy

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
16th July 2010	**Name**	**Signature**	**Name**	**Signature**
	Alan McMorran	Mu		Rogowski T

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SINGLE TEST RECORD FORM

Test No: 2_1	Tool: Cimphony	Score: Pass

Test files

Import	Export
1. ENTSOE_16_BE_EQ.xml	1. ENTSOE_16_BE_EQ_CP_13J10h.xml
2. ENTSOE_16_BE_TP.xml	2. ENTSOE_16_BE_TP_CP_13J10h.xml
3. ENTSOE_16_BE_SV.xml	3. ENTSOE_16_BE_SV_CP_13J10h.xml
4.	4.
5.	5.

Comments/Results/Issues:

The export has an instance count that is 22 less than the original. This is because Cimphony does not export additional, non-profile data and the discrepancy was due to the original file containing the following instance data not covered by the ENTSO-E Profiles:

- 6 ConnectivityNodes
- 15 OperatingShares
- 1 OperatingParticipant

Verified other instance counts for all classes against original files.

Verified instance of ACLineSegment name H1, all attributes matched.
Verified BusbarSection name NODE10 and its associated Terminal
Verified VoltageLevel ANVER220 and its associated Substation
Verified ThermalGeneratingUnit G1 and its attributes
Verified TopologicalNode counts and instance name M7
Verified StateVariables input

Supplementary files:

BE MAS OGS Export Instance Data Browser.png - shows the exported data re-loaded into Cimphony and a navigation tree starting at a Geographical Region
BE MAS Original TN Instance.png - shows an instance of TopologicalNode and the association to a ConnectivityNode that came from the original import
BE MAS OGS Export TN Instance.png - shows the same instance of TopologicalNode from the export with the ConnectivityNode association now removed

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
13th July 2010	**Name**	**Signature**	**Name**	**Signature**
	ALAN McMORRAN	Mc		Rogowski T.

entso@
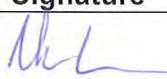
SINGLE TEST RECORD FORM

Test No: 3_1	Tool: Cimphony	Score: Pass

Test files	
Import	**Export**
1. ENTSOE_16_NL_EQ.xml	
2. ENTSOE_16_NL_TP.xml	
3. ENTSOE_16_NL_SV.xml	
4. ENTSOE_16_EU_EQ.xml	
5. ENTSOE_16_EU_TP.xml	

Comments/Results/Issues:

The NL MAS was imported along with the boundary set and merged within Cimphony. A load flow was successfully executed and the results were compared with the results previously produced by DigSILENT running a load flow on the same model.

The results available for comparison (bus voltage, real/reactive load and generation) are available for comparison between the screenshots from DigSILENT (*1.2.1 ldf results loads.JPG, 1.2.1 ldf results synchronous machines.JPG, 1.2.1 line data.jpg*) and Cimphony (*NL MAS Load Flow Result.png*). Thes were accurate to within engineering tolerances.

A screenshot of the load flow results are included as NL MAS Load Flow Result.png

Supplementary files:
NL MAS Load Flow Result.png – load flow results from Cimphony
(*1.2.1 ldf results loads.JPG, 1.2.1 ldf results synchronous machines.JPG, 1.2.1 line data.jpg*) – DigSILENT load flow results available from their exports

Date	**Vendor** Open Grid Systems		**Test witness** Tomasz Rogowski	
15th July 2010	**Name**	**Signature**	**Name**	**Signature**
	ALAN McMORRAN	ML		Rogowski T.

SINGLE TEST RECORD FORM

Test No: 4_1	Tool: Cimphony	Score: Pass

Test files		
Import	**Export**	
1. ENTSOE_16_BE_EQ.xml	1. ENTSOE_16_BE_SV_CP_13J15h.xml	
2. ENTSOE_16_BE_TP.xml	2. ENTSOE_16_BE_TP_CP_MOD_13J15h.xml	
3. ENTSOE_16_BE_SV.xml	3. ENTSOE_16_BE_SV_CP_MOD_13J18h.xml	
4. ENTSOE_16_EU_EQ.xml	4.	
5. ENTSOE_16_EU_TP.xml	5.	

Comments/Results/Issues:

Original BE MAS was imported along with Boundary Set.

Line DFG-THY 1 between Node 11 and Node 3 was taken out of service by marking its Terminals' connected attributes as being false.

The modified Topology File was exported as ENTSOE_16_BE_TP_CP_MOD_13J15h.xml along with a State Variables file (ENTSOE_16_BE_SV_CP_13J15h.xml) with header dependency automatically updated to refer to modified topology set

Load flow was then successfully run and the resulting State Variables were exported along as ENTSOE_16_BE_SV_CP_MOD_13J18h.xml

Original SV file (ENTSOE_16_BE_SV_CP_13J15h.xml) with modified header and modified Topology file (with new header) has been validated in CIMSpy (both files conform to XSD Schema)

Original SV instance class counts for ENTSOE_16_BE_SV_CP_13J15h.xml verified, SvVoltage instance voltage and angle verified.

Solution SV (ENTSOE_16_BE_SV_CP_MOD_13J18h.xml) instance counts were verified (with the addition of 14 new SvPowerFlow objects to represent the flows at each end of the 7 ACLineSegments and 2 additional SvTapStep objects as every tap changer has an SvTapStep in the solution while only the two tap changers with load change capability had SvTapStep input value)

The Solution SV instance file validated successfully

Supplementary files:
Modified TP file with new UUID.png – shows header from Original TP that was modified to show its new UUID
Original SV File with modified header and new model UUID.png – shows the original SV file that now has modified dependencies that point to the new UUID on the modified TP file
Load Flow from original topology.png - shows the load flow results as produced from running against the original MAS files
Load Flow from modified topology.png - shows the load flow results produced from the modified topology
validation_exportFile_test_1_2_4.PNG – validation from CIMSpy of ENTSOE_16_BE_SV_CP_MOD_13J18h.xml

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
14th July 2010	**Name**	**Signature**	**Name**	**Signature**
	ALAN McMorran	UL		Rogowski
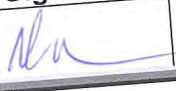
SINGLE TEST RECORD FORM

Test No: 4_2	Tool: Cimphony	Score: Pass

Test files

Import	Export
1. ENTSOE_16_BE_EQ.xml	1. ENTSOE_16_BE_SV_CP_14J11h.xml
2. ENTSOE_16_BE_TP.xml	2. ENTSOE_16_BE_TP_CP_14J11h.xml
3. ENTSOE_16_BE_SV.xml	3. ENTSOE_16_BE_SV_CP_SOLUTION_14J11h.xml
4. ENTSOE_16_EU_EQ.xml	4.
5. ENTSOE_16_EU_TP.xml	5.

Comments/Results/Issues:

Original BE MAS was imported along with Boundary Set.

Line DFG-THY 1 between Node 11 and Node 3 was taken out of service by marking its Terminals' connected attributes as being false.

The modified Topology File was exported as ENTSOE_16_BE_TP_CP_14J11h.xml along with a State Variables file (ENTSOE_16_BE_SV_CP_14J11h.xml) with header dependency automatically updated to refer to modified topology set

Load flow was then successfully run and the resulting State Variables were exported as ENTSOE_16_BE_SV_CP_SOLUTION_14J11h.xml

Original SV file (ENTSOE_16_BE_SV_CP_14J11h.xml) with modified header and modified Topology file (with new header) has been validated in CIMSpy (both files conform to XSD Schema)

Original SV instance class counts for ENTSOE_16_BE_SV_CP_14J11h.xml verified, SvVoltage instance voltage and angle verified.

Solution SV (ENTSOE_16_BE_SV_CP_SOLUTION_14J11h.xml) instance counts were verified (with the addition of 14 new SvPowerFlow objects to represent the flows at each end of the 7 ACLineSegments and 2 additional SvTapStep objects as every tap changer has an SvTapStep in the solution while only the two tap changers with load change capability had SvTapStep input value)

The Solution SV instance file validated successfully

Supplementary files:

Modified TP file with new UUID.png – shows header from Original TP that was modified to show its new UUID

Original SV File with modified header and new model UUID.png – shows the original SV file that now has modified dependencies that point to the new UUID on the modified TP file

Load Flow Result Original Topology.png- shows the load flow results as produced from running against the original MAS files

Load Flow Result Modified Topology.png- shows the load flow results produced from the modified topology

validation_exportFile_test_1_2_4.PNG – validation from CIMSpy of ENTSOE_16_BE_SV_CP_MOD_13J18h.xml

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
14th July 2010	**Name**	**Signature**	**Name**	**Signature**
	ALAN McMORRAN			Ropowski T.

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SINGLE TEST RECORD FORM

Test No: 5_1	Tool: Cimphony	Score: Pass

Test files		
Import		**Export**
1. ENTSOE_16_BE_EQ.xml		1. ENTSOE_16_BE_SV_CP_SOLUTION_14J12h.xml
2. ENTSOE_16_BE_TP.xml		2.
3. ENTSOE_16_BE_SV.xml		3.
4. ENTSOE_16_EU_EQ.xml		4.
5. ENTSOE_16_EU_TP.xml		5.

Comments/Results/Issues:

Original BE MAS was imported along with Boundary Set.

Real power generation at Generator on NODE 7 changed from 90 to 110
Real power load at NODE 1 changed from 100 to 110
Real power load at NODE 3 changed from 200 to 210
Voltage at NODE 7 change from 10.98216 to 10.5

An SV Solution file ENTSOE_16_BE_SV_CP_SOLUTION_14J12h.xml was generated from the load-flow results and saved

Header dependencies in the solution file were checked and verified as pointing to the original topology and equipment files

Instance counts were verified and SvInjection instances were checked and values verified against original inputs. The file validated successfully in CIMSpy

Supplementary files:
Load Flow Original Topology.png– shows the load-flow result from the original set
Load Flow Result Modified SV.png– shows the load-flow result with the modified state variables
SvInjection Starting Conditions.png - shows the SvInjection values for the starting condition state variables
SvInjection Solution.png - shows the SvInjection values for the solved condition (that are the same as the starting condition)

Date	**Vendor** Open Grid Systems		**Test witness** Tomasz Rogowski	
14th July 2010	**Name**	**Signature**	**Name**	**Signature**
	ALAN McMORRAN			Rogowski T.

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SINGLE TEST RECORD FORM

Test No: 7_1	Tool: Cimphony	Score: Pass

Test files	Export
Import	
1. ENTSOE_16_NL_EQ.xml	
2. ENTSOE_16_NL_TP.xml	
3. ENTSOE_16_NL_EQ.xml	
4. ENTSOE_16_NL_SV.xml	
5. ENTSOE_16_EU_EQ.xml	
6. ENTSOE_16_EU_EQ.xml	
7. 1.2.5 ENTSOE_16_PF_13J16h_SV.xml	

Comments/Results/Issues:

Two tests were performed for comparison of power flows.

The first test was to import the base NL EQ and TP models plus the EU MAS and then the original, base NL SV from the test models. Changes were made manually to reproduce DigSILENT's modifications they performed for Test 1.2.5 (which is detailed in their test case document under *Test 5b*) to the SV file within Cimphony. The load flow was then executed to provide results for comparison when run using the same starting conditions.

The second test was to import the base NL EQ and TP models plus the EU MAS and then DigSILENT's NL SV solution from their 1.2.5 export (file 1.2.5 ENTSOE_16_PF_13J16h_SV.xml). The load flow was then executed using the DigSILENT solution as a starting case.

The two load flow results were compared and any differences were significantly below engineering tolerances (~1-2%). The results were then compared against the single line diagram provided by DigSILENT and the generation and line flows were found to match to within engineering tolerances.

Supplementary files:
Solution Modified SV.png – Load flow result run using modified SV as starting conditions
Solution DigSILENT SV.png – Load flow result run using DigSILENT solution as starting conditions
(1.2.5 ENTSOE_16_NL_LDF_Results.wmf) – DigSILENT load flow results from their test outputs

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
	Name	Signature	**Name**	Signature
16th July 2010	ALAN McMORRAN	MM		Rogowski T.
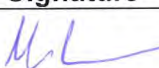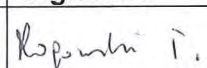
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SINGLE TEST RECORD FORM

Test No: 9_1	Tool: Cimphony	Score: Pass

Test files

Import	Export
1. ENTSOE_16_BE_EQ.xml	1. ENTSOE_16_BE_EQ_CP_14J14h.xml
2. ENTSOE_16_BE_TP.xml	2. ENTSOE_16_BE_TP_CP_14J14h.xml
3. ENTSOE_16_BE_SV.xml	3. ENTSOE_16_EU_EQ_CP_14J14h.xml
4. ENTSOE_16_EU_EQ.xml	4. ENTSOE_16_EU_TP_CP_14J14h.xml
5. ENTSOE_16_EU_TP.xml	5. ENTSOE_16_NL_EQ_CP_RSB_14J14h.xml
6. ENTSOE_16_NL_EQ.xml	6. ENTSOE_16_NL_TP_CP_14J14h.xml
7. ENTSOE_16_NL_TP.xml	7. ENTSOE_16_SV_CP_14J14h.xml
6. ENTSOE_16_NL_SV.xml	

Comments/Results/Issues:

Belgian, Dutch and Boundary MAS were imported together and automatically merged by Cimphony.

The SvInjection variables from both sides of the model were removed manually prior to the load flow being executed otherwise the network would have been unbalanced

The merged model had two swing buses defined (one from each MAS) so the swing bus on the NL EQ file was removed by setting the referencePriority to 0 on the attached SynchronousMachine. This resulted in a slight modification to the contents of the NL EQ file (as denoted with the acronym RSB – Removed Swing Bus – in the generated file).

The load flow converged successfully on the merged model (see file *Load Flow Merged MAS.png*)

The Topology and SV files for the Belgian MAS were replaced with the exports from 1.2.4 and the change was verified by checking the line that was disconnected in 1.2.4 was out of service in the model after the changes were merged. The SvInjection variables were also manually removed to balance the network.

A load flow was successfully executed on this model with topological changes (*see file Load Flow Merged with 1.2.4 Import.png*)

Supplementary files:
Load Flow Merged MAS.png – shows the load-flow result from the merged models
Load Flow Merged with 1.2.4 Import.png – shows the load-flow result with the 1.2.4 export changes integrated

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
14th July 2010	Name	Signature	Name	Signature
	Alan McMoran			Rogowski T.

entso@

SINGLE TEST RECORD FORM

Test No: 11_1	Tool: Cimphony	Score: Pass

Test files		
Import	**Export**	
1. ENTSOE_16_BE_EQ_CP_14J14h.xml	1. ENTSOE_16_BE_EQ_CP _INC_15J10h.xml	
2. ENTSOE_16_BE_TP_CP_14J14h.xml		
3. ENTSOE_16_EU_EQ_CP_14J14h.xml		
4. ENTSOE_16_EU_TP_CP_14J14h.xml		
5. ENTSOE_16_NL_EQ_CP_RSB_14J14h.xml		
6. ENTSOE_16_NL_TP_CP_14J14h.xml		
7. ENTSOE_16_SV_CP_14J14h.xml		

Comments/Results/Issues:

Merged model (3 Equipment, 3 Topology, 1 State) from 1.2.9 was imported.

ACLineSegment between NODE 3 and NODE 11 (DFG-THY 1) was deleted from the model
RatioTapChanger on winding 3_2_10_1 had its Step Voltage Increment changed from 0.625 to 1.0
On ThermalGeneratingUnit G1 in PPBRUG10 attribute longPF was set as 0.9876 (previously unset)
Renamed substation Anvers to "Anvers Modified"

The load flow was run successfully on the modified model and the results were put in a screenshot (see *Load Flow Result.png*)

The difference model was exported as ENTSOE_16_BE_EQ_CP_INC_15J10h.xml which describes these changes.

The load flow State Variable results were not exported due to the open question of whether a dependency on a Difference Model by a SV Full Model is valid.

Verified Difference Model header dependency manually in XML file and manually verified the contents (e.g. rdf ID references) in the file mirror the changes that were applied in the GUI

Supplementary files:
Load Flow Result.png – Load flow result from modified model

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
15th July 2010	**Name**	**Signature**	**Name**	**Signature**
	Alan McMorran	M.L		Rogowski T.
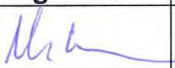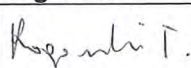
SINGLE TEST RECORD FORM

Test No: 12_1	Tool: Cimphony	Score: Pass

Test files

Import	Export
1. eg_ENTSOE_16_EU_NL_test11_Exp_TP.xml	
2. ENTSOE_16_EU_NL_test11_EQ.xml	
3. ENTSOE_16_NL_SV.xml	
4. eg_ENTSOE_16_EU_NL_test11_Exp_diff.xml	

Comments/Results/Issues:

The GE Export from 1.2.11 (v2) was imported by taking their Equipment file that is merged NL and EU ENTSOE_16_EU_NL_test11_EQ.xml plus their exported topology file eg_ENTSOE_16_EU_NL_test11_Exp_TP.xml and the original SV file from the ENTSO-E NL MAS test model.

The GE Difference model that updated the equipment file was successfully imported and applied to the base Equipment model. The changes were verified by manually analysing the XML file to determine what changes should be applied and then finding the corresponding changes within Cimphony's browser.

The load-flow successfully converged however the initial results were found to contain large discrepancies in comparison to GE's, especially in the area of Voltage Angles (which in turn explained large differences in reactive power flow). After consultation with GE it was determined that they had used a different Tap Step value for the Phase Shift Tap Changer due to a variations between the latest and earlier versions of the ENTSO-E base model.

The Tap Step value was manually changed within Cimphony to reflect the settings that had been used by GE to execute their load flow. Upon applying these changes the differences were reduced down to engineering tolerances. Further examination of the outputs highlighted that GE's Phase Tap Changer was using an angle of -30 degrees, however the tap changer should have had a step of -3 with a phase increment of 8.5deg. As such this should have been 25.5deg (as was used by Cimphony).

As such the output from Cimphony can be considered correct for the input parameters specified and accounts for the differences between the results.

Supplementary files:

Load Flow Results.png – a screenshot showing the load flow results from Cimphony
(eg_test11_resolution_screen.doc) - The GE load flow results from their 1.2.11 test outputs

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
15th July 2010	**Name**	**Signature**	**Name**	**Signature**
	ALAN McMORAN	ML		Rogowski T.

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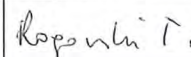
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SINGLE TEST RECORD FORM

Test No: 13_1	Tool: Cimphony	Score: Pass

Test files

Import	Export
1. ENTSOE_16_BE_EQ_CP_14J14h.xml	1. ENTSOE_16_BE_CP_INC_15J11h.xml
2. ENTSOE_16_BE_TP_CP_14J14h.xml	2. ENTSOE_16_NL_CP_INC_15J11h.xml
3. ENTSOE_16_EU_EQ_CP_14J14h.xml	
4. ENTSOE_16_EU_TP_CP_14J14h.xml	
5. ENTSOE_16_NL_EQ_CP_RSB_14J14h.xml	
6. ENTSOE_16_NL_TP_CP_14J14h.xml	
7. ENTSOE_16_SV_CP_14J14h.xml	

Comments/Results/Issues:

Merged model (3 Equipment, 3 Topology, 1 State) from 1.2.9 was imported.

ACLineSegment between NODE 3 and NODE 11 (DFG-THY 2) was deleted from the model
Breaker @1 in PPAMS220 was removed
Breaker @1 in PPAMS15 had its normalOpen attribute changed from true to false
Substation PP_Brussels was renamed to "PP_Brussels Modified"
Substation PP_Amsterdam was renamed to "PP_Amsterdam Modified"
A new aliasName of "new alias added XYZ" was added to PP_Brussels

The changes made meant that the network would not converge in the power flow.

Verified Difference Model header dependencies manually in XML files and manually verified the contents (e.g. rdf ID references) in the files mirror the changes that were applied in the GUI

This verified that the ENTSOE_16_BE_CP_INC_15J11h.xml file contained the changes made due to the deletion of the ACLineSegment and the renaming of Substation PP_Brussels and the addition of a value to its aliasName attribute. Similarly ENTSOE_16_NL_CP_INC_15J11h.xml contained the changes resulting from the deletion of the breaker and renaming of the PP_Amsterdam substation

Supplementary files:

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
15th July 2010	**Name**	**Signature**	**Name**	**Signature**
	Alan McMorran	M.M		Rogowski T.

entsoe

SINGLE TEST RECORD FORM

Test No: 27_1	Tool: Cimphony	Score: Pass

Test files	
Import	**Export**
1. ENTSOE_16_EQ_CPSM.xml	1. ENTSOE_16_TP_CP_CPSM_16J11h.xml
2. ENTSOE_16_SV_CPSM.xml	2. ENTSOE_16_SV_CP_CPSM_16J11h.xml

Comments/Results/Issues:

The ENTSOE 16 bus model from the CPSM test (conducted week beginning 28th June 2010 in Knoxville, TN) was taken as the starting model for this test. The model represents an earlier version of the base ENTSO-16 model used in this test and is compliant with the CPSM profile.

The EQ was imported first (screenshot Instance Data from CPSM Equipment.png shows the summary of instance data), then the SV file was added. A Topological Processor was executed to generate a TP file containing the new, generated Topological Nodes. [The SV file contained the SvPowerFlows values and additional equipment State Variables (e.g. SvTapStep, SvShuntCompensatorSection) that were used to set the starting conditions for a load flow. Any SvVoltage values and SvInjection values in this file referred to Topological Nodes that were not imported and so were ignored by the load flow engine. The initial starting voltages and angles were thus set to 1.0pu and 0.0deg respectively]

The topological nodes created were compared manually against the nodes within the base ENTSO-E 16 bus model from this test and found to match the topology generated by Cimphony. Two screenshots (Instance Data of Nodes in ENTSOE16 Base Case.png and Instance Data of Generated Topological Nodes.png) show the same topological node from the original ENTSO-E base case and generated Topological Nodes files respectively. They were found to have the same Terminal associations to the same equipment (as would be expected).

This new set of 3 files was used to successfully execute a load-flow that produced a converged solution (shown in screenshot) and the SV were exported as ENTSOE_16_SV_CP_CPSM_16J11h.xml

Validation errors were found by CIMSpy for the Topological file, however this is because the files reflect the decision MADE that a Topological Node is either contained within a VoltageLevel or has a BaseVoltage, not both. All the nodes generated by Cimphony were within a VoltageLevel so the error regarding a missing BaseVoltage is due to CIMSpy not having been updated. The SV file validated successfully.

Supplementary files:
Instance Data from CPSM Equipment.png
Instance Data of Generated Topological Nodes.png
Instance Data of Nodes in ENTSOE16 Base Case.png

Date	**Vendor** Open Grid Systems		**Test witness** Tomasz Rogowski	
16th July 2010	**Name**	**Signature**	**Name**	**Signature**
	Alan McMorran	*Mh*		*Rogowski T.*

SINGLE TEST RECORD FORM

Test No: 31_1	Tool: Cimphony	Score: Pass

Test files

Import	Export
1. ENTSOE_16_BE_EQ.xml	1. ENTSOE_16_BE_TP_CP_15J12h.xml
2. ENTSOE_16_BE_TP.xml	
3. ENTSOE_16_EU_EQ.xml	
4. ENTSOE_16_EU_TP.xml	
5. ENTSOE_16_BE_SV.xml	

Comments/Results/Issues:

The header in ENTSOE_16_BE_TP.xml was modified so that its dependency was changed from http://www.pti-us.com/2010/ENTSOE_16_BE_EQ/1 to http://www.pti-us.com/2010/ENTSOE_16_BE_EQ/1a so as to break its dependency on the Equipment file. Its own identity was then changed from http://www.pti-us.com/2010/ENTSOE_16_BE_TP/1 to http://www.pti-us.com/2010/ENTSOE_16_BE_TP/1a which breaks the dependencies of the SV file ENTSOE_16_BE_SV.xml which has a dependency on the original ID. The file was then saved as ENTSOE_16_BE_TP_CP_15J12h.xml to reflect that it has been changed.

The importer was told to verify header dependencies on import and notified the user that there were two dependency issues and asked whether the user wanted to continue (as shown in *Header Dependency Warnings.png*

Supplementary files:

Header Dependency Warnings.png – a screenshot showing the warning produced by Cimphony due to the modified header dependencies.

Date	Vendor Open Grid Systems		Test witness Tomasz Rogowski	
15th July 2010	**Name**	**Signature**	**Name**	**Signature**
	ALAN McMORRAN			Rogowski T.

entsoe

TOOL SUMMARY FORM

Vendor: CESI		Tool: CRESO	

Witnessed by

Name	Signature	Name	Signature
1. Adriano Gubernali	*A. Gubernali*	9.	
2.		10.	
3.		11.	
4.		12.	
5.		13.	
6.		14.	
7.		15.	
8.		16.	

Performed tests

Test No	Score	Test No	Score	Test No	Score
1.2.1	Pass				
1.2.2	Pass with errors				
1.2.3	Pass				
1.2.7	Pass				

Comments:
CRESO doesn't import short-circuit data, so it was not possible to performed (1.2.8)

Issues:
- import and export of short circuit data
- import and export of operational model
- management of CIM header in all xml files
- implementation of busbar coupler
- export and import of incremental file

Date	Vendor		ENTSO-E	
16.07.2010	**Name**	**Signature**	**Name**	**Signature**
	Ferdinando Parma *Ferdinando Parma*		*Chavdar Ivanov*	

SINGLE TEST RECORD FORM

Test No: 1.2.1	Tool: CRESO	Score: Pass

Test files

Import	Export
1. ENTSOE_16_NL_EQ.xml (ver 13July)	1.
2. ENTSOE_16_NL_TP.xml (ver 13July)	2.
3. ENTSOE_16_EU_EQ.xml (ver 13July)	3.
4. ENTSOE_16_EU_TP.xml (ver 13July)	4.
5. ENTSOE_16_NL_SV.xml (ver 13July)	5.
6.	6.
7.	7.

Comments/Results/Issues:
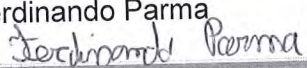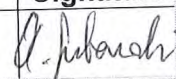
The following items were checked:

- Load data of area NL and
- Voltage on the electrical node;
- Generation data of area NL
- The Flow trough the Phase Shifter Transformer between NODE 4 and NODE 8
- Tie flow data between area NL and EU

The power flow gave the same results as from the original data of the model.

Supplementary files:

Screen shot: CR_TEST01_SCREENSHOT.doc

Date	Vendor		Test witness	
	Name	Signature	Name	Signature
14 July	Ferdinando Parma	*Ferdinand Parma*	Adriano Gubernali	*signature*

SINGLE TEST RECORD FORM

Test No: 1.2.2	Tool: CRESO	Score: Pass with errors

Test files

Import	Export
1. ENTSOE_16_NL_EQ.xml (ver 13July)	1. ENTSOE_16_CR_16J14h_BE_TP.xml
2. ENTSOE_16_NL_TP.xml (ver 13July)	2. ENTSOE_16_CR_16J14h_BE_EQ.xml
3. ENTSOE_16_EU_EQ.xml (ver 13July)	3. ENTSOE_16_CR_16J14h_NL_TP.xml
4. ENTSOE_16_EU_TP.xml (ver 13July)	4. ENTSOE_16_CR_16J14h_NL_EQ.xml
5. ENTSOE_16_NL_SV.xml (ver 13July)	5. ENTSOE_16_CR_16J14h_EU_TP.xml
6. ENTSOE_16_BE_SV.xml (ver 13July)	6. ENTSOE_16_CR_16J14h_EU_EQ.xml
7. ENTSOE_16_BE_TP.xml (ver 13July)	7. ENTSOE_16_CR_16J14h_SV.xml
8. ENTSOE_16_BE_EQ.xml (ver 13July)	8. ENTSOE_16_CR_16J14h_ME.xml

Comments/Results/Issues:

CimSpy was used to check all the instance counts and some instance details as below.
Phase Shifter Tap position
ControlArea
GeographicRegion
BaseVoltage
VoltageLevel

We have tried to export the xml files with CRESO, we verified with CimSpy the files, but there are again some errors in EQ files, while the others (TP, SV) are correct.

The circuit breaker between NODE8 and NODE5, between NODE6 and NODE9 was converted into 2 two-windings transformers, because CRESO doesn't deal with line in the same VoltageLevel.

Supplementary files:

Screen shot: CR_TEST02_SCREENSHOT.doc

Date	Vendor		Test witness	
	Name	**Signature**	**Name**	**Signature**
16 July	Ferdinando Parma *Ferdinando Parma*		Adriano Gubernali	*[signature]*

European Network of
Transmission System Operators
for Electricity
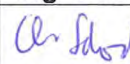
entsoe

SINGLE TEST RECORD FORM

Test No: 1.2.3	Tool: CRESO	Score: Pass

Test files

Import	Export
1. ENTSOE_16_NL_EQ.xml (ver 12July)	1.
2. ENTSOE_16_NL_TP.xml (ver 12July)	2.
3. ENTSOE_16_EU_EQ.xml (ver 12July)	3.
4. ENTSOE_16_EU_TP.xml (ver 12July)	4.
5. ENTSOE_16_NL_SV.xml (ver 12July)	5.
6.	6.
7.	7.

Comments/Results/Issues:

The comparison was made between the following tool in relation to the Test 01: CRESO and Enterprise Gateway of GE.

The results are comparable and mach in the engineering tolerance.

Supplementary files:

Screen shot: CR_TEST03_1_SCREENSHOT.doc
CR_OtherTOOLS_SCREENSHOT.doc (import of GE files)

Date	Vendor		Test witness	
	Name	**Signature**	**Name**	**Signature**
14 July	Ferdinando Parma *Ferdinando Parma*		Adriano Gubernali	*A.fubernali*

European Network of
Transmission System Operators
for Electricity
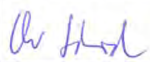
entsoe

SINGLE TEST RECORD FORM

Test No: 1.2.7	Tool: CRESO	Score: Pass

Test files

Import	Export
1. ENTSOE_16_NL_EQ.xml (ver 13July)	1.
2. ENTSOE_16_NL_TP.xml (ver 13July)	2.
3. ENTSOE_16_EU_EQ.xml (ver 13July)	3.
4. ENTSOE_16_EU_TP.xml (ver 13July)	4.
5. ENTSOE_16_SV_SPv1_16J9h.xml	5.
6.	6.
7.	7.

Comments/Results/Issues:

The test07 was made using for input the following files xml: from Test 01 the EQ and TP files, from Test 05 the SV file, exported by SPIRA.

The results are comparable and mach in the engineering tolerance with SPIRA results.

Supplementary files:

Screen shot: CR_TEST07_SCREENSHOT.doc

Date	Vendor		Test witness	
	Name	Signature	Name	Signature
16 July	Ferdinando Parma		Adriano Gubernali	

entsoe

TOOL SUMMARY FORM (PER TOOL)

Vendor: DIgSILENT		Tool: PowerFactory v14.1	

Witnessed by

Name	Signature	Name	Signature
Reinier van Offeren			

Performed tests

Test No	Score	Test No	Score	Test No	Score
1 official	pass	5 a	pass	15	pass
1 FGH	pass	5 b	pass	16	pass
2 official	pass	6	pass	17	pass
2 FGH	pass	7 selftest	pass	24 selftest	pass
3 official	pass	7 GE	pass	25	pass
3 FGH	pass	8	pass	26 selftest	pass
3 CESI SPIRA	pass	9	pass	29 GE	pass with error*
4	pass	10 selftest	pass	29 ABB	pass with error*
				31	pass

Comments:

* the errors are described in the single test record form.

PowerFactory has demonstrated interoperability with: Siemens (PSS/E, ODMS), FGH (Integral), CESI (SPIRA), GE (Enterprise Gateway) and ABB (ABB MMS).

The test numbers 11, 12, 13, 14 about incremental files are not yet supported by the tool.
The test numbers 18, 19, 20, 21, 22, 23 have already been successfully tested in the Dallas IOP 2009.
The test numbers 27 and 28 are mainly for SCADA vendors and will be supported by the planning tool PF later.
The test 30 was not performed because of missing or incomplete files from other vendors.

Date	Vendor		ENTSO-E	
16 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Chavdar Ivanov	

SINGLE TEST RECORD FORM

Test No: 1 official	Tool: PowerFactory v14.1	Score: pass

Test files

Import	Export
1. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_EQ.xml	1.
2. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_TP.xml	2.
3. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_EQ.xml	3.
4. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_TP.xml	4.
5. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_SV.xml	5.

Comments/Results/Issues:

- Load flow solves.
- Slack bus P = 597.6 MW, Q = 180.7 Mvar. Values in the description of the official example are P = 597.4 MW, Q = 180.9 Mvar. Results are ok.
- Generator and load data are as in the screenshot and are checked with the description of the official example. Results are ok.
- Line node5-XAF_AK21 checked the length, nominal voltage, R, X and Charging. Results are ok.
- Switched shunt at node 4. Checked rating 50 Mvar. Results are ok.
- Transformer between node 4 and 8. Rating A is in the PowerFactory model. Also checked the voltage magnitude, angle, flow of P and Q at HV and LV side. Results are ok.
- Line instance data are shown in the screen shot and the same as in the documentation.

Supplementary files:

1.2.1 ldf results synchronous machines.JPG
1.2.1 ldf results loads.JPG
1.2.1 line data.JPG

Date	Vendor		Test witness	
12 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	
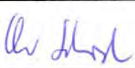
SINGLE TEST RECORD FORM

Test No: 1 FGH	Tool: PowerFactory v14.1	Score: pass

Test files

Import		Export
1. …\3_Official_Test_Models\FGH test network\ FGH_DE_EQ.xml		1.
2. …\3_Official_Test_Models\FGH test network\ FGH_DE_TP.xml		2.
3. …\3_Official_Test_Models\FGH test network\ FGH_DE_SV.xml		3.
4.		4.
5.		5.

Comments/Results/Issues:

Files have been manually corrected because of errors. Model.DependsOn to Model.DependentOn in TP and SV file.
In addition the IEC61970CIMVersion that is included in the TP and SV file has been removed. Imports without errors.

Checked is all the load data.
Checked is generator data of all generators.

Supplementary files:

1.2.1 FGH load data.JPG

Date	Vendor		Test witness	
16 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

European Network of
Transmission System Operators
for Electricity
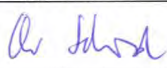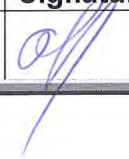
entsoe

SINGLE TEST RECORD FORM

Test No: 2 official	Tool: PowerFactory v14.1	Score: pass

Test files		
Import	**Export**	
1. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_EQ.xml	1. ENTSOE_16_PF_13J08h.zip	
2. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_TP.xml	2. 1.2.2 ENTSOE_16_PF_13J16h.zip with header information corrected.	
3. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_EQ.xml	3.	
4. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_TP.xml	4.	
5. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_SV.xml	5.	

Comments/Results/Issues:

In the export file the Netherlands and boundary MAS are included.
All files pass validation with the CIMSpy tool.
Checked of the line L1: bch, R, X, length.
Checked P and Q values of all loads, injections and generators.
Checked of transformer 3 primary winding the ratedS, voltage, r, x, b and g.
Checked of T4 primary winding the ratedS, voltage, r, x, b and g.

1.2.2 ENTSOE_16_PF_13J15h.zip:
CIMSpy validation ControlArea.type, OperationalLimitSet.Equipment and
RatioTapChanger.tculControlModel are not in the exported model as they will be optional
attributes but CIMSpy still requires them.

Supplementary files:

1.2.2 ACLinesegment data.JPG for reference of instance data.
1.2.2 ValidationReport.JPG as an example of the validation report.
1.2.2b ValidationReport.JPG

Date	Vendor		Test witness	
13 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	
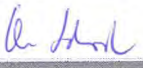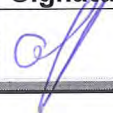
SINGLE TEST RECORD FORM

Test No: 2 FGH	Tool: PowerFactory v14.1	Score: pass

Test files

Import	Export
1. ...\3_Official_Test_Models\FGH test network\ FGH_DE_EQ.xml	1. 1.2.2 FGH_DE_PF_16J10h.zip
2. ...\3_Official_Test_Models\FGH test network\ FGH_DE_TP.xml	2.
3. ...\3_Official_Test_Models\FGH test network\ FGH_DE_SV.xml	3.
4.	4.
5.	5.

Comments/Results/Issues:

In the export file the Netherlands and boundary MAS are included.
All files pass validation with the CIMSpy tool.
CIMSpy validation: ControlArea.type, OperationalLimitSet.Equipment and
RatioTapChanger.tculControlModel are not in the exported model as they will be optional
attributes but CIMSpy still requires them.
The attribute TransformerWinding.r0 is negative in the output xml file. This is shown in the
validation report as against the profile. This value was also negative in the input xml file.

Supplementary files:

1.2.2 FGH Validation Report.JPG

Date	Vendor		Test witness	
16 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	
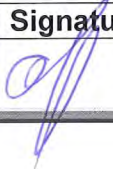
SINGLE TEST RECORD FORM

Test No: 3 official	Tool: PowerFactory v14.1	Score: pass

Test files

Import	Export
1. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_EQ.xml	1.
2. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_TP.xml	2.
3. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_EQ.xml	3.
4. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_TP.xml	4.
5. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_SV.xml	5.

Comments/Results/Issues:

Compared is the following data:

PF slack generator at node 10: P = 118.1 MW, Q = 18.8 Mvar.
PF generator at node 7: P = 90.0 MW, Q = 100.2 Mvar.
PF voltage at node 3 is 231.52 kV.
Siemens generator at node 10: P = 118.1 MW, Q = 18.8 Mvar.
Siemens generator at node 7: P = 90.0 MW, Q = 100.4 Mvar.
Siemens voltage at node 3 is 231.51 kV.
Results are identical.

Supplementary files:

1.2.3 ENTSOE_16_BE_LDF_Results.wmf
Siemens_S_No1_1.jpg

Date	Vendor		Test witness	
	Name	Signature	Name	Signature
12 jul 2010	Christoph Schmid DIgSILENT		Reinier van Offeren	

entso⊜
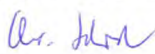
Single Test Record Form

Test No: 3 FGH	Tool: PowerFactory v14.1	Score: pass

Test files

Import	Export
1. …\3_Official_Test_Models\FGH test network\ FGH_DE_EQ.xml	1.
2. …\3_Official_Test_Models\FGH test network\ FGH_DE_TP.xml	2.
3. …\3_Official_Test_Models\FGH test network\ FGH_DE_SV.xml	3.
4.	4.
5.	5.

Comments/Results/Issues:

Checked is the generator data in the load flow results of the two tools. The active power matches perfectly, the reactive power match within tolerance.

Supplementary files:

1.2.3 FGH_PF_equivalentBranch_as_ACLineSegment.pdf FGH load flow results.
1.2.3 FGH ldf results sym.JPG PowerFactory load flow results.

Date	Vendor		Test witness	
16 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

SINGLE TEST RECORD FORM

Test No: 3 CESI SPIRA	Tool: PowerFactory v14.1	Score: pass

Test files	

Import	Export
1. …\ CESI\SPIRA\Test 02_1\ ENTSOE_16_EU_EQ_SPv1.xml	1.
2. …\ CESI\SPIRA\Test 02_1\ ENTSOE_16_EU_TP_SPv1.xml	2.
3. …\ CESI\SPIRA\Test 02_1\ ENTSOE_16_NL_EQ_SPv1.xml	3.
4. …\ CESI\SPIRA\Test 02_1\ ENTSOE_16_NL_TP_SPv1.xml	4.
5. …\ CESI\SPIRA\Test 02_1\ ENTSOE_16_ SV_SPv1.xml	5.

Comments/Results/Issues:

Data from the SPIRA files are corrected in PowerFactory because the data is missing in the exported xml files. We corrected:
- Tap position of transformer T3 and T4
- Shunt step of shunt 3

The load flow result is checked via the generator data. This data is the same in both tools.

Supplementary files:

SP_Test02_1_LfSolution.out contains the SPIRA results
1.2.3 SPIRA ldf results sym.JPG

Date	Vendor		Test witness	
16 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

entsoe

SINGLE TEST RECORD FORM

Test No: 4	Tool: PowerFactory v14.1	Score: pass

Test files

Import	Export
1. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_EQ.xml	1. 1.2.4. ENTSOE_16_PF_13j09h.zip
2. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_TP.xml	2. 1.2.4. ENTSOE_16_PF_13j15h.zip with header information corrected.
3. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_EQ.xml	3.
4. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_TP.xml	4.
5. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_SV.xml	5.

Comments/Results/Issues:

Only the Netherlands and boundary MAS are imported.
Both circuit breakers are opened.
Only SV and TP xml are exported, as required.

Supplementary files:

1.2.4 ENTSOE_16_NL_LDF_Results.wmf
1.2.4 ValidationReport.JPG

Date	Vendor		Test witness	
13 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	
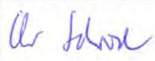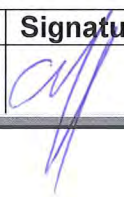
SINGLE TEST RECORD FORM

Test No: 5 a	Tool: PowerFactory v14.1	Score: pass

Test files	
Import	**Export**
1. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_EQ.xml	1. 1.2.5 ENTSOE_16_PF_13J10h.zip
2. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_TP.xml	2.
3. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_EQ.xml	3.
4. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_TP.xml	4.
5. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_SV.xml	5.
6. Version_1_12July_SVInjection_signs\per_MAS\ BE_MAS\ENTSO_16_BE_EQ.xml	
7. Version_1_12July_SVInjection_signs\per_MAS\ BE_MAS\ENTSO_16_BE_TP.xml	
8. Version_1_12July_SVInjection_signs\per_MAS\ BE_MAS\ENTSO_16_BE_SV.xml	

Comments/Results/Issues:

Generator 1 at node 9 from P = 140 MW to P = 160 MW.
Generator at node 7 changed voltage setpoint for node 1 from V = 1.05 pu to V = 1,04 pu.
Load at node 3 from P = 200 MW to P = 250 MW.
Load flow solves. Power setpoints are ok. Voltage setpoint is ok.
Only SV xml file is exported, as required. Validated with the CIMSpy.

Supplementary files:

1.2.5 ValidationReport.JPG
1.2.5 ENTSOE_16_NL_BE_LDF_Results.wmf for the load flow results.

Date	Vendor		Test witness	
13 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	
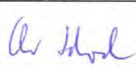
SINGLE TEST RECORD FORM

Test No: 5 b	Tool: PowerFactory v14.1	Score: pass

Test files	
Import	**Export**
1. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_EQ.xml	1. 1.2.5 ENTSOE_16_PF_13J16h.zip
2. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_TP.xml	2.
3. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_EQ.xml	3.
4. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_TP.xml	4.
5. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_SV.xml	5.

Comments/Results/Issues:

Generator 1 at node 9 from P = 140 MW to P = 160 MW.
Generators at node 9 changed voltage setpoint for node 1 from V = 1.047 pu to V = 1.04 pu.
Load 2 at node 4 from P = 10 MW to P = 20 MW.
Load flow solves. Power setpoints are ok. Voltage setpoint is ok.
Only SV xml file is exported, as required. Validated with the CIMSpy.

Supplementary files:

1.2.5 ValidationReport.JPG
1.2.5 ENTSOE_16_NL_LDF_Results.wmf for the load flow results.

Date	Vendor		Test witness	
13 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	
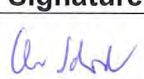
SINGLE TEST RECORD FORM

Test No: 6	Tool: PowerFactory v14.1		Score: pass
Test files			
Import			**Export**
1. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_EQ.xml			1.
2. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_TP.xml			2.
3. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_EQ.xml			3.
4. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_TP.xml			4.
5. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_SV.xml			5.
6. ENTSOE_16_NL_OD_13J12h_TP.xml			
7. ENTSOE_16_NL_OD_13J12h_SV.xml			

Comments/Results/Issues:

Imported topological change (opening circuit breaker) from Siemens. The load flow results are compared between Siemens PSS/E and PF. These results match up well within tolerance. After discussion between Siemens and DIgSILENT the probable origin of the difference is the implementation of the voltage dependent load in PSS/E. The voltage of the NODE 8 is lower in comparison with the original test case 1.2.1, but the MW value in the Siemens results of load A is higher.

The load flow results are the same if you either do the change directly in PF or do the change via the import of a changed TP file.

Checked is the flow (P and Q) from all generators, lines and transformers and also the voltage of all nodes.

Supplementary files:

1.2.6 ldf results sym.JPG
1.2.6 Siemens_S_No4_1_Load_flow_AfterChange.jpg

Date	Vendor		Test witness	
14 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

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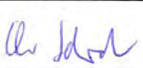
SINGLE TEST RECORD FORM

Test No: 7 selftest	Tool: PowerFactory v14.1	Score: pass

Test files		
Import		**Export**
1. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_EQ.xml		1.
2. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_TP.xml		2.
3. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_EQ.xml		3.
4. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_TP.xml		4.
5. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_SV.xml		5.
6. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_EQ.xml		
7. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_TP.xml		
8. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_SV.xml		
9. 1.2.5 ENTSOE_16_PF_13J10h.zip		

Comments/Results/Issues:

Done by importing back the export of the same tool of test 5.
First the base case files 1 to 8 were imported. Then the SV file from test 5 was imported.
We see all the changes of test 5.

Supplementary files:

1.2.7 ENTSOE_16_NL_LDF_Results.wmf

Date	Vendor		Test witness	
13 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

entso⊜
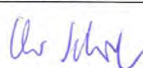
SINGLE TEST RECORD FORM

Test No: 7 GE	Tool: PowerFactory v14.1	Score: pass

Test files		Export
Import		**Export**
1. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_EQ.xml		1.
2. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_TP.xml		2.
3. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_EQ.xml		3.
4. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_TP.xml		4.
5. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_SV.xml		5.
6. eg_ENTSOE_16_NL_test05_SV_fixed.xml		

Comments/Results/Issues:

Found some problems in the GE-file:
no uri in header, fixed manually in xml file
for transformers position and not continuousPosition, fixed manually in xml file
for shunt sections and not continuousSections, fixed manually in xml file
tapposition of transformer, fixed manually in xml file
The fixed GE-xml file is in the DIgSILENT test record

PF results:
node 6 generator P = 637.7 MW, Q = 185.2 Mvar
node 9 generator1 P = 140.0 MW, Q = 81.7 Mvar
node 9 generator2 P= 150.0 MW, Q = 81.5 Mvar
Load A at node 8 P = 486.6 MW, Q = 230.1 Mvar, U = 226.6 kV

GE results:
node 6 generator P = 638 MW, Q = 185 Mvar
node 9 both generators P = 290.0 MW, Q = 163 Mvar
Load A at node 8 P = 486 MW, Q = 230 Mvar, U = 226.5 kV

Perfect match of PF and GE results.

Supplementary files:

1.2.7 ENTSOE_16_NL_LDF_Results_GE_SV_update.wmf , PF results
eg_test05_resolution_screen.doc , GE results

Date	Vendor		Test witness	
14 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

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SINGLE TEST RECORD FORM

Test No: 8	Tool: PowerFactory v14.1	Score: pass

Test files		
Import		**Export**
1. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_EQ.xml		1.
2. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_TP.xml		2.
3. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_EQ.xml		3.
4. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_TP.xml		4.
5. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_SV.xml		5.

Comments/Results/Issues:

The results are compared against the results of Neplan.
The values for subtransient reactance xd"sat is manually set to 0.544 p.u for the 10.5 kV generator and to 0.136 for the 21 kV generator. This attribute is missing in the original xml and also missing in the profile. It should be in the profile.
Short circuit results of PF at node XAA_AB13:
Sk" = 783 MVA
Ik" = 1.13 kA
This is calculated with the following options:
iec 6909
max short circuit current
no detection of unit transformer
The data for the transformers is strange. All windings are the same.
The PF and Neplan results are different. That might be caused by the insufficient support of short circuit data in the profile.

Supplementary files:

1.2.8 ENTSOE_16_BE_SHC_Results.wmf

Date	Vendor		Test witness	
14 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

SINGLE TEST RECORD FORM

Test No: 9	Tool: PowerFactory v14.1	Score: pass

Test files	
Import	**Export**
1. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_EQ.xml	1. 1.2.9 ENTSOE_16_PF_13J10h.zip
2. Version_1_12July_SVInjection_signs\per_MAS\ EU_MAS\ENTSO_16_EU_TP.xml	2. 1.2.9 ENTSOE_16_PF_13J16h.zip with fixed file headers.
3. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_EQ.xml	3.
4. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_TP.xml	4.
5. Version_1_12July_SVInjection_signs\per_MAS\ NL_MAS\ENTSO_16_NL_SV.xml	5.
6. Version_1_12July_SVInjection_signs\per_MAS\ BE_MAS\ENTSO_16_BE_EQ.xml	
7. Version_1_12July_SVInjection_signs\per_MAS\ BE_MAS\ENTSO_16_BE_TP.xml	
8. Version_1_12July_SVInjection_signs\per_MAS\ BE_MAS\ENTSO_16_BE_SV.xml	
9. 1.2.9 ENTSOE_16_NL_OD_13J12h.zip	

Comments/Results/Issues:

In the zip file output are the EQ, TP and SV xml files. There are EQ and TP files for each MAS and only one SV xml file.
All files validate with the CIMSpy tool.
A topological change is input via an xml file from Siemens and this is correctly imported.
1.2.9 ENTSOE_16_PF_13J16h.zip:
CIMSpy validation ControlArea.type, OperationalLimitSet.Equipment and RatioTapChanger.tculControlModel are not in the exported model as they will be optional attributes but CIMSpy still requires them.
When the breaker is opened by importing the xml file the generator load flow data is the same as when the breaker is opened in PF natively.

Supplementary files:

1.2.9b ENTSOE_16_NL_BE_LDF_Results.wmf
1.2.9 ValidationReport.JPG
1.2.9b ENTSOE_16_NL_BE_LDF_Results after TP_SV_Import.JPG

Date	Vendor		Test witness	
13 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	
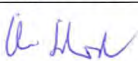
SINGLE TEST RECORD FORM

Test No: 10 selftest	Tool: PowerFactory v14.1	Score: pass

Test files

Import		Export	
1. 1.2.9 ENTSOE_16_PF13J16h.zip		1.	
2.		2.	
3.		3.	
4.		4.	
5.		5.	

Comments/Results/Issues:

Results are exactly the same after reimport of xml files.

Supplementary files:

Date	Vendor		Test witness	
	Name	**Signature**	**Name**	**Signature**
13 jul 2010	Christoph Schmid DIgSILENT		Reinier van Offeren	

SINGLE TEST RECORD FORM

Test No: 15	Tool: PowerFactory v14.1	Score: pass

Test files	
Import	**Exp**
1. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_EQ.xml	1.
2. Version_1_12July_SVInjection_signs\per_MAS\EU_MAS\ENTSO_16_EU_TP.xml	2.
3. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_EQ.xml	3.
4. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_TP.xml	4.
5. Version_1_12July_SVInjection_signs\per_MAS\NL_MAS\ENTSO_16_NL_SV.xml	5.
6. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_EQ.xml	
7. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_TP.xml	
8. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_SV.xml	
9. …\per_MAS_DY_V2.zip\ENTSO_16_V2_BE_DY.xml	
10. …\per_MAS_DY_V2.zip\ENTSO_16_V2_NL_DY.xml	

Comments/Results/Issues:

Test is done with the dynamics.xml files of 15 July 2010.
Checked all data of the round rotor generator of node 10, see screenshot.
Checked all data of the salient pole generator of node 6.
The speed damping D on all generators is 0 as included in the official test cases V2.
Checked all data of GovStream1. Data that is not present in the profile is supplemented with default data.
Checked all data of ExcAC4A on node 7 and 10.
Checked all data of ExcAC1A on node 6.
Checked all data of ExcST1A on node 9.
Load flow is correct.

Supplementary files:

1.2.15 NODE 10 Generator data.jpg
1.2.15 INC_Results.wmf

Date	Vendor		Test witness	
15 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

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SINGLE TEST RECORD FORM

Test No: 16	Tool: PowerFactory v14.1	Score: pass

Test files		
Import		**Export**
1. all as test 15		1. 1.2.16 ENTSOE_16_PF_15J13h.zip
2.		2.
3.		3.
4.		4.
5.		5.

Comments/Results/Issues:

Imported data is exactly the same as test 15.
Checked all data of GovSteam0 and GovSteam1 in xml file.
DY files validated with CIMSpy.
The exported zip file includes all xml files including DY files for BE and NL.
CIMSpy doesn't recognise mandatory attributes of the profile.
CIMSpy reports one problem (shown in screenshot). This is a profile issue as the official model includes ExcAC1A.vrmin = 0. The exported values are correct.

Supplementary files:

1.2.15 NODE 10 Generator data.jpg
1.2.16 GOV instance data.JPG
1.2.16 NL DY validation.JPG

Date	Vendor		Test witness	
15 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

SINGLE TEST RECORD FORM

Test No: 17	Tool: PowerFactory v14.1	Score: pass

Test files	
Import	**Export**
1. all as test 15	1.
2.	2.
3.	3.
4.	4.
5.	5.

Comments/Results/Issues:

Imported data is exactly the same as test 15.
The voltage reference of the avr at node 6 is increased by 5%.
Graph of dynamic simulation is checked against the documentation.
Checked against neplan, the shape of the response is the same, but the values differ.
Checked against psse, the voltage response looks similar and the differences are within tolerance.
The active power response is similar in shape however the damping in PF is smaller.

Supplementary files:

1.2.17 ENTSOE_16 NODE 6 vref step repsonse.wmf
SIEMENS_S_NO17_1_DYNAMICS.jpg

Date	Vendor		Test witness	
15 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

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SINGLE TEST RECORD FORM

Test No: 24 selftest	Tool: PowerFactory v14.1	Score: pass

Test files

Import	Export
1. 1.2.25 ENTSOE_16_PF_15J14h.zip	1.
2.	2.
3.	3.
4.	4.
5.	5.

Comments/Results/Issues:

The file that is exported in test 25 is imported back into PF as a self test as DIgSILENT provided the official test example for the proprietary model.

Supplementary files:

1.2.24 NODE 10 avr proprietary data.jpg
1.2.24 INC_Results.wmf

Date	Vendor		Test witness	
	Name	**Signature**	**Name**	**Signature**
15 jul 2010	Christoph Schmid DIgSILENT		Reinier van Offeren	

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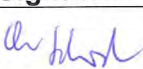
entsoe

SINGLE TEST RECORD FORM

Test No: 25	Tool: PowerFactory v14.1	Score: pass

Test files	
Import	**Export**
1. as test 15	1. 1.2.25 ENTSOE_16_PF_15J14h.zip
2.	2.
3.	3.
4.	4.
5.	5.

Comments/Results/Issues:

NODE 10 avr model is encrypted. Before and after dynamic simulation results are the same.
Model is exported in one combined zip archive that contains all xml files.
DY files are validated with CIMSpy. In the screen shot a profile issue is shown.
Each attribute of the proprietary model is checked in the xml file.

Supplementary files:

1.2.25 ENTSOE_16 NODE 10 vref step repsonse.wmf
1.2.25 ValidationReport.JPG
1.2.25 NODE 10 avr proprietary data.jpg as it is in PF
1.2.25 NODE 10 avr proprietary data xml.JPG as it is in xml file

Date	Vendor		Test witness	
15 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

SINGLE TEST RECORD FORM

Test No: 26 selftest	Tool: PowerFactory v14.1	Score: pass

Test files			
Import		**Export**	
1. 1.2.25 ENTSOE_16_PF_15J14h.zip		1.	
2.		2.	
3.		3.	
4.		4.	
5.		5.	

Comments/Results/Issues:

The proprietary dynamic model is imported into PF and a dynamic simulation is made. For the results see the screen shot in the supplementary file. This result is the same as the original dynamic simulation.

Supplementary files:

1.2.26 ENTSOE_16 NODE 10 vref step repsonse.wmf

Date	Vendor		Test witness	
15 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

entsoe
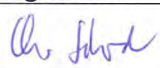
SINGLE TEST RECORD FORM

Test No: 29 GE	Tool: PowerFactory v14.1	Score: pass with error*

Test files

Import	Export
1. …\3_Official_Test_Models\GE_OperationModel\ ge1_EQ.xml	1.
2. …\3_Official_Test_Models\GE_OperationModel\ ge1_SV.xml	2.
3. …\3_Official_Test_Models\GE_OperationModel\ ge1_TP_v2.xml	3.
4.	4.
5.	5.

Comments/Results/Issues:

The SvInjection instances have been manually deleted from the SV file as they represent the balance (Pgen – Pload) on each node.
The import leads to an error message because there is a SeriesCompensator in the GE network model that is not yet supported by PowerFactory.

Instance data of line XA1Line847, generator XA1Generator141 and transformer winding XA1XfmrPrimaryWinding405.

*error. The voltage control node reference for the generators goes wrong. Therefore a load flow calculation could not be performed.

Supplementary files:

Date	Vendor		Test witness	
	Name	**Signature**	**Name**	**Signature**
16 jul 2010	Christoph Schmid DIgSILENT		Reinier van Offeren	

SINGLE TEST RECORD FORM

Test No: 29 ABB	Tool: PowerFactory v14.1	Score: pass with error*

Test files

Import		Export	
1. ABB40bus_NM\Basic model\Basic model.zip		1.	
2.		2.	
3.		3.	
4.		4.	
5.		5.	

Comments/Results/Issues:

In the input file there are values that contain '*****'. This is incorrect and will be replaced by the default value in PowerFactory.
OperationalLimitType is missing in the input file. This is a difference between CPSM and ENTSOE profile. This is reported during the input.
A screenshot is given of two substations, Bowman and Marcella. They appear to be ok.

*error. There is no instance data reported for the imported files so this cannot be checked. Also a load flow could not be performed due to missing breaker status.

Supplementary files:

1.2.29 ABB BOWMAN.wmf
1.2.29 ABB MARCELLA.wmf

Date	Vendor		Test witness	
16 jul 2010	**Name**	**Signature**	**Name**	**Signature**
	Christoph Schmid DIgSILENT		Reinier van Offeren	

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SINGLE TEST RECORD FORM

Test No: 31	Tool: PowerFactory v14.1	Score: pass

Test files

Import		Export
1. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_EQ.xml		1.
2. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_TP.xml		2.
3. Version_1_12July_SVInjection_signs\per_MAS\BE_MAS\ENTSO_16_BE_SV.xml		3.
4.		4.
5.		5.

Comments/Results/Issues:

When a header is missing the file cannot be imported. Gives warning.
The Belgium xml files are dependent on the EU boundary files. Importing Belgium without first importing the boundary results in an error message. This dependency is declared in the header.
Importing an EQ file twice but with different filenames results in an error message, as required. The header of the TP file is corrupted by falsely writing it is an equipment file. This gives an import error, as expected.
If the profile name is an unknown this leads to an import error message and the import is aborted.

Supplementary files:

1.2.31 ImportError.txt

Date	Vendor		Test witness	
	Name	Signature	Name	Signature
13 jul 2010	Christoph Schmid DIgSILENT	*[signature]*	Reinier van Offeren	*[signature]*