

About

Provide general information regarding the described test objective.

Test objective name	CommsVoltageControl
Author / organization	Petra Raussi (VTT)
Short description	This test case is used to verify the communication performance for voltage control in a coupled power and ICT network enabling harvesting communication performance (QoS) data from the communication and verifying the impact of the communication channel on the voltage control algorithm.
Present use / development status	V1.0

Scope and goal

What is the test objective, i.e. what is the purpose of carrying out the test? Try to formulate the objective within one of the following three categories:

1. *Characterization: a measure is given without specific requirements for passing the test. Examples: understanding the behaviour of a system, developing a mathematical model of a component.*
2. *Validation: a requirement and abstract measure is provided, but the results are subject to interpretation, i.e. passing a test depends on a qualitative evaluation by an expert or user of the system. These tests seek to answer the question are we building the right system? Example: Is the mathematical model good enough?*
3. *Verification: acceptance of a test result depends on the direct evaluation against fixed and formalized assessment criteria. These criteria can be formulated as quantitative measures with a set/range of acceptable values of these measures, i.e. quantitative tests. These tests seek to answer the question are we building the system right? Example: Testing whether a component conforms to a standard.*
4. *Optimization: optimization is the selection of a best element (regarding a defined criterion) from some set of available alternatives. These tests seek to answer the question on how to build the right system? Example: Sizing of a component*

Test objective	<input type="checkbox"/> characterization <input type="checkbox"/> validation <input checked="" type="checkbox"/> verification <input type="checkbox"/> optimization
Description incl. justification	This test case is used to verify the communication performance for voltage control in a coupled power and ICT

	<p>network enabling harvesting communication performance (QoS) data from the communication and verifying the impact of the communication channel on the voltage control algorithm.</p> <p>The aim of this test case is to assess the performance of equipment used for communication in smart grids and power systems. The characterization of this performance is one of the major goals of this test case, taking into account the different communication technologies that could be supported in such devices and the stochastic nature of communication effects.</p> <p>In particular, the experiments in the test case allow characterizing the performance of communication equipment by means of communication delay calculation and the rate of dropped packets. Through this experiment, it is possible to statistically determine communication delay, together with the packet loss rate for different polling times.</p>
<p>System configuration</p> <p><i>To which system configuration does this test apply?</i></p>	JRA1 Electrical + ICT benchmark
<p>Use case</p> <p><i>To which use case does this test apply?</i></p>	JRA1-EICT-UC

Identification of test components

This section provides information about the system under test, object under investigation and function under investigation.

<p>System Under Test</p> <p><i>Which subset of the entire system configuration needs to be simulated to achieve the test objective?</i></p>	<p>The entire system is required since the behaviour of every component in this system can impact the Function Under Investigation and includes transmission or MV distribution power grid, and ICT network.</p> <p>In order to execute this test, the following components are needed:</p> <ul style="list-style-type: none"> • Power systems model on simulator or hardware • ICT network model on simulator or hardware
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	<pre> graph TD subgraph TopBox [] P[Power system simulator] <-.-> A[Application] P --- I[Interface] end subgraph BottomBox [] C[Communication simulator/emulator or hardware] end I <--> C A --> C C --> A </pre>
Object Under Investigation <i>Which are the components of the System Under Test that are to be characterized or validated?</i>	ICT network at least between two communication points.
Function Under Investigation <i>which of the system behavior defined in the use case is to be characterized, validated or verified?</i>	The characteristics of two communication devices exchanging information. The delay of the information transmission and the loss packet rate, for different communication protocols.

Test criteria

This section provides information about the criteria to evaluate the test results.

Objective Function / Target Metrics <i>Optimization studies: Define the objective function (OF), which specifies how the measured parameters are used to evaluate the optimization target. Refer to OF and KPI description forms (separate forms).</i> <i>Other studies: Define the target metrics, which specifies how the measured parameters are used to evaluate the test objective in terms of KPIs. If available, refer to KPI description forms (separate forms).</i>	<ul style="list-style-type: none"> • Voltage deviation • Network latency
Acceptable test result <i>Applicable for validation and verification test cases.</i> <i>Define quality attributes for assessing an acceptable test result.</i> <i>For validation tests an abstract</i>	For delay calculation, at least have a packet loss rate less than 1%.

<i>measure to enable a qualitative assessment is stated. For verification tests, the acceptance threshold (worst case for passing the test) is stated.</i>	
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