

TITLE: PERFORMANCE Analysis of PV Integrated Distribution Network with combination of Different Control Strategies and Communication Network (PERFECT)		AUTHOR: Anju Yadav DATE: 01.08.2022	
Object under Investigation (Oul) "The component(s) (1..n) that are to be qualified by the test" <div><div>1) RTDS</div><div>2) Communication Network</div><div>3) PV</div><div>4) Grid Emulator</div><div>5) CHIL</div><div>6) Power amplifier converter</div></div>	Test Objectives Why is the test needed? What do we expect to find out? <div><div>1) The objective of test to asses the technical foundation being faced for voltage regulation in the distribution network with PV integration</div><div>2) The expected outcome of test to find out:<div><div>a) Investigation of the interaction between PV inverters modeled in RTDS controlled via VVC-VWC and operate with future PV installation.</div><div>b) Impact of bad data conditions; time delay and data loss (packet drop) in the communication network</div></div></div></div>	System under Test (SuT) Systems, subsystems, components included in the test case or test setup <div><div>1) IEEE-37 bus/any other simple bus network with PV integration</div><div>2) PV system emulator</div><div>3) CHIL</div><div>4) PHIL</div><div>5) Communication network (wired and wireless)</div></div>	
		Function(s) under Investigation (Ful) “The referenced specification of a function realized (operationalized) by the object under investigation” <div><div>1) Voltage regulation using control algorithm, constant/time varying and data packet loss will be also included.</div><div>2) Voltage regulation using control algorithm interchanged among the PV inverters.</div></div>	
	Domain under Investigation (Dul): “The relevant domains of test parameters and connectivity” Volt-Var control and Volt-Watt control, CHIL, PV System	Purpose of Investigation (Pol) The test purposes classified in with terms <i>Characterization, Verification, or Validation</i> <div><div>1) Understanding of voltage regulation in distribution network</div><div>2) Validation using Volt-Var and Volt-Watt control algorithm</div></div>	Functions under Test (FuT) Functions relevant to the operation of the system under test, including Ful and relevant interactions btw. Oul and SuT <div><div>1) Bus voltage profile</div><div>2) Voltage sensitivity estimation for PV inverters</div></div>
Target metrics (TM) Measures retrievable from SuT required to quantify each of the identified test criteria <div><div>1) Output active and reactive power of PV System</div><div>2) Distribution network bus voltage</div><div>3) Voltage sensitivity estimation</div></div>	Test criteria (TCR) Formulation of criteria <i>for each Pol</i> based on properties of SuT; encompasses properties of test signals and output measures <div><div>1) In respect to Pol 1, Voltage unbalance due to load and solar uncertainty</div><div>2) In respect to Pol 2, Voltage sensitivity estimation using data driven Volt-Var and Volt-Watt control</div></div>	Variability attributes (VA) Identify relevant controllable or uncontrollable factors of the SuT and their required variability; refer to Pol Controllable factors: <div><div>1) Controllable load</div><div>2) Grid/PV emulator</div></div> Uncontrollable factor: <div><div>1) Solar radiation</div><div>2) Active and reactive power imbalance</div></div>	
	Quality attributes (QA) Threshold levels for test result quality as well as pass/fail criteria The system will be able to control voltage under load and solar uncertainties		