

Reliability Software

Minimum Requirements & Best Practices

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Technical Conference July 14, 2004

Caveat: The minimum requirements and performance indicies quoted are considered to be commercially achievable and are not intended to be regulatory requirements. Their purpose is to initiate industry discussion on what these minimum reliability capabilities ought to be.

Reliability Applications & Tools		Description	Classification	
<i>Network Analysis</i>				
1	Network Topology Processor	Computes the correct status of the network connectivity as a front-end to the State Estimator to reduce mismatches and improve robustness.	Minimum Requirement	
2	State Estimator (SE)	Provides a reliable real time ac power flow model and system snapshot computed at least every 2 minutes with mismatches less than 10 MVA. Used for RTCA and other Reliability based and Market based applications.	Minimum Requirement	
3	Real Time Contingency Analysis (RTCA)	Contingency analysis computed at least every 5 minutes for all internal facilities typically 100 kV and above and for all facilities external to the foot-print that have the potential for adverse impact within the internal system	Minimum Requirement	
4	Critical Facility Loading Assessment	Assesses the post contingency loading of critical facilities using telemetered data and Line Outage Distribution Factors (LODF) at least every 5 seconds with LODFs updated on status change. This is a fall back should the state estimator fail to solve.		Best Practice

5	Dynamic Security Assessment (DSA) <ul style="list-style-type: none"> • Voltage stability • Transient stability • Small signal stability 	Near real time determination of system operating limits based on transient and voltage stability assessment using a snap-shot of the real-time system. Also derivation of minimum voltages at key buses & minimum dynamic reactive reserves required in local areas.		Best Practice
6	Real Time Thermal Capability Assessment	Real time evaluation of line ampacity, cable ampacity and transformer capability based on measured ambient conditions and pre-load or dynamic field measurements		Best Practice
7	Real Time Short Circuit Level Assessment	Real time evaluation of 3 ph and L-G short circuit levels of buses 100 kV and above based on prevailing generation & transmission conditions. This determines the need for operating actions such as “split” bus operation and conditions when the buses can be operated “solid”.		Best Practice
(A) Monitoring & Visualization				
8	Wide Area Visualization	Dynamic system overview driven by the EMS and wide area view of critical facilities external to the foot print that have the potential for adverse impact to the internal system. This includes monitoring of frequency at multiple points to detect islanding.	Minimum Requirement	
9	Dynamic Reactive Reserve Monitoring	Monitoring dynamic reactive reserves in local areas or major load centers, and alarming when either a unit in the area has reached its reactive capability or the minimum reactive reserve requirement for the area is approached.	Minimum Requirement	
10	Remedial Action Schemes/Special Protection Systems	Monitoring the status of and proximity to triggering conditions of major RAS/SPS facilities	Minimum Requirement	
11	Automatic Safety Nets	Monitoring the status of and proximity to triggering conditions of Under Voltage Load Shedding Schemes and Under Frequency Load Shedding Schemes	Minimum Requirement	
12	Transaction Impacts	Monitoring actual & scheduled transactions & interchange flow between control areas	Minimum Requirement	
13	Status of EMS facilities	Monitoring the status of servers, back-up systems,	Minimum	

		communications and other mission critical EMS facilities & functionality and displaying the same to operators	Requirement	
14	Remote visualization with navigation capability	Display and navigation capability of system topology, loading, voltage & reactive power conditions, RTCA results etc. at remote locations for use by other entities that need to know and be aware of the state of the system and potential problems		Best Practice
15	Electronic Documentation	Documentation of operating policies, procedures, instructions, equipment characteristics, ratings, idiosyncrasies etc. stored electronically and linked to affected facilities on network topology diagrams		Best Practice
<i>(B) Real – Time Enablers</i>				
16	Alarm Filtering	Filtering, prioritization & organization of alarms and separation of power system alarms from sustained and other equipment defect alarms to enable operators to promptly recognize and communicate power system problems. Ideally the alarms should be grouped according to impacted facility and electronically linked to the impacted facility in the network topology and vice versa.	Minimum Requirement	
17	Block Load Shedding	Pre-programmed patterns of load shedding in different areas of the foot print that can be initiated in blocks within 10 minutes.	Minimum Requirement	
18	ACE/AGC	Capability to monitor and control ACE, CPS & DCS performance	Minimum Requirement	
19	Back-Up EMS	Remote hot stand-by computer systems capable of independently carrying out the primary EMS functions in the event that the primary EMS fails. This includes redundant voice and data communications.	Minimum Requirement	
20	Options to return system to a secure state	Determination of a range of feasible control actions including system re-configuration to reduce flows to within secure operating limits following a contingency.		Best Practice

<i>(C) Operations Planning</i>				
21	Outage Scheduling	Capability to schedule & approve planned outages by off-line studies of impact assessment using historical data and ac load flow.	Minimum Requirement	
22	Operator “Study Mode”	Capability to take a snap shot of the system in real-time to carry out “what-if” studies to approve short notice requests for outages and assess impact of contingencies not covered by RTCA. Best practice would allow rehearsal of next days operation by simulating all planned outages & testing using contingency analysis in study mode	Minimum Requirement	Best Practice: Rehearsal of next days operations
23	Generation Reserve Sharing	Capability to determine distribution of operating reserve among units taking into account internal transmission constraints	Minimum Requirement	
<i>(D) Transactions Scheduling</i>				
24	Interchange Distribution Calculator (IDC)	Assess impact of existing or proposed transactions on flowgates and critical facilities and determine the appropriate level and amount of TLR required to unload facilities. The IDC model is updated through SDX and transaction information is input from the E-tag system	Minimum Requirement	Best Practice: Full range of mitigating options for TLR
25	System Data Exchange (SDX)	Provision of element status information to update the IDC model for facilities that are not observable through direct telemetered data. Update required within 15 min. of outage.	Minimum Requirement	Best Practice: Automatic update of IDC
26	E-tag, Approval/Scheduling	Electronic tagging of transactions for approval and scheduling consistent with forecasted available flowgate capacity. Also provides input to IDC	Minimum Requirement	
27	OASIS	Web based application for reserving Tx capacity	Minimum Requirement	

<i>(E) History & Forecasting</i>				
28	Weather data	Forecast of weather conditions for load forecasts & for requiring operation under “high risk” conditions i.e. placing the system in a safe posture to respect contingencies beyond criteria	Minimum Requirement	
29	Load Forecasts	Short term and next day load forecasts for operations planning, unit commitment and economic dispatch	Minimum Requirement	
30	Information Storage & Retrieval (IS&R)	Capability to reconstruct system scenarios and “mine” data for system performance & planning and initiate proactive inspection/maintenance of critical assets	Minimum Requirement	Best Practice: IS&R linked to Asset Management System & Training Simulator
<i>(F) Communications</i>				
31	Reliability Coordinator Information System (RCIS)	System to share critical information among Reliability Coordinators per Operating Policy 4.	Minimum Requirement	
<i>(G) Market Based Applications</i>				
32	Location Marginal Pricing & FTR	Market based tool for congestion management that uses some of the above applications (1,2,3)		
33	Security Constrained Unit Commitment (SCUC)	Market based tool for committing generation to meet demand and operating reserves taking into account transmission constraints. Uses some of the above applications (1,2,3,28,29,30)		
34	Security Constrained Economic Dispatch	Market based tool for economic dispatch of generation taking into account transmission constraints. Uses some of the above applications (1,2,3,28,29,30)		