Automated Reliability Reports (ARR)

CERTS Industry Leaders Council Meeting

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Automated Reliability Reports (ARR) Presentation Overview

- Automated Reliability Reports (ARR) Background
- Reliability Reports Objective and Value
- Data Sources, Communications, Reports Objectives and Content
- Reports Layout and Typical Charts
- ARR Research and Development Timeframe
- Presentation Summary

Background, Objectives, Value and Target Interconnections

ARR Project Background

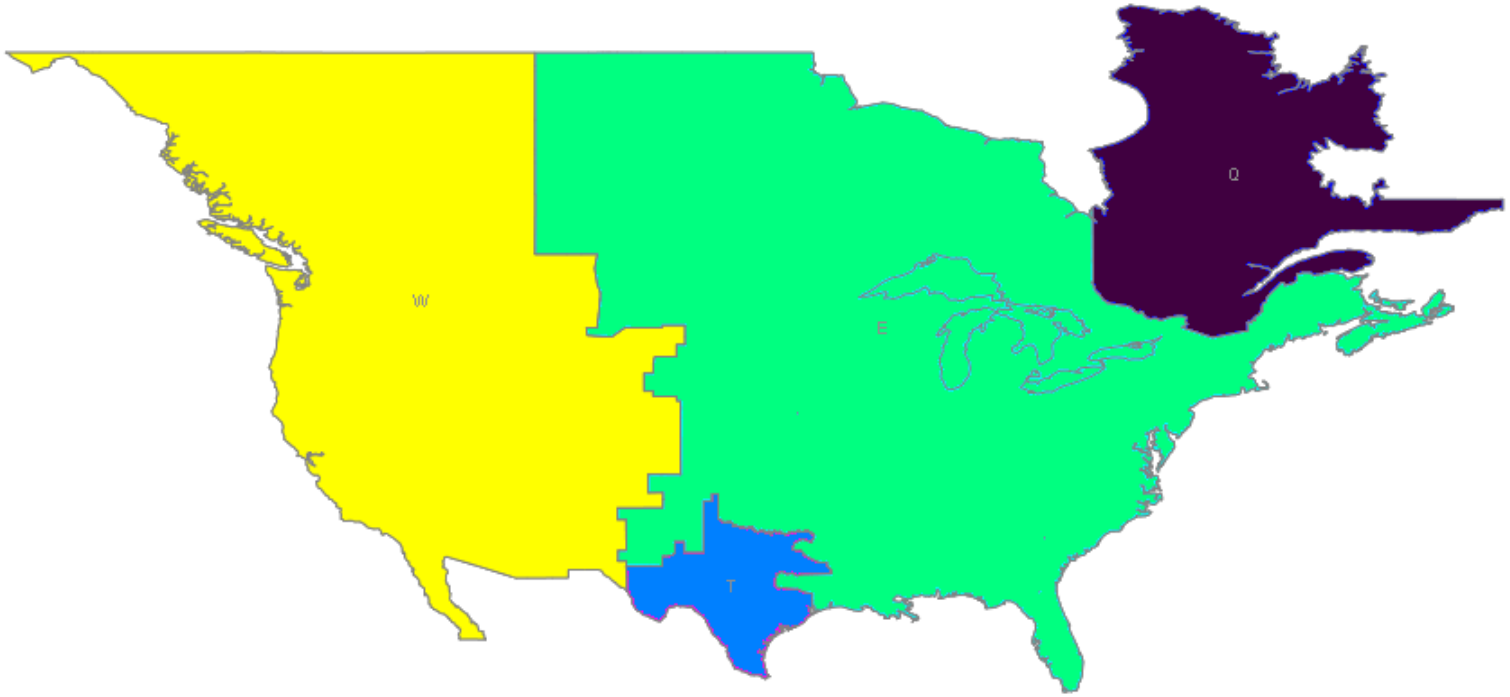
- August, 2008 – CERTS provided a briefing on the concept of Automated Reliability Reports (ARR) at the Interconnection level using historical data to Staff and Management of DOE, FERC and NERC. There was consensus on the need and value for ARR.
- January, 2009 – DOE and FERC agreed to fund the necessary research and prototype development for ARR
- March, 2009 - FERC hosted a Stakeholders meeting to review the functional specification proposed by CERTS-EPG. After agreeing on some functional changes, research and development started and NERC agreed to host the ARR system for the first three years of production
- April, May 2009 – ARR objectives and functionality will be presented by FERC-CERTS during NERC Resources Subcommittee and Reliability Coordinators Working Group meetings requesting feedback

ARR Reliability Reports Objective and Value

The ARR in its first phase will automatically provide for different timeframes historical summaries of NERC interconnections load-generation resource adequacy, control and reliability metrics performance data, facts, figures and charts that are available from NERC archived data. The reports will provide a starting point for:

- Compare the reliability state of three NERC Interconnections
- Identify key trends on interconnections reliability performance
- Identify, track and quantify current or surfacing reliability issues such as declining frequency response, and hours 5 to 7 and 22 and 23 load-generation adequacy and control
- Assess reliability performance relative to industry establish standards and statistical base control thresholds where applicable
- Assess current load-generation reliability performance standards adequacy and need for re-tuning or new standards
- Assess future impact of high penetration of renewable resources on wide-area reliability

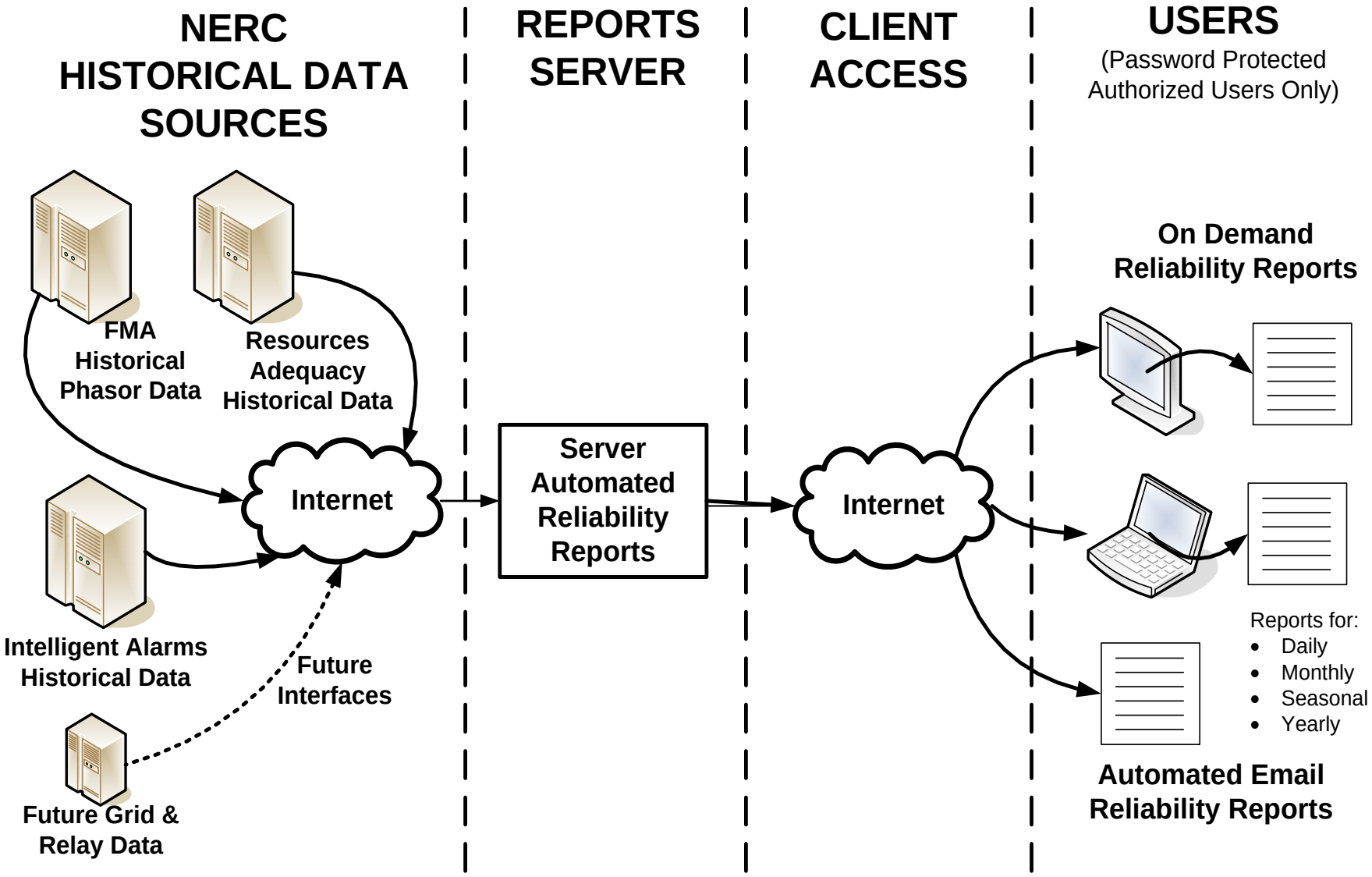
ARR Reliability Reports Target Interconnections



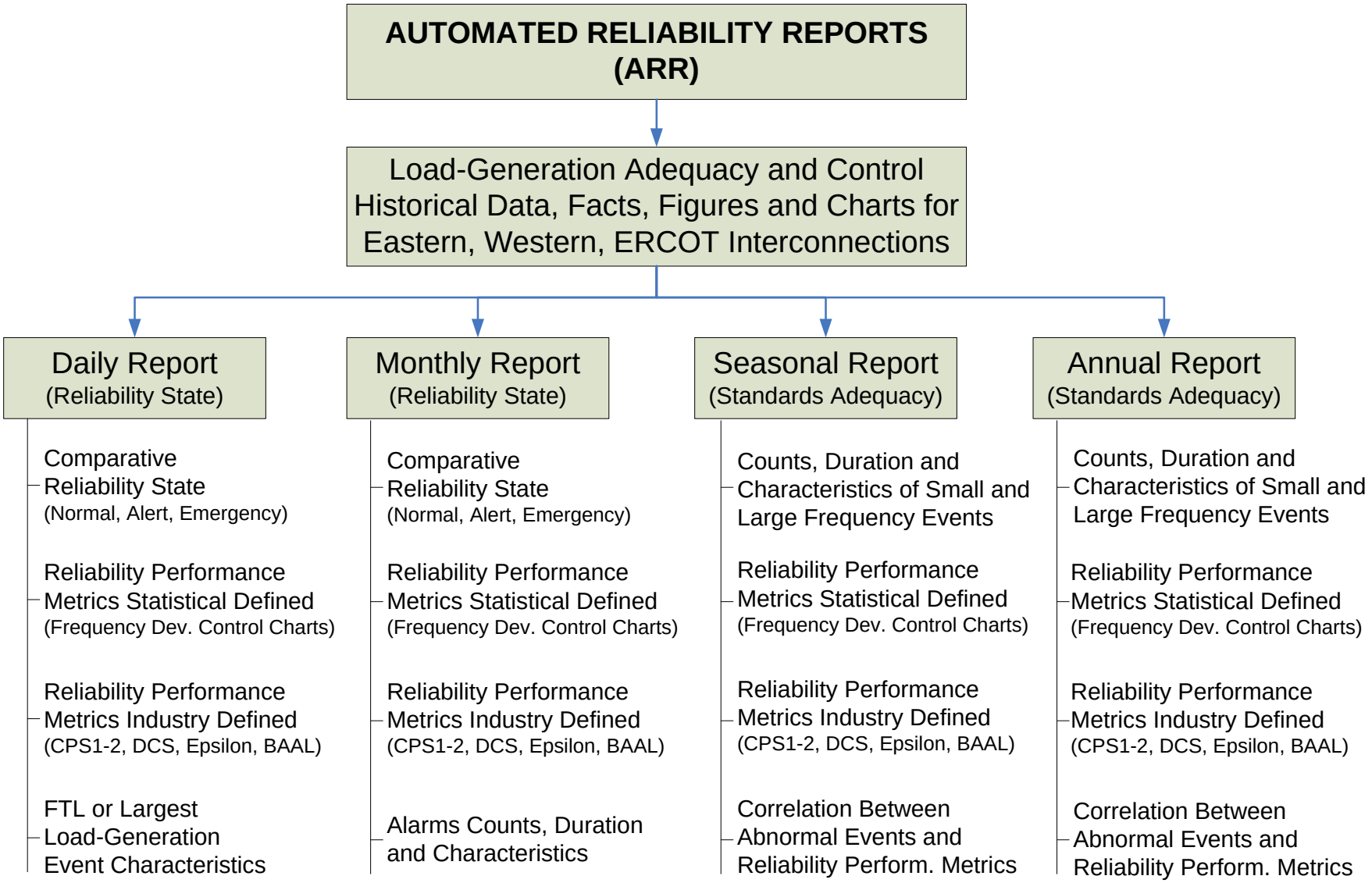
Eastern, Western and ERCOT Interconnections

Data Sources, Data Communications, Architecture and Reports Objectives and Contents

ARR Data Sources and Data Communications



ARR Reports Objectives and Content



Reports Layout Sample and Typical Charts for Monthly Report

Monthly Report Pages 1-2 Layout – March, 2009

1. INTRODUCTION

This report provides a historical summary of March 2009 load-generation resource adequacy, control performance and intelligent alarms (I-Alarms) for the three NERC interconnections known as the Eastern, Western and ERCOT. For each interconnection the report presents:

- Section 2.1 the number of days within March that each interconnection was operating in the three reliability states[1] (Normal, Alert, and Emergency) equivalent to the three alerts defined and in trial by NERC Reliability Coordinators.
- Section 2.2 load-generation resource adequacy and control performance represented by CPS1-2, BAAL and DCS reliability metrics compared to recommended limits and considering each interconnection as only one Balancing Authority.
- Sections 2.3 the interconnections reliability performance during alert state compared to ACE-frequency thresholds.
- Section 3 the monthly circular and statistical process control (SPC) charts showing in the circular plot load-generation adequacy represented by key reliability performance metrics all aligned by day, and in the SPC charts frequency deviation RSM (Epsilon).
- Section 4 the monthly summaries of load-generation adequacy and I-Alarms broadcasted during March: FTL, FAL, FRL, Short and Long Term and Time Error Corrections (TEC).

2. SUMMARY SECTION

2.1 Interconnections Reliability State Condition

The three interconnections operated in normal reliability state during each of the 31 days of March.

Interconnections Days of Operation in Each Reliability State				
Intercon-nection	NORMAL	ALERT	EMERGENCY	Observations
Eastern	31	-	-	31 Days in Normal State
Western	31	-	-	31 Days in Normal State
ERCOT	31	-	-	31 Days in Normal State

2.2 Interconnections Normal State Performance

The Eastern and ERCOT interconnections monthly CPS2 performance metric were below the 90-percent and comply with CPS2, BAAL and DCS metrics. The Western performance was within thresholds of all.

Interconnections Monthly Performance Metrics - Actual vs Recommended									
Intercon-nection	CPS2 - % Monthly		CPS1 - % Monthly		BAAL Exceeds Min.Monthly		DCS Minutes to Return to Normal		Observations
	Rec Min	Actual	Rec Min	Actual	Rec Max	Actual	Std. Max	Actual	
Eastern	90	70	100	150	30	11	15	5	CPS2 Below Threshold
Western	90	92	100	185	30	2	15	-	No Violations
ERCOT	90	75	100	140	30	16	15	-	CPS2 Below Threshold

1 NERC Reliability Coordinators Working Group, "Guideline for Operating State Alert Levels,", Response to August 2003 Blackout Recommendation, May 22, 2007

2.3 Interconnections Alert State Performance

All of the three interconnections operated normally during March.

Interconnections Alert State Performance Metrics							
Intercon-nection	Frequency Trigger Limit Minutes		Frequency Alert Limit Minutes		Frequency Relay Limit Minutes		Observations
	Std. Max	Actual	Std. Max	Actual	Std. Max	Actual	
Eastern	30	9	1	0	1	0	Normal
Western	30	2	1	0	1	0	Normal
ERCOT	30	14	1	0	1	0	Normal

3. LOAD-GENERATION ADEQUACY AND CONTROL PERFORMANCE FOR EACH INTERCONNECTION

3.Eastern Interconnection

The circular plot from Figure-1 shows the interconnection load-generation resources adequacy and control values exceeded the recommended performance metric (CPS2) threshold of 90-percent during each of the 31 days of March with the lowest value of 65-percent on March 5 and 16. The BAAL performance metric was exceeded during March, 5, 17 and 26. The CPS1 and Epsilon performance metrics were within thresholds during March.

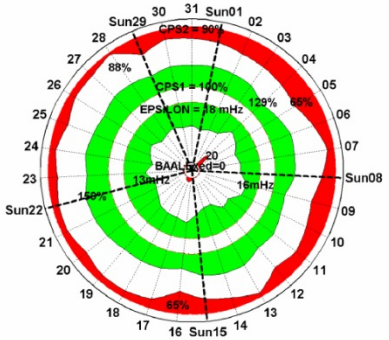


Fig 1 - Eastern Load-Generation Adequacy Performance Metrics

The first Statistical Process Control (SPC) chart from Figure-2 shows the interconnection frequency deviation RMS mean did not violate its statistical upper or lower statistical control limits during March. The second SPC chart shows the frequency deviation RMS variability exceeded its upper statistical control limit of 16 mHz during March 4, 17, and 18. During March a total of 20 short-term alarms and two FTL alarms during March 17 and 18 were broadcasted.

INTERCONNECTIONS MONTHLY RELIABILITY REPORT Report for : March 2009 Page: 1

Cont...Eastern Load-Generation Adequacy and Control

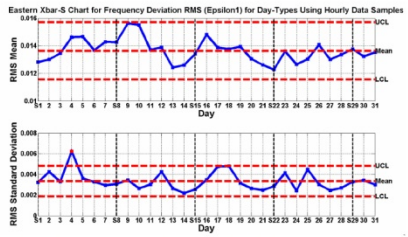


Fig 2 - Eastern Frequency Deviation RMS (Epsilon) Performance

3.Western Interconnection

The circular plot from Figure-3 shows load-generation resources adequacy and control values were below the recommended performance metric (CPS2) threshold of 90-percent in March 1 and 31 with a lowest value of 88-percent during March 1. The BAAL performance metric was exceeded during March 5 and 14. The CPS1 and Epsilon performance metrics were not exceeded during March.

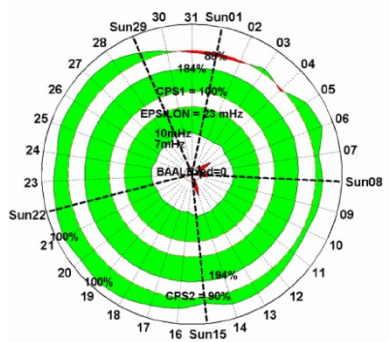


Fig 3- Western Load-Generation Adequacy Performance Metrics

The first Statistical Process Control (SPC) chart from Figure-4 shows during March the frequency deviation RMS mean was within its statistical upper or lower control limits. The second SPC chart shows the frequency deviation RMS variability exceeded its upper control limit of 4 MHz during March 31. There were not I-Alarms broadcasted during March.

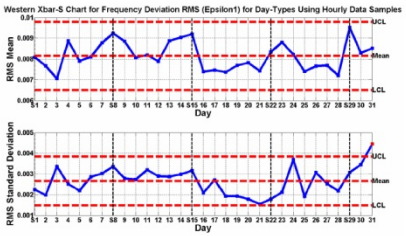


Fig 4- Western Frequency Deviation (Epsilon) Performance

3.ERCOT Interconnection

The circular plot from Figure-5 shows load-generation resources adequacy and control values were below the recommended performance metrics (CPS2) threshold of 90-percent during each of the 31 days of March with a lowest value of 58-percent during March 1. The BAAL performance metric was exceeded during March 10, 18, 16 and 29. The CPS1 and Epsilon metrics were not exceeded during March.

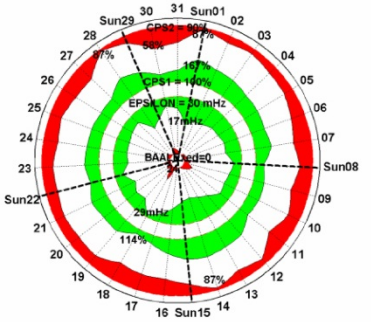


Fig 5 - ERCOT Load-Generation Adequacy Performance Metrics

The first Statistical Process Control (SPC) chart in Figure-6 shows the frequency deviation RMS mean exceeded its upper and lower statistical control limits during March 1, 13, 14, 15, 17, 18, and 28. The second SPC chart shows frequency deviation RMS variability exceeded its upper and lower control limits during March 7, 8, 10, 18, and 22. During March there were 7 FTL and 100 short-term alarms broadcasted.

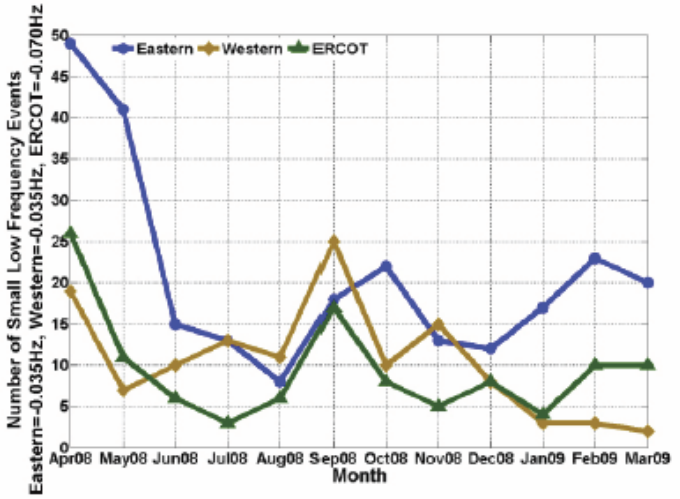
DISCLAIMER - Report is automatically generated by CERTS Automated Reliability Report application utilizing historical data from NERC. Provided solely for informational purposes
CONFIDENTIAL - Covered under NERC Data Confidentiality Agreement

ARR Monthly Report Typical Performance Plots

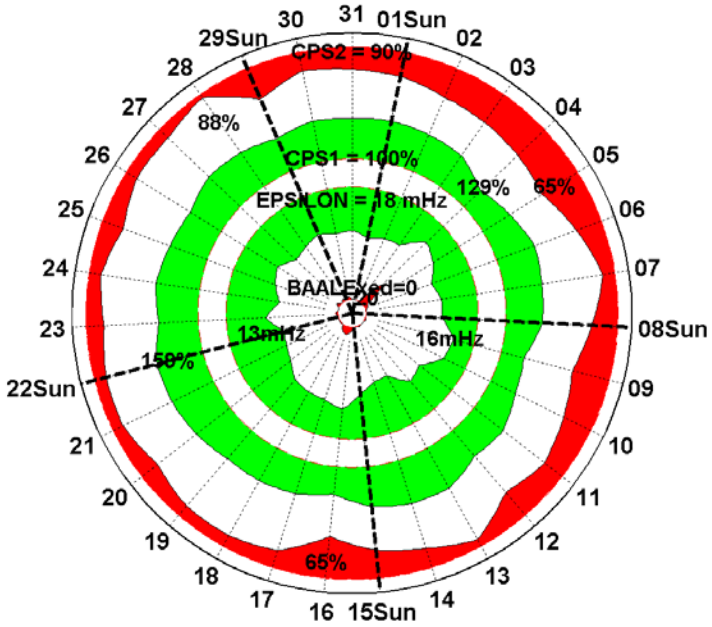
Comparative Reliability Performance Tables

Interconnections Alert State Performance Metrics							
Intercon-nection	Frequency Trigger Limit Minutes		Frequency Alert Limit Minutes		Frequency Relay Limit Minutes		Observations
	Std. Max	Actual	Std. Max	Actual	Std. Max	Actual	
Eastern	30	9	1	0	1	0	Normal
Western	30	2	1	0	1	0	Normal
ERCOT	30	14	1	0	1	0	Normal

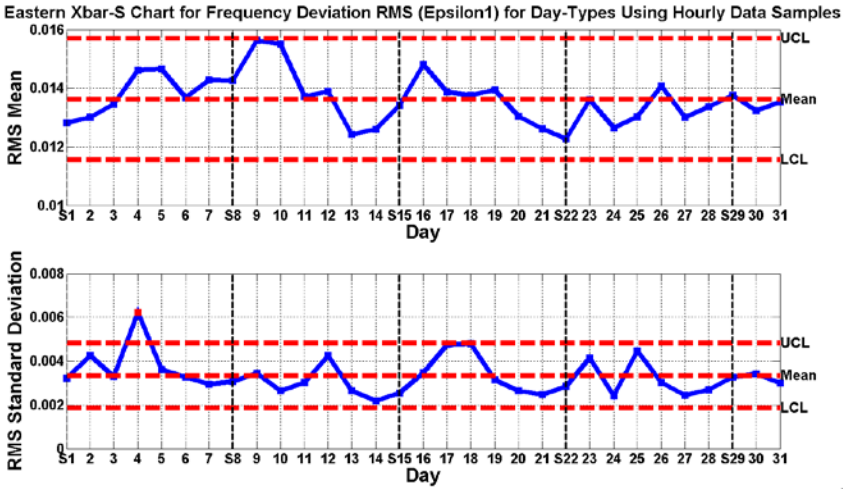
Monthly Small Low-Frequency Events



Performance Metrics Industry Defined

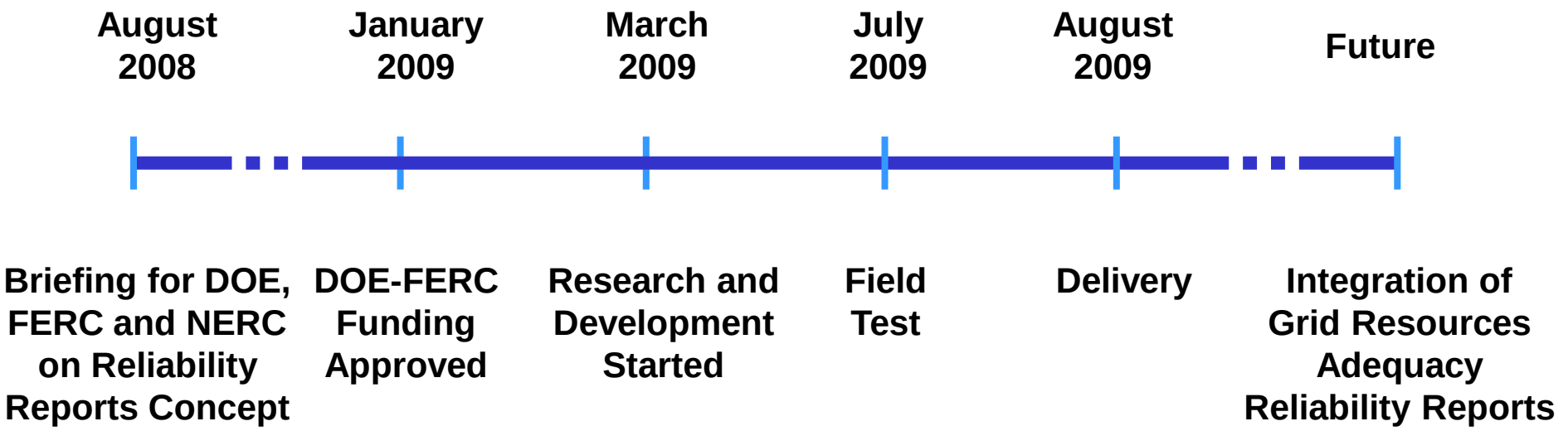


Performance Metrics Statistical Defined



Schedule for Research and Development and Summary

ARR Research and Development Timeframe



Summary

- Reliability Reports Contain Data, Facts, Figures and Charts Using Historical Data – Any Data Confidentiality Issues ?
- Reports Goal is Not to Identify Standards Violations. The Goal is for Reliability Standards Adequacy Evaluation and Assessment
- Reports Data and Charts are a Starting Point, and are Open for Industry Feedback and Recommendations – Email Feedback to: Mahmood.Mirheydar@ferc.gov
- Historical Data Quality and Availability Could Lead to Misinterpretation of Reports Charts and Tables. The Goal is to Improve Data Quality and Availability, and Jointly with Industry Improve Content and Usability.
- Reports Subscription is Available to NERC Reliability Committees and Subcommittee Members, Signatories of NERC Data Confidentiality Agreement