

RELIABILITY PLAN

For the

ERCOT Reliability Coordinator Area

**ELECTRIC RELIABILITY COUNCIL OF TEXAS
RELIABILITY COORDINATOR**

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Introduction

The North American Electric Reliability Corporation (NERC) requires every Region, Sub-region, or interregional coordinating group to establish a Reliability Coordinator (RC) to provide the reliability assessment and emergency operations coordination for Transmission Operators (TOP) and Balancing Authorities (BA) within Regions and across the Regional boundaries.

The Electric Reliability Council of Texas (ERCOT) is the Independent Organization certified by the Public Utility Commission of Texas (PUCT), which is responsible for maintaining reliability and facilitating the wholesale and retail electricity markets in the ERCOT Region. ERCOT also is registered as, and operates as the RC for the entire ERCOT Interconnection according to the NERC Reliability Standards and ERCOT Protocols and Operating Guides.

The ERCOT RC is responsible for the Reliability Coordinator function for the ERCOT Interconnection. The function includes the tasks and relationships with other functional entities as identified in the NERC Reliability Function Model.

ERCOT ensures availability and deployment of Ancillary Services to meet NERC reliability requirements. In the exercise of functions related to deployment of energy or Ancillary Services as described in the ERCOT Protocols, ERCOT acts on behalf of its Market Participants. ERCOT's reliability procedures and policies meet NERC requirements. This document represents the Reliability Plan for the ERCOT Reliability Coordinator Area.

A. Responsibilities – Authorization

ERCOT is the single Reliability Coordinator (RC) for the ERCOT Interconnection and is responsible for reliability coordination and associated reporting for the region. ERCOT's functions as an RC are described in the requirements of the NERC Reliability Standards and the rules described in the ERCOT Protocols and Operating Guides.

The ERCOT Protocols describe ERCOT's functions as the Independent Operator for the ERCOT Region. ERCOT is certified by the PUCT as the Entity responsible for the reliability of the Interconnected Transmission System in Texas. These Protocols are posted at:

<http://www.ercot.com/mktrules/nprotocols/current>

The ERCOT Operating Guides supplement the Protocols and describe the working relationship between ERCOT and entities within the ERCOT System that interact with ERCOT on a real-time basis to ensure the reliability and security of the ERCOT System. The Operating Guides are posted at:

<http://www.ercot.com/mktrules/guides/noperating/cur>

ERCOT is authorized to direct transmission and generation entities to take operating actions to ensure the reliability of system operations. This authorization is documented in the ERCOT Protocols and Operating Guides. Specific provisions are listed in Protocol Section 6.5.1.1.

The ERCOT System Operators follow predefined Communications Protocols that reduce the possibility of miscommunication that could lead to action or inaction harmful to the reliability of the ERCOT Transmission Grid. This procedure set out the communication expectations of the ERCOT ISO System Operators and how they communicate with ERCOT Transmission Operators (TOs) and Qualified Scheduling Entities (QSEs) for the issuance of any oral Operating Instructions. The Communications Protocols are posted at:

http://www.ercot.com/content/wcm/key_documents_lists/90055/Communication_Protocols.doc

B. Responsibilities – Delegation of Tasks

ERCOT ISO does not delegate any Reliability Coordinator tasks.

C. Operations Planning

The ERCOT Operations Planning Horizon spans from real-time out through approximately one year into the future. Planning beyond one year is generally the responsibility of the ERCOT System Planning Department; however their activities are closely integrated with those of the Operations Analysis group.

Operations Analysis is generally the responsibility of the ERCOT Grid Operations. There is two-way communications between the operations environment and the planning groups.

Analyses are conducted to determine which necessary resources must be operated to provide voltage support and stability to the ERCOT system (Described in Section 3.14.1 of the ERCOT Protocols).

ERCOT develops Voltage Profiles twice per year depicting a normally expected voltage set-point for each generating plant. These set-points provide the basis for first-line voltage control activities between the TO and generating plants. (Described in Section 3.15 of the ERCOT Protocols).

ERCOT reviews Remedial Action Plans (RAP) and Mitigation Plans (MP) annually, each spring for the upcoming summer (Described in the Operations Planning Horizon Constraint Management Plan Developments Procedure).

ERCOT analyzes and approves or rejects requests for planned transmission outages for daily, weekly, and monthly periods. In addition, ERCOT approves or rejects requests for Resource Planned Outages that are submitted with less than forty-six days' notice. These processes include capacity analysis, load forecasting and contingency analysis for the ERCOT Area.

The ERCOT Day Ahead Process begins at 0600 and ends at 1800 daily. Transmission security analysis and Reliability Unit Commitment are used to ensure ERCOT System reliability and to ensure that enough Resource capacity, in addition to Ancillary Service capacity, is committed in the right locations to reliably serve the ERCOT System forecasted Load.

ERCOT develops an Operating Day Ancillary Service Plan for the ERCOT System. Each Qualified Scheduling Entity (QSE) may self-arrange its Obligation assigned by ERCOT for each of its Ancillary Services. Any of the Ancillary Services that are not self-arranged will be procured as a service by ERCOT on behalf of the QSE (Described in Section 6.4.9.1 of the ERCOT Protocols).

ERCOT performs the Operational Planning Analysis to determine anticipated (pre-Contingency) and potential (post-Contingency) day-ahead System Operating Limits (SOL) and potential Interconnection Reliability Operating Limit (IROL). A description

of these activities is provided in the Reliability Unit Commitment Operating Procedure posted at:

<http://www.ercot.com/mktrules/guides/procedures/>

ERCOT provides a Wide Area Network (the ERCOT WAN), further described in Operating Guide section 7.1, which is a data exchange supporting real-time telemetry, wholesale operations, frequency control, and transmission security.

D. Current Day Operations

The ERCOT RC maintains situational awareness by periodic “look ahead” security analysis reviews throughout each day of changes in schedules, load forecast, Current Operating Plans, and planned and unplanned outages. During each operating hour ERCOT runs an Hour-Ahead Reliability Unit Commitment Analysis. The hour ahead analysis provides a last “look ahead” at expected operating conditions for the next hour. A complete description of these activities is provided in the Reliability Unit Commitment Operating Procedure posted at:
<http://www.ercot.com/mktrules/guides/procedures/>

ERCOT uses State Estimator (SE), Real-Time Contingency Analysis (RTCA), and Voltage Security Assessment Tool (VSAT) applications to perform the Real-time Assessment to evaluate the reliability of the ERCOT system and to determine real-time and predicted post-contingency compliance with System Operating Limits. The SE and RTCA applications run and update every five (5) minutes. The VSAT applications run within every ten (10) minutes. Based upon the results of the RTCA and VSAT analyses, security-constrained economic dispatch or transmission switching action is directed to keep ERCOT in a secure operating state.

ERCOT deploys Non-Spinning Reserve (resource capacity that can be implemented in 30 minutes or less) for the Operating Hour in response to loss-of-Resource contingencies, load forecasting error, or other contingency events on the ERCOT System (Described in Section 6.5.7.6.2.3 of the ERCOT Protocols).

ERCOT Responsive Reserve Service (RRS) immediately responds to system frequency through governor response or under frequency relay operation and maintains the response level for the period of service commitment. ERCOT may manually instruct deployment of RRS from online capability (Described in Section 6.5.7.6.2.2 of the ERCOT Protocols). ERCOT will deploy RRS for frequency restoration or to supplement Regulation as required.

ERCOT, as the single Balancing Authority Interconnection, monitors frequency control including deployment of Regulation up, and Regulation down, BAAL, and CPS 1 compliance.

ERCOT performs day ahead analysis, commits units and sets limits to assure voltage stability. The ERCOT RC monitors and deploys reactive reserve using area specific techniques and routinely monitors ERCOT generators, flows, and RTCA results.

ERCOT communicates with QSEs and TOs through standardized voice and data communications to ensure the security and reliability of the ERCOT system (Described in Section 7 of the ERCOT Operating Guides).

E. Emergency Operations

ERCOT is responsible for maintaining reliability in normal and emergency operating conditions. During a declared system emergency, ERCOT issues Operating Instructions to TOs and QSEs to take specific operating actions to mitigate the emergency conditions. In addition, many specific operating actions are predefined and are implemented for specific emergency notices, advisories, or alerts. Instructions during Emergency Conditions are facilitated by ERCOT “Hot Lines” (Described in Section 4.5.3.2 of the ERCOT Operating Guides).

The Energy Emergency Alert (EEA), described in section 6.5.9.4 of the ERCOT Protocols is the process used by the ERCOT RC to provide maximum possible continuity of service while maintaining the integrity of the ERCOT Transmission Grid. The ERCOT RC directs actions to relieve emergency conditions up to and including load shedding if required (Described in Section 6.5.9.4.2 of the ERCOT Protocols).

In the extreme case that no one of the four redundant ERCOT frequency control systems is able to dispatch Regulation Energy Up or Down, ERCOT has an emergency plan to provide for one of the larger QSE’s to temporarily go on Constant Frequency Control (CFC) for the duration of the control application loss. ERCOT will select the QSE based on its ability to provide sufficient regulation up and regulation down to maintain frequency for the ERCOT power system. A complete description of these activities is provided in the EMMS (LFC and RLC/SCED) Failure section in the Real Time Desk Operating Procedure posted at:

<http://www.ercot.com/mktrules/guides/procedures/index.html>

ERCOT operates two hardened control centers; the primary site and the alternate site are separated by approximately 40 miles. Both facilities are staffed 7X24. If a natural disaster or other debilitating event incapacitates the primary Operations Center, the alternate facility will assume control without significant interruption. Each site utilizes redundant energy and market management systems, back-up power supplies, UPS, and on-site standby generators along with fully redundant communications independent of one another.

F. System Restoration

In the event of a partial or complete collapse of the ERCOT system, ERCOT shall restore the system to normal by applying the principles, strategies, and priorities outlined in Section 4.6 of the ERCOT Operating Guides, and in The ERCOT Black Start Plan.

In order to restore services as quickly as possible, ERCOT will coordinate the restoration using the strategies outlined in Section 4.6.2 of the ERCOT Operating Guides.

Annual system restoration training is conducted in ERCOT.

G. Coordination Agreements and Data Sharing

ERCOT has no AC synchronous ties with other NERC reliability regions. The ERCOT Protocols describe ERCOT's functions as the Independent Operator for the ERCOT Region. ERCOT is certified by the PUCT as the Entity responsible for the reliability of the ERCOT Interconnected Transmission System and is registered by NERC as the Reliability Coordinator. The Protocols are posted at:
<http://www.ercot.com/mktrules/nprotocols/current>

The ERCOT Protocols define standard operating agreements between operating entities and ERCOT. All Market Participants are signatories which require compliance with ERCOT Protocols. These protocols include, by reference, the ERCOT Operating Guides and the NERC Reliability Standards.

TOs coordinate with and receive approval from ERCOT prior to energizing and placing into service any new or relocated Facility connected to the ERCOT system.
(Described in Section 3.3.2.1 of the ERCOT Protocols)

ERCOT has provided its DC Tie Operating Procedures to SPP. SPP serves, on behalf of the owners, as the transaction scheduling agent for the DC Ties between ERCOT and SPP. ERCOT and SPP both monitor power flow across and voltage measurements at the DC Ties. A complete description of these activities is provided in the ERCOT DC-Tie Operation Procedure posted at:
<http://www.ercot.com/mktrules/guides/procedures/>

The QSE control centers supply operational data to ERCOT via ICCP data links through the ERCOT WAN. (Described in Section 3.10.7.5 of the ERCOT Protocols and section 7.3.3 of the ERCOT Operating Guides)

TOs normally supply data to ERCOT via ICCP data links through the ERCOT WAN.
(Described in Section 3.10.7.5 of the ERCOT Protocols and section 7.3.3 of the ERCOT Operating Guides)

H. Facility

The ERCOT RC normally performs Reliability Coordinator functions at the primary Operations Center location which has redundant communications, adequate analysis tools, including state estimation, pre-and post-contingency analysis capabilities (thermal, stability, and voltage), and wide-area overview displays. The ERCOT RC continuously monitors its area in conjunction with the ERCOT TOs monitoring of local facilities and issues.

The alternate facility, contains all the same features as the primary Operations Center location and is able to continue operations without significant interruption if the primary Operations Center is unable to perform its functions.

I. Staffing

The ERCOT RC is staffed with Information Technology (IT) Support, and NERC Certified System Operators performing Reliability Coordination, 24 hours/day, 7 days/week.

In the event of a real-time or forecasted emergency, ERCOT has a Shift Engineer available as well as Operations Support Engineers who are available and on-call to provide additional support.

ERCOT's System Operator Training department uses a systematic approach to develop and implement a training program for its System Operators. System Operations personnel are trained to perform their duties, both entry level and continuing training. (Described in the Reliability Unit Commitment, Reliability Risk Desk, Real Time Desk, Resource Desk, DC-Tie Desk, and Transmission Security Desk training outlines)

ERCOT employs a sixth shift of System Operators in order to provide for one week of training in each six week shift rotation. This training schedule provides for 6 weeks of training per year per System Operator.

ERCOT's newly hired System Operators undergo an on-the-job training process that trains them to perform the tasks associated with the functional desks to which they are assigned. Each new hire works under the direct supervision of the ERCOT System Operator Training department and different NERC Reliability Coordinator certified System Operators. This includes training that covers the ERCOT Operating Guides, ERCOT Protocols, and NERC Reliability Standards. On-the-job qualification guides, specific curricula, and technical qualification training checklists are used to guide and document this initial training. The System Operator is tested on their ability to perform identified reliability-related tasks. Once the trainee has successfully completed the NERC Reliability Coordinator certification and ERCOT's System Operator Training process, they will request a Shift Supervisor's approval to be released to operate unsupervised. The employee and a Shift Supervisor can then meet with the Director,

Control Room Operations, System Operations Manager and Manager, System Operations Training to be certified and released to operate unsupervised.

As part of the ERCOT's continuing training for System Operators, ERCOT System Operators are also required to complete training each year to maintain their knowledge of current policies, equipment and tools, emergency procedures and management expectations. Part of this training is accomplished on a full system simulator to practice their emergency procedures and responses to abnormal events. Additionally, special training events are directed at practicing system restoration and severe weather event responses. An annual ERCOT Operations Seminar is provided that includes reviews of fundamental principles, updates and introduces new policies and procedures and provides an opportunity for personal interaction between ERCOT System Operators and market participant operators.

Each ERCOT Operator has signed the ERCOT Ethics Agreement.

ERCOT has signed the NERC Reliability Coordinator Standards of Conduct.