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| NOGRR Number | [258](https://www.ercot.com/mktrules/issues/NOGRR258) | NOGRR Title | Related to NPRR1198, Congestion Mitigation Using Topology Reconfigurations |
| Date Posted | | August 31, 2023 | |
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| Requested Resolution | | Normal | |
| Nodal Operating Guide Sections Requiring Revision | | 11.1, Introduction  11.4, Remedial Action Plan  11.6, Pre-Contingency Action Plans  11.8, Extended Action Plans (new)  11.8.1, Extended Action Plan Process (new) | |
| Related Documents Requiring Revision/Related Revision Requests | | Nodal Protocol Revision Request (NPRR) 1198, Congestion Mitigation Using Topology Reconfigurations | |
| Revision Description | | This Nodal Operating Guide Revision Request (NOGRR) proposes changes to align the Nodal Operation Guides with NPRR1198 that adds language to allow the use of Remedial Action Plans (RAPs) and Extended Action Plans (EAPs) to facilitate the market use of the ERCOT Transmission Grid. NOGRR258 also adds guardrails to ensure that topology reconfiguration requests meet basic reliability and economic criteria, and defines the process for submission, review, and approval of EAPs.  This NOGRR and NPRR1198 leverage ERCOT’s existing Constraint Management Plan (CMP) process to quickly mitigate critical transmission congestion impacts by establishing a scalable process for topology reconfiguration requests that is transparent, predictable, equitable, workable, reliable, and compatible with existing planning processes.  ERCOT already leverages topology optimization in the CMP processes. Since NPRR529, Congestion Management Plan was introduced in 2013 with the limitations that NPRR1198 proposes to revise, the power industry has evolved and there have been technological improvements that make transmission topology reconfigurations a powerful option to mitigate congestion beyond just use cases for which there is no feasible Security-Constrained Economic Dispatch (SCED) solution. | |
| Reason for Revision | | Addresses current operational issues.  Meets Strategic goals (tied to the [ERCOT Strategic Plan](https://www.ercot.com/files/docs/2018/12/13/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board).  Market efficiencies or enhancements  Administrative  Regulatory requirements  Other: (explain)  *(please select all that apply)* | |
| Business Case | | Transmission congestion in ERCOT has been increasing. The Real-Time congestion value for 2022 was $2.8B, which exceeded the $2.1B for the full year 2021, even accounting for impacts from Winter Storm Uri.  Congestion has major impacts on grid reliability, electricity costs, and open access. All Market Participants are affected. The proposed revisions aim to make the best use possible of the ERCOT Transmission Grid to mitigate congestion and its impacts.  Grid topology optimization finds network reconfiguration options to re-route power flows around bottlenecks. Solutions validated by the System Operator can be rapidly implemented using existing circuit breaker equipment. Several other regions (e.g., Midcontinent Independent System Operator (MISO), Southwest Power Pool (SPP)) currently endorse reconfiguration actions for congestion mitigation and impacts have been overwhelmingly positive. The use of optimal reconfigurations in those regions has demonstrated significant economic and reliability benefits such as 10% transfer capacity increase for major thermal constraints, 40% reduction in congestion costs, 70% reduction in the frequency of constraint overloads, and mitigation of transmission bottlenecks; thus, increasing generation deliverability, improving resource adequacy, and providing resilience benefits.  In the context of CMPs, topology reconfigurations are effective, inexpensive, and low-risk. Prior to wholesale competition, Texas utilities made extensive use of topology reconfigurations to mitigate congestion for generation deliverability. The original mathematical formulation for SCED includes transmission topology as an input for price formation. Reconfigurations are a latent feature of the market design; thus, their application is not at all “out-of-market". When SCED was first implemented, there was no known method to identify optimal network topologies in operational time scales. Computational advances have now reduced the time required for solution identification to just a few seconds.  The EAPs outlined in this NOGRR and NPRR1198 can be proposed by ERCOT or any Market Participant to implement a switching solution for a set period of time. The solution is approved by ERCOT, impacted generators, and Transmission Operators (TOs). A detailed list of guardrails is applied to ensure that the solution is reliable, workable, and transparent.  As topology optimization is a technological reality, to delay its natural implementation would distort price signals and mislead investors. This NOGRR and NPRR1198 were developed jointly with ERCOT Staff to ensure that these operational capabilities are implemented in a manner that meets the following criteria:  **Transparency.** The EAP process is transparent - reconfiguration plans are published and Market Participants can comment on them. The information and software required to identify reconfiguration solutions and their impacts are available to all Market Participants.  **Predictability.** Congestion patterns and their impacts are generally well known and changes can be anticipated by Market Participants. Approval criteria can be established such that expectations are clear and consistent. Reconfigurations can easily be reversed. EAPs have pre-determined beginning and ending times that make the impact or reconfigurations easily predictable by any Market Participant.  **Equity.**  The choices of Market Participants are made with the understanding that market conditions may change for a range of reasons including technological improvements. Suboptimal operation of the transmission network is inequitable to Customers as they bear the burden of transmission congestion.  **Workability.** The validation of EAP requests can be performed rapidly using existing processes and without major investment in additional capabilities or staffing resources. Based on experience in other regions, the number of EAP submissions would be limited (i.e., less than 2% of the number of transmission outage ticket submissions that ERCOT supports today). If EAPs were to become burdensome, the submission process could be streamlined to reduce workload or two additional ERCOT Staff may be warranted and justified given the significant benefits the process would provide to the ERCOT System. Further, EAP submissions would bear the burden of proving benefits, thus preventing spurious submissions.  **Reliability.** ERCOT already leverages reconfigurations with CMPs for overload mitigation, showing their reliability value even during extreme system conditions. Adoption of EAPs will further improve reliability for issues not covered in current CMPs.  **Planning.** Depending on the situation,topology reconfigurations can be deployed either as temporary solutions to congestion problems while transmission upgrades are pending or as longer-term solutions in areas where further transmission capacity need is not anticipated. This distinction makes it possible to account only for long-term topology reconfigurations that are approved as such by ERCOT and/or the Transmission Service Providers (TSPs) in the planning process. | |

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| Proposed Guide Language Revision |

**11 CONSTRAINT MANAGEMENT PLANS AND REMEDIAL ACTION SCHEMES**

**11.1 Introduction**

(1) Constraint Management Plans (CMPs) are developed in accordance to the guidelines set forth in the sections below, and are defined in Protocol Section 2.1, Definitions. CMPs include, but are not limited to the following:

(a) Remedial Action Plans (RAPs) which are modeled in Network Security Analysis (NSA) where practicable;

(b) Automatic Mitigation Plans (AMPs) which are modeled in NSA where practicable;

(c) Pre-Contingency Action Plans (PCAPs);

(d) Extended Action Plans (EAPs);

(e) Temporary Outage Action Plans (TOAPs); and

(f) Mitigation Plans.

(2) When developing CMPs, ERCOT shall first attempt to utilize the 15-Minute Rating of the impacted Transmission Facilities, where available, to develop RAPs such that the ERCOT Transmission Grid is utilized to the fullest extent.

(3) RAPs and EAPs may be utilized to facilitate the market use of the ERCOT Transmission Grid for constraints that have resulted in over $1 million of congestion cost in a given month within the past 36 months.

(4) Prior to submitting a RAP or EAP for review to facilitate the market use of the ERCOT Transmission Grid, the proposing Entity must review the design with impacted Transmission Operators (TOs) to verify the feasibility.

(5) For a RAP or EAP submitted for review to facilitate the market use of the ERCOT Transmission Grid, all Generation Resource Entities that would be directly affected operationally by the proposed actions must be part of the submitting parties. Impacts resulting from market clearing processes shall not constitute a direct operational impact under this paragraph.

(6) ERCOT shall provide notification to the market of any approved, amended, or removed CMP or RAS. ERCOT shall provide notification to the market of any RAP, AMP, or RAS that cannot be modeled in the Network Operations Model. ERCOT shall post to the Market Information System (MIS) Secure Area all CMPs and RASs and any unmodeled CMPs or RASs.

(7) ERCOT is not required to provide notification to the market of any proposed TOAPs.

(8) All submittals related to CMPs or RASs must be emailed to [ras\_cmp@ercot.com](mailto:ras_cmp@ercot.com).

**11.4 Remedial Action Plan**

(1) Remedial Action Plans (RAPs) are defined in Protocol Section 2.1, Definitions, and may be relied upon in allowing additional use of the transmission system in Security-Constrained Economic Dispatch (SCED). Normally, it is desirable that a Transmission Service Provider (TSP) constructs Transmission Facilities adequate to eliminate the need for any RAP; however, in some circumstances, such construction may be unachievable in the available time frame.

(2) RAPs for reliability must:

(a) Be coordinated by ERCOT with all Transmission Operators (TOs) and Resource Entities included in the RAP, and approved by ERCOT;

(b) Be limited to the time required to construct replacement Transmission Facilities; however, the RAP will remain in effect if ERCOT has determined the replacement Transmission Facilities to be impractical;

(c) Comply with all applicable requirements in the Protocols and applicable North American Electric Reliability Corporation (NERC) Reliability Standards;

(d) Clearly define and document TOs and Resource Entities included in the RAP actions;

(e) Must be able to resolve the issue for which it was designed over the range of conditions that might reasonably be experienced;

(f) Be executed by the TOs and/or Resource Entities;

(g) Have a 15-minute Rating greater than the Normal and Emergency Ratings for the Transmission Facilities it intends to resolve;

(h) Be defined in the Network Operations Model and considered in the SCED and Reliability Unit Commitment (RUC) processes. RAPs that cannot be modeled using ERCOT’s existing infrastructure shall be rejected unless the Technical Advisory Committee (TAC) approves a plan to work around the infrastructure problem; and

(i) Not include generation re-Dispatch or Load shed.

(3) Prior to approving a RAP proposal to facilitate the market use of the ERCOT Transmission Grid, ERCOT and the impacted TOs must verify that the RAP:

(a) Meets all of the criteria established in paragraph (2) above;

(b) Does not result in radial Load;

(c) Does not create new binding constraints or increase flow on any existing binding constraint by more than 1%;

(d) Does not negatively impact any Generic Transmission Constraints (GTCs), decrease Generic Transmission Limits (GTLs) or create new instability situations;

(e) Has not been previously rejected, unless there have been major changes to the system configuration or RAP proposal; and

(f) Provides more than $1 million savings to total production cost or congestion cost with the RAP action in place compared to generation re-Dispatch alone. This can be established either by using annual production cost model simulation or other methods acceptable to ERCOT.

(4) An approved RAP may be executed immediately after a contingency by the TOs and Resource Entities included in the RAP without instruction by ERCOT or shall be executed upon direction by ERCOT.

(5) ERCOT shall conduct a review of each existing RAP annually or as required by changes in system conditions to ensure its continued effectiveness. Each review shall proceed according to a process and timetable documented in ERCOT Procedures.

(6) ERCOT may approve the expiration of a RAP after consultation with the TOs and Resource Entities included in the RAP. ERCOT shall modify its reliability constraints to recognize the unavailability of the RAP.

**11.6 Pre-Contingency Action Plans**

(1) Pre-Contingency Action Plans (PCAPs) are defined in Protocol Section 2.1, Definitions, and are implemented in anticipation of a contingency. Normally, it is desirable that a Transmission Service Provider (TSP) construct Transmission Facilities adequate to eliminate the need for any PCAP; however, in some circumstances, such construction may be unachievable in the available time frame.

(2) A PCAP may be proposed by any Market Participant, and be approved by ERCOT and the Transmission Operator (TO) included in the PCAP prior to implementation. PCAPs must:

(a) Be coordinated with the TOs included in the PCAP;

(b) Be limited in use to the time required to construct replacement Transmission Facilities and until such Facilities are placed in-service, or the PCAP is no longer needed; however, the PCAP will remain in effect if ERCOT has determined the replacement Transmission Facilities to be impractical;

(c) Comply with all requirements of the Protocols and applicable North American Electric Reliability Corporation (NERC) Reliability Standards;

(d) Clearly define and document TO actions;

(e) Be executed by TOs; and

(f) Not include generation re-Dispatch or Load shed.

(3) An approved PCAP may be executed immediately prior to a contingency by the TO without instruction by ERCOT, or shall be executed upon direction by ERCOT.

(4) All proposed, approved, amended, and removed PCAPs shall be managed in accordance with paragraph (6) of Section 11.1, Introduction.

(5) ERCOT may limit the quantity of PCAPs that are used.

**11.8 Extended Action Plans (EAPs)**

(1) An Extended Action Plan (EAP) may be proposed by any Market Participant or developed by ERCOT, and must be approved prior to implementation by ERCOT, the Transmission Operators (TOs) included in the EAP, and directly operationally impacted Resource Entities. Impacts resulting from market clearing processes shall not constitute a direct operational impact under this section. EAPs must:

(a) Be coordinated with the Resource Entities and TOs included in the EAP;

(b) Be limited in use to the time required to evaluate, approve, and construct replacement Transmission Facilities until such Transmission Facilities are placed in-service, or the EAP is no longer needed. In cases where the EAP mitigates temporary congestion, the use of an EAP may be limited to the duration of the temporary congestion, or until the EAP is no longer needed;

(c) Comply with all requirements of the Protocols and applicable North American Electric Reliability Corporation (NERC) Reliability Standards;

(d) Clearly define and document TO actions;

(e) Be executed by TOs; and

(f) Not include generation re-Dispatch or Load shed.

(2) Prior to approving an EAP proposal to facilitate the market use of the ERCOT Transmission Grid, ERCOT and the impacted Resource Entities and TOs must verify that the EAP:

1. Meets all of the criteria in paragraph (1) above;
2. Does not result in radial Load;
3. Does not create new binding thermal constraints or voltage violations, or increase flow on any existing binding constraint by more than 1%;
4. Does not negatively impact any Generic Transmission Constraints (GTCs), decrease Generic Transmission Limits (GTLs), or create new instability situations;
5. Has not been previously rejected, unless there have been major changes to the system configuration or EAP proposal;

(f) Provides more than $1 million savings to total production cost or total congestion cost with the EAP action in place compared to generation re-Dispatch alone. This can be established either by using annual production cost model simulation or other methods acceptable to ERCOT;

(g) Limits the action to changing the normal status of transmission equipment at up to two substations;

(h) If applicable, is limited to a post-contingency generation trip of no more than ERCOT frequency bias; and

(i) Does not impact the ability of a Resource to meet its minimum deliverability criteria described in Planning Guide Section 4.1.1.7, Minimim Deliverability Criteria.

(3) An approved EAP may be executed immediately prior to a contingency by the TO without instruction by ERCOT, or shall be executed upon direction by ERCOT.

(4) All proposed, approved, amended, and removed EAPs shall be managed in accordance with paragraph (6) of Section 11.1, Introduction.

(5) ERCOT may limit the quantity of EAPs that are used.

(6) ERCOT may reject proposals that fail to practicably assess impact to operations and reliability.

***11.8.1 Extended Action Plan (EAP) Process***

(1) EAPs may be proposed by any Market Participant or may be developed by ERCOT. For EAPs submitted by Market Participants not registered as a Transmission Service Provider (TSP):

(a) ERCOT shall post EAPs submitted by a Market Participant not registered as a TSP on the Market Information System (MIS) Secure Area within five Business Days of receipt.

(b) ERCOT will provide a five-Business Day comment period from the date when the proposed EAP under review is posted by ERCOT unless notice of a shorter comment period is provided by ERCOT.

(c) ERCOT shall consider all comments received within the five-Business Day comment period on the proposed EAP, along with its own evaluation and those of the Transmission Facility owners, and either approve, modify or reject the proposed EAP.

(d) If a proposed EAP is modified or rejected, ERCOT shall post an explanation for the rejection or a description of the modification.