

Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed:

1. SAC authorized posting TTC/ATC/AFC SAR development June 20, 2005.
2. SAC authorized the SAR to be development as a standard on February 14, 2006.
3. SC appointed a Standard Drafting Team on March 17, 2006.
4. SDT posted second first for comment from May 25–June 25, 2007

Description of Current Draft:

This is the second draft of the proposed standard posted for stakeholder comments. This draft includes the modifications identified in the SAR with consideration of stakeholder comments submitted in response to the first draft of the proposed standard and applicable FERC directives from FERC Order 693 and Order 890.

Future Development Plan:

Anticipated Actions	Anticipated Date
1. Respond to comments.	February 1, 2008
2. Post for 30-day pre-ballot review.	February 1, 2008
3. First ballot of standard.	March 3, 2008
4. Respond to comments.	April 10, 2008
5. Recirculation ballot.	April 10, 2008
6. 30 Day posting before board adoption.	March 2, 2008
7. Board adopts MOD-001-1.	April 24, 2008

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Rated System Path Methodology: The Rated System Path Methodology is characterized by an initial Total Transfer Capability (TTC), determined via simulation. Capacity Benefit Margin, Transmission Reliability Margin, and Existing Transmission Commitments are subtracted from TTC to derive Available Transmission Capability.

A. Introduction

- 1. Title:** Rated System Path Methodology
- 2. Number:** MOD-029-1
- 3. Purpose:** To increase consistency and transparency in the development and documentation of transfer capability calculations for Transmission services performed by entities using the Rated System Path Methodology to support reliable system operations.
- 4. Applicability:**
 - 4.1.** Each Transmission Operator that uses the Rated System Path Methodology to calculate Total Transfer Capabilities (TTCs) for Posted Paths.
 - 4.2.** Each Transmission Service Provider that uses the Rated System Path Methodology to calculate Available Transfer Capabilities (ATCs) for Posted Paths.
- 5. Proposed Effective Date:** First day of the first calendar quarter that is twelve months beyond the date that all six (MOD-001-1, MOD-004-1, MOD-008-1, MOD-028-1, MOD-029-1, MOD-030-1)ATC-related standards are approved by applicable regulatory authorities, or in those jurisdictions where regulatory approval is not required, the standard becomes effective on the first day of the first calendar quarter that is twelve months beyond the date the set of standards is approved by the NERC Board of Trustees.

B. Requirements

- R1.** When calculating TTCs for Posted Paths, the Transmission Operator shall use a Transmission model that meets the following criteria: [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*]
- R1.1.** Includes at least:
 - R1.1.1.** The Transmission Operator Area
 - R1.1.2.** All Transmission Operator Areas contiguous with its own Transmission Operator Area
 - R1.1.3.** Any other Transmission Operator Area linked to the Transmission Operator’s Area by joint operating agreement.
 - R1.2.** Models all system elements as in-service for the assumed initial conditions.
 - R1.3.** Models all generation Facilities larger than 20 MVA in the studied area.
 - R1.4.** Models phase shifters in Non-regulating mode, unless otherwise specified in the ATCID.
 - R1.5.** Uses current Facility Ratings as provided by the Transmission Owner and Generator Owner
 - R1.6.** Uses peak load forecast by Balancing Authority.
 - R1.7.** Uses Transmission Facility additions and retirements.
 - R1.8.** Uses Generation Facility additions and retirements.
 - R1.9.** Uses Special Protection System (SPS) models where currently existing or projected for implementation within the studied time horizon
 - R1.10.** Models series compensation for each “Extra High Voltage (EHV)” line at the expected operating level unless specified otherwise in the ATCID.
 - R1.11.** Includes any other modeling requirements or criteria specified in the ATCID.

- R1.12.** Where three phase fault damping is used to determine stability limits, identifies the percent used and includes justification for use unless specified otherwise in the ACTID.
- R2.** The Transmission Operator shall use the following process to determine TTC: [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*]

 - R2.1.** Except where otherwise specified within MOD-029-1, adjust base case generation and Load levels within the updated power flow model to determine the maximum flow (reliability limit) that can be simulated on the Posted Path while at the same time satisfying all planning criteria for N-0, N-1, and N-2 contingencies as follows:

 - R2.1.1.** When modeling normal conditions (N-0), do not model any Transmission Element above 100% of its continuous rating.
 - R2.1.2.** When modeling N-1 or N-2 contingencies, the system shall demonstrate transient, dynamic and voltage stability, with no Transmission Element modeled above its emergency rating.
 - R2.1.3.** Do not exceed any Facility Ratings (including thermal and voltage ratings)
 - R2.1.4.** Uncontrolled separation shall not occur.
 - R2.1.5.** Initiate system disturbances for stability studies by a three-phase-to-ground fault on all modeled “Extra High Voltage (EHV)” buses adjacent to the major interconnection point of the modeled Posted Path.
 - R2.2.** Where it is impossible to actually simulate a reliability-limited flow in a direction counter to prevailing flows (on an alternating current transmission line), set the TTC for the non-prevailing direction equal to the TTC in the prevailing direction.
 - R2.3.** For a Posted Path whose capacity is limited by contract, set TTC on the Posted Path at the lesser of the maximum allowable contract capacity or the reliability limit as determined by R1.2.1.
 - R2.4.** For Posted Paths whose TTC varies due to simultaneous interaction with one or more other paths, develop a nomogram describing the interaction of the paths and the resulting TTC under specified conditions.
 - R2.5.** Verify that the TTC for the Posted Path being studied does not adversely impact the TTC value of any existing path. Do this by modeling the flow on the path being studied at its proposed new TTC level simultaneous with the flow on the existing path at its TTC level while at the same time honoring the reliability criteria outlined in R2.1
 - R2.6.** Where multiple ownership of Transmission rights exists on a Posted Path, allocate TTC of that Posted Path in accordance with the contractual agreement made by the multiple owners of that Posted Path.
 - R2.7.** For Posted Paths whose path rating, adjusted for seasonal variance, was established, known and used in operation since January 1, 1994, and the Regional Entity has not taken action to have the path rated using a different method, set the TTC at that previously established amount.
 - R2.8.** Create a study report that describes the steps undertaken, including the contingencies and assumptions used, when determining the TTC and the results of the study.
- R3.** Within seven calendar days of the finalization of the study report, the Transmission Operator shall make available to the Transmission Service Provider of the Posted Path, the most

current value for TTC and the TTC study report documenting the assumptions used and steps taken in determining the current value for TTC for that Posted Path.

- R4.** Each Transmission Operator shall establish the TTC at the lesser of the TTC calculated in MOD-029-1 or any System Operating Limit for that Posted Path. [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*]
- R5.** When calculating ETC for firm Existing Transmission Commitments (ETC_F) for a specified period for a Posted Path, the Transmission Service Provider shall use the following algorithm: [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*]

$$ETC_F = NL_F + NITS_F + GF_F + PTP_F + ROR_F + OS_F$$

Where:

NL_F is the firm capacity reserved to serve peak Native Load forecast commitments for the time period being calculated, to include Native Load growth, and losses not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin.

$NITS_F$ is the firm capacity reserved for Network Integration Transmission Service serving Load, to include load growth, and losses not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin.

GF_F is the capacity reserved for grandfathered Firm Transmission Service and bundled contracts for energy and Transmission, where executed prior to the effective date of a Transmission Service Provider's Open Access Transmission Tariff or "Safe Harbor Tariff" accepted by FERC.

PTP_F is the firm capacity reserved for confirmed Point-to-Point Transmission Service,

ROR_F is the firm capacity reserved for Roll-over rights for contracts granting Transmission Customers the right of first refusal to take or continue to take Transmission Service when the Transmission Customer's Transmission Service contract expires or is eligible for renewal.

OS_F is the firm capacity reserved for any other service(s), contract(s), or agreement(s) not specified above using Firm Transmission Service.

- R6.** When calculating ETC for non-firm Existing Transmission Commitments (ETC_{NF}) for all time horizons for a Posted Path the Transmission Service Provider shall use the following algorithm: [*Violation Risk Factor: Lower*] [*Time Horizon: Operations Planning*]

$$ETC_{NF} = NITS_{NF} + GF_{NF} + PTP_{NF} + OS_{NF}$$

Where:

$NITS_{NF}$ is the non-firm capacity reserved for Network Integration Transmission Service serving Load, to include load growth, and losses not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin.

GF_{NF} is the non-firm capacity reserved for grandfathered Transmission Service and bundled contracts for energy and Transmission, where executed prior to the effective date of a Transmission Service Provider's Open Access Transmission Tariff or "Safe Harbor Tariff" accepted by FERC.

PTP_{NF} is non-firm capacity reserved for confirmed Point-to-Point Transmission Service.

OS_{NF} is the non-firm capacity reserved for any other service(s), contract(s), or agreement(s) not specified above using non-firm.

- R7.** When calculating Firm ATC for a Posted Path for a specified period, the Transmission Service Provider shall use the following algorithm: [*Violation Risk Factor: Medium*] [*Time Horizon: Operations Planning*]

$$ATC_F = TTC - ETC_F - CBM - TRM + Postbacks_F + Counter-schedules_F$$

Where

ATC_F is the firm Available Transfer Capability for the Posted Path for that period.

TTC is the Total Transfer Capability of the Posted Path for that period.

ETC_F is the sum of existing firm commitments for the Posted Path during that period.

CBM is the Capacity Benefit Margin for the Posted Path during that period.

TRM is the Transmission Reliability Margin for the Posted Path during that period.

Postbacks_F are adjustments to firm Available Transfer Capability due to postbacks for that period, as defined in business practices.

Counter-schedules_F are adjustments to firm Available Transfer Capability as determined by the Transmission Service Provider and described in their Available Transfer Capability Implementation Document.

- R8.** When calculating non-firm ATC for a Posted Path for a specified period, the Transmission Service Provider shall use the following algorithm: [*Violation Risk Factor: Lower*] [*Time Horizon: Operations Planning*]

$$ATC_{NF} = TTC - ETC_F - ETC_{NF} - CBM_S - TRM_U + Postbacks_{NF} + Counter-schedules_{NF}$$

Where:

ATC_{NF} is the non-firm Available Transfer Capability for the Posted Path for that period.

TTC is the Total Transfer Capability of the Posted Path for that period.

ETC_F is the sum of existing non-firm commitments for the Posted Path during that period.

ETC_{NF} is the sum of existing non-firm commitments for the Posted Path during that period.

CBM_S is the Capacity Benefit Margin for the Posted Path that has been scheduled during that period.

TRM_U is the Transmission Reliability Margin for the Posted Path that has not been released for sale as non-firm capacity by the Transmission Service Provider during that period,

Postbacks_{NF} are adjustments to non-firm Available Transfer Capability due to postbacks for that period, as defined in business practices, and

Counter-schedules_{NF} are adjustments to non-firm Available Transfer Capability as determined by the Transmission Service Provider and described in its Available Transfer Capability Implementation Document.

C. Measures

- M1.** Each Transmission Operator that uses the Rated System Path Methodology shall produce each Transmission model it used to calculate TTC for purposes of posting ATC for each Posted Path, as required in R1, for the time horizon(s) to be examined.

- M1.1.** Production shall be in the same form and format used by the Transmission Operator to calculate the TTC used in its posted ATC calculations, as required in R1.
- M1.2.** The Transmission model produced must show the use of each attribute specified in R1.1; except that, no evidence shall be required to prove: 1) utilization of a Special Protection System where none was included in the model or 2) that no additions or retirements to the generation or Transmission system occurred.
- M1.3.** The Transmission model produced must show the use of the modeling parameters stated in R1.1 through R.12.
- M2.** Each Transmission Operator that uses the Rated System Path Methodology shall produce the ATCID it uses to show where it has described and used additional modeling criteria in its ACTID that are not otherwise included in MOD-29 (See R1.4, R.1.10, R1.11 and R1.12).
- M3.** Each Transmission Operator that uses the Rated System Path Methodology shall produce the source documents reflecting the values it used to meet the requirements in R.1.5 through R1.9 for the period examined. (R1)
- M4.** Each Transmission Operator that uses the Rated System Path Methodology shall produce the models, reports, or study results that it used to establish TTC in accordance with R2.1 through R2.7. (R2)
- M5.** Each Transmission Operator that uses the Rated System Path Methodology shall produce as evidence the study reports, as required in R.2.8, for each path for which it determined TTC for the period examined. (R2)
- M6.** Each Transmission Operator shall provide evidence (such as logs or data) that it provided the TTC and its study report to the Transmission Service Provider within seven calendar days of the finalization of the study report. (R3)
- M7.** Each Transmission Operator shall provide evidence that it used the lesser of the calculated TTC or the SOL as the TTC, by producing: 1) all values calculated pursuant to R.1.2 for each Posted Path, 2) Any corresponding SOLs for those Posted Paths, and 3) the TTC set by the Transmission Operator and given to the Transmission Service Provider for use in R6 and R7 for each Posted Path. (R4)
- M8.** Each Transmission Service Provider shall produce the algorithms it used to calculate ETCs for Firm and Non-Firm Transmission Service, as required in R5 and R6, showing that only the variables allowed in R5 and R6 were used to calculate ETCs.
 - M8.1.** Production of the algorithms shall be in the same form and format used by the Transmission Service Provider to calculate ETCs in R5 and R6.
- M9.** Each Transmission Service Provider shall produce the algorithms it used to calculate Firm and Non-Firm ATCs, as required in R7 and R8, showing that only the variables allowed in R7 and R8 were used to calculate ATCs.
 - M9.1.** Production of the algorithms shall be in the same form and format used by the Transmission Service Provider to calculate ATCs in R7 and R8.

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

Regional Entity.

1.2. Compliance Monitoring Period and Reset Time Frame

Not applicable.

1.3. Data Retention

- The Transmission Operator shall have its latest models used to determine TTC and evidence of previous versions for R1. (M1 and M6)
- The Transmission Operator shall have the current, in force ATCID(s) provided by its Transmission Service Provider(s) and any prior versions of the ATCID that were in force since the last compliance audit to show compliance with R1. (M2)
- The Transmission Operator shall retain the latest version and the prior version of the source documents used to update its models to show compliance with R1. (M3)
- The Transmission Operator shall retain evidence to show compliance with R2.1 through R2.7 for the most recent three calendar years plus the current year. (M4)
- The Transmission Operator shall retain the latest version and prior version of the TTC study reports to show compliance with R2. (M5)
- The Transmission Operator shall retain evidence for the most recent three calendar years plus the current year to show compliance with R1, R3 and R4. (M6 and M7)
- The Transmission Service Provider shall retain evidence for the most recent three calendar years plus the current year to show compliance with R5, R6, R7 and R8. (M8 and M9)
- If a Transmission Service Provider or Transmission Operator is found non-compliant, it shall keep information related to the non-compliance until found compliant.
- The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

1.4. Compliance Monitoring and Enforcement Processes:

The following processes may be used:

- Compliance Audits
- Self-Certifications
- Spot Checking
- Compliance Violation Investigations
- Self-Reporting
- Complaints

1.5. Additional Compliance Information

None.

2. Violation Severity Levels

R #	Lower VSL	Moderate	High VSL	Severe VSL
R1.	<p>The Transmission Operator met all but one of the modeling requirements specified in R1</p> <p>OR</p> <p>The Transmission Operator utilized Facility Ratings that were different from those specified by a Transmission Owner in their Transmission model and one of those Facility Ratings were used (or should have been used) to establish a TTC for one or more Posted Paths.</p>	<p>The Transmission Operator met all but two of the modeling requirements specified in R1</p> <p>OR</p> <p>The Transmission Operator utilized Facility Ratings that were different from those specified by a Transmission Owner in their Transmission model and two to five of those Facility Ratings were used (or should have been used) to establish a TTC for one or more Posted Paths.</p>	<p>The Transmission Operator met all but three of the modeling requirements specified in R1</p> <p>OR</p> <p>The Transmission Operator utilized Facility Ratings that were different from those specified by a Transmission Owner in their Transmission model and six to ten of those Facility Ratings were used (or should have been used) to establish a TTC for one or more Posted Paths.</p>	<p>The Transmission Operator did not meet four or more of the modeling requirements specified in R1</p> <p>OR</p> <p>The Transmission Operator utilized Facility Ratings that were different from those specified by a Transmission Owner in their Transmission model and eleven or more of those Facility Ratings were used (or should have been used) to establish a TTC for one or more Posted Paths.</p>
R2	N/A	N/A	N/A	The Transmission Operator did not calculate TTC using the process described in R2.
R3.	The Transmission Operator provided the TTC and study report to the Transmission Service Provider after more than seven, but not more than 14 calendar days after the report was finalized.	The Transmission Operator provided the TTC and study report to the Transmission Service Provider after more than 14, but not more than 21 calendar days after the report was finalized.	The Transmission Operator provided the TTC and study report to the Transmission Service Provider after more than 21, but not more than 28 calendar days after the report was finalized.	The Transmission Operator provided the TTC and study report to the Transmission Service Provider 28 or more calendar days after the report was finalized.
R4.	N/A	N/A	The Transmission Operator did not specify the TTC as the lesser of the TTC calculated using the process described in R4 or the SOL for one to four Posted Paths.	The Transmission Operator did not specify the TTC as the lesser of the TTC calculated using the process described in or the SOL, for five or more Posted Paths

R #	Lower VSL	Moderate	High VSL	Severe VSL
R5.	N/A	N/A	N/A	The Transmission Service Provider did not use all the elements defined in R5 when determining Firm ETC, or used additional elements.
R6.	N/A	N/A	N/A	The Transmission Service Provider did not use all the elements defined in R6 when determining Non-Firm ETC, or used additional elements.
R7.	N/A	N/A	N/A	The Transmission Service Provider did not use all the elements defined in R7 when determining Firm ATC, or used additional elements.
R8.	N/A	N/A	N/A	The Transmission Service Provider did not use all the elements defined in R8 when determining Non-Firm ATC, or used additional elements.