



Working to Perfect the Flow of Energy

# NERC

## Interconnection Reliability Operations and Coordination Standards

**PJM State & Member Training  
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- Identify and describe the reliability responsibilities of operating entities to take action on directives issued by the Reliability Coordinator or the Transmission Operator regarding operating conditions which threaten reliability, and to take actions including corrective measures to mitigate an emergency condition, and to report the same to other affected entities.

## Reliability Coordination – Responsibilities and Authorities

### Purpose:

- In order to direct reliability entities within their areas, Reliability Coordinators must have authority, plans, and agreements in place to re-dispatch generation, reconfigure transmission, or reduce load to mitigate critical conditions while retaining a neutrality towards all the market participants\*
- If the Reliability Coordinator delegates the tasks, the Coordinator retains responsibilities to comply with NERC and regional standards
- Standards of conduct are necessary to ensure no favoritism among market participants

## Applicability:

- Reliability Coordinators
- Regional Reliability Organizations
- Transmission Operators
- Balancing Authorities
- Generator Operators
- Transmission Service Providers
- Load-Serving Entities
- Purchasing-Selling Entities

## Requirements:

- Reliability Coordinators are established to continually assess transmission reliability and coordinate emergency operations on an on-going basis among the operating entities within their regions and across regional boundaries
- Coordinators shall comply with the regional reliability plan approved by the NERC Operating Committee
- The Reliability Coordinator has the authority to act and to direct actions to be taken by all entities within the area to preserve the integrity and reliability of the Bulk Power System without delay (no longer than 30 minutes)\*

## Reliability Coordination – Responsibilities and Authorities

### Requirements:

- In delegating tasks to other entities, it is required that formal agreements are in place, and that all tasks are understood, communicated, and addressed with verification by the Reliability Coordinator\*
- The Reliability Coordinator must list all entities with delegated tasks within its reliability plan, and verify that the tasks are being carried out by NERC-certified operating personnel
- Must have coordination agreements that are clear and comprehensive with adjacent Reliability Coordinator Areas to insure System Operating Limit or Interconnection Reliability Operating Limit violation mitigations are coordinated

## Requirements:

- All entities shall comply with RC directives unless safety, equipment, regulatory, or statutory requirements would be violated
  - The Reliability Coordinator must be informed of any inability to perform the directive so an alternate remedial action can be implemented
- The Reliability Coordinator shall act in the interests of reliability for the overall Area and the Interconnection before the interests of any other entity

## Purpose:

- Information, tools, and other capabilities are needed in order for Reliability Coordinators to do their job

## Applicability:

- Reliability Coordinator

## Requirements:

- Each RC should have adequate voice and data link communication facilities to each entity within its Area\*
- Each facility should be staffed and available to act in addressing a real-time emergency condition
- The RC determines the data requirements to support its reliability functions and requests such data from all the entities within its Area

## Requirements:

- Provisions should be provided, or arranged, for data exchange via a secure network
- Multi-directional communications capabilities for both voice and data exchange are required with BA's, TO's, and neighboring RC's
- Each RC shall have detailed real-time monitoring capability of its Area and surrounding Areas to include alarm management, awareness systems, automated data transfers, and synchronized information systems to ensure that potential or actual SOL or IROL violations are identified over a redundant and highly reliable infrastructure

## Requirements:

- Each RC shall monitor:
  - Bulk Electric System elements (generators, transmission lines, buses, transformers, breakers etc) that could result in SOL and/or IROL violations
  - Real and reactive power flows on the system
  - Operating reserves
  - Status of BES elements that are or could be critical to SOL's and IROL's in its area
  - System restoration requirements in its area

## Requirements:

- Each RC shall have adequate analysis tools such as state estimator, pre and post-contingency analysis capabilities to include thermal, stability, and voltage, and wide-area overview displays
- Provisions shall be made for backup facilities if the main monitoring system is unavailable to ensure SOL and IROL monitoring and derivations continue
- Each RC shall control their analysis tools including planned maintenance approvals
- Each RC shall have procedures to mitigate the effects of analysis tool outages

## Purpose:

- Each RC must have a wide area view of its own Area and that of its neighboring RC's areas

## Applicability:

- Reliability Coordinators

## Requirements:

- Each RC will monitor all Bulk Electric System facilities, which could include sub-transmission information, within its Area and adjacent Areas to ensure that, regardless of planned or unplanned events, potential SOL and/or IROL violations can be determined

## Requirements:

- Be aware of the current status of all critical facilities whose failure, degradation, or disconnection could result in a SOL or IROL violation
- Know the status of any facilities that may be required to assist in a system restoration objective
- **Measures:**
- Coordinators shall have and provide evidence to confirm that it monitors its area to include:
  - EMS description documents, computer printouts, SCADA data collection, or equivalent evidence

## Purpose:

- Next-day reliability analyses must be performed to ensure the Bulk Electric System can be operated reliably in both normal and contingency conditions
- System studies must be conducted to highlight potential interface and other operating limits including:
  - Overloaded transmission lines and transformers
  - Voltage and stability limits
- Plans must be developed to alleviate SOL's and IROL's

## Applicability:

- Reliability Coordinators
- Balancing Authorities
- Transmission Operators
- Transmission Owners
- Transmission Service Providers
- Generation Operators
- Generation Owners
- Load-Serving Entities

## Requirements:

- Contingency analysis studies shall be conducted by Reliability Coordinators to identify interface, SOL, and IROL violations including:
  - Transmission and transformer overloads
  - Voltage and stability limit violations
- Attention to parallel flows shall be done to ensure that an Area does not place a burden on an adjacent Area\*
- Reliability Coordinator, in conjunction with its Balancing Authorities and Transmission Operators, shall develop action plans

## Requirements:

- Plans of actions shall include:
  - Reconfiguration of transmission system
  - Generation redispatch
  - Interchange Transaction reduction or curtailment
  - Reduce load to return transmission loading within acceptable SOL or IROL limits
- All entities are required to provide information to RC (available 1200 CST for Eastern Interconnection)\* for system studies such as facility status, load, generation, operating reserve projections, and known Interchange Transactions

## Requirements:

- Study results will be shared by the RC when conditions warrant or upon request by 1500 CST for the Eastern Interconnection
- If the study indicates potential SOL or IROL violations, the RC will direct any necessary action needed to address the potential violations
- Each entity within the area will comply with the RC's directives based on the next day assessments in the same manner as if they were real-time operating events

## Purpose:

- There must be a continuous awareness and monitoring of conditions that may have significant impacts within an Area and/or neighboring Areas with that information included in the Area's reliability assessment
- Coordinator must monitor Bulk Electric System parameters that may significant impacts on its area and adjacent areas

## Applicability:

- Reliability Coordinators
- Balancing Authorities
- Transmission Operators
- Transmission Service Providers

## Requirements:

- Coordinators must monitor its Area parameters to include:
  - Current status of Bulk Electric System elements, both generation and transmission including critical auxiliaries (Automatic Voltage Regulators and Special Protection Schemes)
  - System loading
  - Current pre- and post-contingency element conditions (Voltage, thermal, or stability) including mitigation plans to alleviate SOL and IROL violations, including the plan's viability and scope
  - System real and reactive reserves (actual versus required)

## Requirements:

- Capacity and energy adequacy
- Current ACE for all its Balancing Authorities
- Current local or TLR procedures in effect
- Planned generation dispatches
- Planned transmission or generation outages
- Contingency events
- To be aware of all interchange transactions that wheel through, source, or sink in the RC Area, and to make all information concerning interchange transactions available to all RC's within the Interconnection\*

## Requirements:

- Upon parts of the system approaching or exceeding SOL's or IROL's, the RC shall work proactively with TO's and BA's to assess and evaluate any interchange schedules that would violate those limits
- For a potential or actual IROL violation, control actions or emergency procedures should be initiated to relieve the violation without delay and no longer than 30 minutes
- Coordinator shall ensure that all resources, including load shedding, are available to address a potential or actual IROL violation

## Requirements:

- Balancing Authority parameters shall be monitored to ensure that the correct amount of operating reserves is provided to meet the Control Performance Measure, Balancing Authority Area Control Error Limit, and the Disturbance Control Standard requirements
- Coordinator shall direct all BA's in its area to arrange for assistance from neighboring BA's
- Coordinator shall also issue Energy Emergency Alerts as needed and at the request of the BA's and LSE's

## Requirements:

- Coordinator shall identify the cause of any potential or actual SOL or IROL violations, initiate the control action or emergency procedure to correct the situation (30 minutes) using all resources, including load shedding
- Insure that all information concerning Geo-Magnetic Disturbance forecasts are disseminated among all Transmission Operators and Balancing Authorities\* and assist as needed in developing a required response
- Coordinator shall monitor system frequency and its Balancing Authorities' performance directing any rebalancing to return to CPM, BAAL, and DCS compliance

## Requirements:

- Transmission Operators and Balancing Authorities shall use all resources, including firm load shed, as directed by the Coordinator to alleviate emergency conditions
- Coordinator will work in conjunction with Transmission and Generation Operators, and Balancing Authorities to develop and implement actions plans to correct potential or actual SOL, IROL, CPM, BAAL, or DCS violations
- Coordinator will oversee all pending transmission and generation outages with entities as needed in both real-time and next-day analysis

## Requirements:

- Coordinator shall assist its area Balancing Authorities in arranging for assistance from neighboring RC's and BA's
- Coordinator shall identify sources of Area Control Error that may be contributing to Frequency Error, Time Error, and Inadvertent Interchange coordinating corrective actions and directing its Balancing Authority to comply with CPM, BAAL, and DCS
- Coordinator shall be aware of the impact of all armed Special Protection Schemes as to its operation on inter-area flows
- Transmission Operators shall notify RC's immediately of any status change of a SPS such as degradation or a potential failure to operate

## Requirements:

- Coordinator shall ensure that all entities operate to prevent the likelihood of a disturbance, action, or non-action will result in a SOL or IROL violation in another area of the Interconnection
- For a difference in derived operating limits, entities will always operate the BES to the most limiting parameter
- Coordinators shall make known to Transmission Service Providers SOL's or IROL's within its wide-view area
- For a transmission problem, the RC shall issue an alert to all impacted entities disseminating this information and notifying the entities when the problem is corrected

## Requirements:

- Coordinators shall confirm reliability assessment results and determine the effects within its own and adjacent areas
- In correcting potential or actual violations, the actions taken shall always be in the best interests of the Interconnection
- For an actual violation, the Coordinator shall evaluate the local and wide-area impacts, both real-time and post-contingency, to determine if the action is sufficient to alleviate the violation within 30 minutes, and if not, shall direct all entities to return the system to within limits

## Definitions:

- RCIS: Reliability Coordinator Information System used by RC's to post messages and share operating information in real time
- Control Performance Measure: (CPM) Reliability Standard that sets the limits of a Balancing Authority's Area Control Error over a specified time period
- Disturbance Control Standard: (DCS) Reliability Standard that sets the time limit following a disturbance within which a Balancing Authority must return its Area Control Error to within a specified range

## Purpose:

- The Reliability Coordinator must direct its Balancing Authorities and Transmission Operators to return the system to within its Interconnection Reliability Operating Limits as soon as possible, but no longer than 30 minutes
- Actions such as reconfiguration, redispatch, and load shed shall be executed until relief through the TLR process has been achieved

## Applicability:

- Reliability Coordinators
- Transmission Operators
- Balancing Authorities

## Requirements:

- For a potential or actual SOL or IROL violation, the RC can select either a “local” or an Interconnection-wide transmission loading relief procedure
  - Local is defined as regional, interregional, or subregional
- TLR or congestion management procedures can be used as long as the Transmission Operator experiencing the potential or actual violation is party to the procedures
- Local relief can be used simultaneously with an Interconnection-wide procedure, but the curtailments directed by the Interconnection-wide procedure shall take precedence and be followed by the RC

## Requirements:

- Substitution of a local procedure for curtailments as directed by the Interconnection-wide procedure must be approved by the NERC Operating Committee
- Upon implementation, RC's shall comply with the provisions of the Interconnection-wide procedure
- During implementation of relief procedures, and up to the point that emergency action is necessary, RC's and Balancing Authorities shall comply with interchange scheduling standards INT-001 through INT-004

## **Purpose:**

- Procedures are outlined for the curtailment and reloading of Interchange Transactions to relieve transmission overloads on all facilities modeled in the Interchange Distribution Calculator (IDC)

## **Applicability:**

- Eastern Interconnection

## **Transmission Loading Relief Procedure:**

- Initiation of the TLR procedure is the responsibility of the Reliability Coordinator only either by or at the RC's own request or at the request of a TO

## **Transmission Loading Relief Procedure:**

- The procedure is used to mitigate a potential or actual SOL or IROL violation for any facility modeled in the IDC
  - Any TO who operates a tie facility is allowed to request relief from the Reliability Coordinator
  - Priority on transaction curtailment is determined by the transmission service reserved on the Transmission Service Provider's system who requested the relief
- The RC is not required to follow implementation of TLR's in their numerical order

## **Transmission Loading Relief Procedure:**

- If a transmission loading condition could jeopardize the reliability of the BES, the RC shall have the authority to enter a TLR Level 6 directly, and redispatch generation, reconfigure transmission, and reduce load to correct the condition
- Notification to RC's, TO's, and BA's of information concerning the initiation and progress of a TLR event is done on the appropriate NERC web pages
  - The initiating RC shall indicate the actions expected to be taken by the other Reliability Coordinators

## Transmission Loading Relief Procedure:

- Notification must be made, when entering and leaving any TLR level to Transmission Operators and Balancing Authorities
- The RC for the Sink Balancing Authority is responsible for directing the Sink Balancing Authority to curtail Interchange Transactions as specified by the RC that implemented the TLR procedure
  - The Sink Balancing Authority whose transactions have the largest impact on the constraint shall be notified first

## **Transmission Loading Relief Procedure:**

- Updates on the TLR event shall be done at least once an hour, or when conditions change, by the initiating RC
- Updates to Coordinators will be done through the Reliability Coordinator's Information System (RCIS)
- Updates to TO's and BA's will be done through their Coordinator

## **Transmission Loading Relief Procedure:**

- The TLR procedure utilizes the information that is obtained from the Interchange Distribution Calculator to include transactions not appearing in the IDC
- For a transaction not in the IDC, the RC will ensure that transactions with a Transfer Distribution Factor less than the Curtailment Threshold are not curtailed
- IDC results that are questionable should be brought brought into conformance of this procedure by the initiating Coordinator

## Transmission Loading Relief Procedure:

- Causes of questionable results:
  - Missing transactions that contribute to the constraint
  - Transmission system topology change
  - TDF matrix error
- Impacts of questionable results:
  - Curtailment that has no/negative effect on constraint
  - Curtailment that initiates a constraint elsewhere
- If more than one RC is involved in the event, all RC's must be in agreement before any adjustments are made to the Curtailment list

## **Transmission Loading Relief Procedure:**

- A Coordinator can allow an Interchange Transaction to be exempt from curtailment if that transaction could cause a constraint to occur elsewhere.
- The exemption can only take place after the Coordinator has consulted with the initiating Coordinator
- Transactions that are linked to redispatch options are protected from curtailment in accordance with the redispatch provisions

## **Transmission Loading Relief Procedure:**

- During a TLR Level 3A, higher priority transactions that meet the approved tag submission deadline shall be considered for reallocation
- During a TLR Level 5A, any transaction using Firm Transmission Service that meets the approved tag submission deadline shall be considered for reallocation
- Any transaction adjustments or curtailments that result from using this procedure must be entered into the IDC

## Transmission Loading Relief Procedure:

- If an Interchange Transaction is identified as a Dynamic Schedule, and the transmission service is considered firm according to the constrained path method, then it will not be held by the IDC during a TLR Level 4 or lower
- A NERC Transmission Loading Relief Procedure Log must be completed whenever a TLR Level 2 or above is issued
- A copy of the log must be sent via email to NERC within two business days for posting on the NERC website
- All TLR events shall be reported by the RC to the NERC Market Committee and Operating Reliability Subcommittee

## **Transmission Loading Relief Procedure:**

- Transmission Operators and Balancing Authorities within the RC's Area, and all other RC's, including Transmission Operators and Balancing Authorities within their respective Areas, shall provide information, as requested by the initiating RC, in accordance with the NERC TLR review process
- Market Committee may review may conduct reviews of certain TLR events based on the size and number of Interchange transactions that are affected, the frequency that a TLR procedure is called for a particular constraint, or other factors

## **Transmission Loading Relief Procedure:**

- Operating Reliability Subcommittee Review: based on ensuring proper implementation and for “lessons learned”

## **TLR Level 1: Notification of Reliability Coordinator of Potential SOL or IROL Violations**

- Issued when the transmission system is secure, but a potential transmission or generation contingency or other operating problem could cause a SOL or IROL violation
- Notification is to all RC's via the (RCIS) Reliability Coordinator Information System with RC's ensuring that transactions are posted in the IDC
- All affected RC's should check to ensure all Interchange Transactions are posted in the IDC

## **TLR Level 2: Hold Transfers at present levels to prevent SOL or IROL violations**

- Issued when the transmission is secure, but one or more facilities are expected, approaching, or at a SOL or IROL violation
  - Hold the implementation of additional transactions that are at or above the Curtailment Threshold
  - Allow additional transactions to flow that reduce loading on the constraint or that has a Transfer Distribution Factor less than the Curtailment Threshold

## TLR Level 2:

- All Firm Point-to-Point Transmission Service shall be allowed to start
  - TLR Level 2 is considered a transient state
  - A TLR Level 2 is used to allow transactions to be implemented according to their reservation priority
  - Time for being in a Level 2 is no more than 30 minutes
  - If the 30 minute timeframe is exceeded, the RC will document the action on the TLR log

## **TLR Level 3A: Reallocation of Transmission Service by curtailing Interchange Transactions Non-Firm Point-to-Point Transmission Service to allow higher priority Transmission Service to flow**

- Issued when the transmission system is secure, and one or one or more facilities are expected to approach, or are at their SOL or IROL limits
- Non-Firm Point-to-Point service is flowing at or above the Curtailment Threshold on those facilities
- Transmission Provider has approved a higher Point-to-Point service reservation over which a customer wishes to begin the transaction

## TLR Level 3A:

- Transactions with low priority shall be displaced by higher priority Non-Firm or Firm service
- Non-Firm service will not be curtailed to allow the start or increase of a transaction with the same priority Non-Firm service
- If there is insufficient Non-Firm Point-to-Point service that can be curtailed allowing Firm Point-to-Point service to begin, a TLR Level 5 should be issued
- Curtailed Interchange Transactions shall be reloaded prior to allowing the start of new or increased Interchange Transactions

## TLR Level 3A:

- Interchange Transactions whose tags were submitted prior to a TLR Level 2 or 3A, but were held from starting, shall be reloaded at the same time as curtailed transactions
- Reloading or starting of transactions shall be done on a pro-rata basis
- Consideration will be given for tags meeting the submission deadline for Reallocation for the upcoming hour
- Tags submitted after the Reallocation deadline will be considered for reallocation the following hour

## **TLR Level 3B: Curtail Interchange Transactions using Non-Firm Transmission Arrangements to mitigate a SOL or IROL violation for the following:**

- One or more facilities are operating above their SOL or IROL
- Unless corrective action is initiated, it is expected that facilities will exceed their reliability limit
- On removal of a generation or transmission facility, one or more facilities will exceed SOL or IROL
- Non-Firm Point-to-Point transactions are flowing at or above the Curtailment Threshold on those facilities

## TLR Level 3B:

- New Non-Firm Point-to-Point transactions that are at or above the Curtailment Threshold during a SOL or IROL violation will held from starting
- Firm Point-to-Point transactions can start if tag submission to the IDC was within time limits
- Interchange Transactions using Non-Firm Point-to-Point Transmission Service that are at or above the Curtailment Threshold will be curtailed

## TLR Level 4: Reconfigure Transmission

- One or more transmission facilities are above their SOL or IROL, and it is expected that facilities will exceed their reliability limit unless corrective action is taken
- New Non-Firm Point-to-Point transactions that are at or above the Curtailment Threshold during a SOL or IROL violation will be held from starting
- Firm Point-to-Point transactions can start if submitted to the IDC by 25 minutes past the hour or at the time at which the TLR Level 4 is called, whichever is later

## TLR Level 4:

- Following curtailment of Non-Firm Point-to-Point transactions, the violation is imminent or occurring, the RC will request affected Transmission Operators to reconfigure transmission on their system, or arrange for reconfiguration on other systems to mitigate the constraint

## **TLR Level 5A: Reallocation of Transmission Service by curtailing Interchange Transactions Firm Point-to-Point service on a pro-rata basis to allow additional Firm Point-to-Point Transmission Service**

- Transmission system is secure, and one or more facilities are at their SOL or IROL
- All Non-Firm Point-to-Point service is at or above the Curtailment Threshold have been curtailed
- Transmission Provider has been requested to begin a transaction using Firm Transmission Service that will result in a SOL or IROL violation
- No further reconfiguration is possible or effective

## **TLR Level 5B: Curtail Firm Point-to-Point service to mitigate a SOL or IROL violation**

- One or more Transmission Facilities are operating at or above their SOL or IROL limits
- One or more Transmission Facilities will exceed their SOL or IROL limits upon removal from service of a generating or transmission facility
- Interchange Transactions using Non-Firm Point-to-Point Transmission Service that are at or above the Curtailment Threshold have been curtailed

- **TLR Level 5B:**
  - Identify available redispatch options
  - Calculate the overload percent caused by both Firm Point-to-Point Service at or above the Curtailment Threshold and the Transmission Provider's Network Integration service and Native Load as required by Provider's tariff
  - Curtail transactions as calculated over the constrained facilities using Firm Point-to-Point Service until the SOL or IROL violation is mitigated
  - Assist Transmission Provider in curtailing service of Network Integration service and Native Load if required

## TLR Level 6: Emergency Procedures

- One or more facilities are operating above their SOL or IROL
- On removing a generation unit or transmission facility, one or more facilities will exceed SOL or IROL
- If transmission loading is critical to Bulk Electric System reliability, the Transmission Operators and Balancing Authorities will redispatch generation, or reconfigure transmission, or reduce load to mitigate the condition until TLR procedures or other procedures can return the system to a secure and stable state

- **TLR Level 0: TLR Concluded**
  - The initiating RC of the TLR procedure notifies all Reliability Coordinators via the RCIS system when the violation has been mitigated and the system is secure
  - At this time, transactions can be reestablished with the highest transmission priorities reloaded first

## Transmission Service Priorities

Priority 0: Next-Hour Market service (NX)

Priority 1: Service over secondary receipt and delivery points (NS)

Priority 2: Non-Firm Point-to-Point Hourly service (NH)

Priority 3: Non-Firm Point-to-Point Daily service (ND)

Priority 4: Non-Firm Point-to-Point Weekly service (NW)

Priority 5: Non-Firm Point-to-Point Monthly service (NM)

Priority 6: Network Integration Service from sources not designated as network resources (NN)

Priority 7: Firm Point-to-Point and Network Integration service from designated resource (FN)

## Transmission Service Priorities

- Transaction curtailment priority that do not have a service reservation over a constrained facility is defined by the lowest priority of the reserved transmission segments

## Curtailment using Non-Firm Transmission Service

- TLR 3A: Enable transactions with a higher priority to be implemented
- TLR 3B: Mitigate a SOL or IROL violation

## **Curtailment using Firm Transmission Service**

- TLR 5A: Enable additional Firm Point-to-Point Service to be implemented after all Non-Firm Point-to-Point Service has been curtailed
- TLR 5B: Mitigate SOL or IROL violation that remains after all Non-Firm Point-to-Point service has been curtailed under a TLR 3b, and following transmission reconfiguration under a TLR 4

## Introduction:

- A transaction's contract path may not reflect the actual power flow over the transmission network from generation source to load sink
- Curtailment priority depends on whether the Constrained Facility is on or off the contract path

## Constraints ON the Contract Path:

- The entire transaction is considered non-firm if the constrained segment on the contract path is Non-Firm Point-to-Point service
- The entire transaction is considered firm if the constrained segment on the contract path is Firm Point-to-Point service

## Constraints ON the Contract Path:

- For curtailment purposes, the Interchange Transaction's priority will be the priority of the Transmission Service link with the Constrained Facility
- If the Transmission Provider provides its services under the FERC pro forma tariff, it may be obligated to offer its Transmission customer alternate receipt and delivery points, allowing the customer to curtail its Transmission service over the constrained facility

## Constraints OFF the Contract Path

- The entire transaction is considered non-firm if none of the segments on the contract path are on the constrained facility and if any of the transmission links on the contract path are Non-Firm Point-to-Point service
- The transaction takes on the lowest service priority of all the links along the contract path
- The entire transaction is considered Firm if all of the transmission links on the contract path are Firm Point-to-Point service, even if none of the links are on the constrained facility

## Constraints OFF the Contract Path:

- Transmission Providers off the contract path are not obligated to reconfigure their transmission system or provide other congestion management procedures unless special arrangements are in place
- Because a transaction is considered Firm everywhere, a Coordinator may arrange for Transmission Operators to reconfigure their transmission system or Balancing Authorities to redispatch generation, even if they are off the contract path, to prevent curtailing a transaction with Firm Point-to-Point Transmission Service

## Introduction:

- Curtailment of transactions is required when a facility becomes constrained to allow transactions of higher priority to be scheduled (Reallocation) or to provide transmission loading relief (Curtailment)
- A transaction is considered for reallocation or curtailment if its Transfer Distribution Factor exceeds the TLR Curtailment Threshold

## Requirements:

- The “Per Generator Method” is programmed into IDC to calculate the portion of parallel flows on any constrained facility due to Native Load service with the following requirements:

## Requirements for reallocation or curtailment:

- Identify all Firm transmission services that contribute to the flow on a constraint by the amount greater than or equal to the Curtailment Threshold on a pro rata basis
- Transfer Distribution Factors must be greater than or equal to the Curtailment Threshold for all Firm Point-to-Point services
- Generator-to-Load Distribution Factors must be greater than or equal to the Curtailment Threshold for all Network Integration services and Native Load services

## Requirements for reallocation or curtailment:

- The amount of Constrained Facility Relief that must be achieved by each Balancing Authority's Network Integration service and/or service to Native Load is assigned by the "Per Generator Method"
- All Balancing Authorities within the Eastern Interconnection are required to achieve the amount of Constrained Facility Relief assigned to them by the "Per Generator Method"
- The "Per Generator Method" is based on both transmission and generation information that is readily available

- **Requirements for reallocation or curtailment:**
  - Calculation of flow on a Constrained Facility due to Network Integration service or service to Native Load is based on Generation Shift Factors of a Balancing Authority's assigned generation and the Load Shift Factors of its native load relative to the system's swing bus
  - GSF's are calculated from a single bus in the IDC
  - The IDC will report all generators assigned to Native Load where the GLDF is greater than or equal to the Curtailment Threshold

## Introduction:

- TLR Level 3A accomplishes reallocation by curtailing Non-Firm Point-to-Point service to allow higher priority Non-Firm or Firm Point-to-Point service to start
- Reallocation when a Level 3A is in effect should be according to the Transmission Service Priorities when curtailing or reloading
- TLR Level 5A accomplishes reallocation by curtailing Firm Point-to-Point service on a pro-rata basis to allow new Firm Point-to-Point service to begin, also on a pro-rata basis

## Requirements:

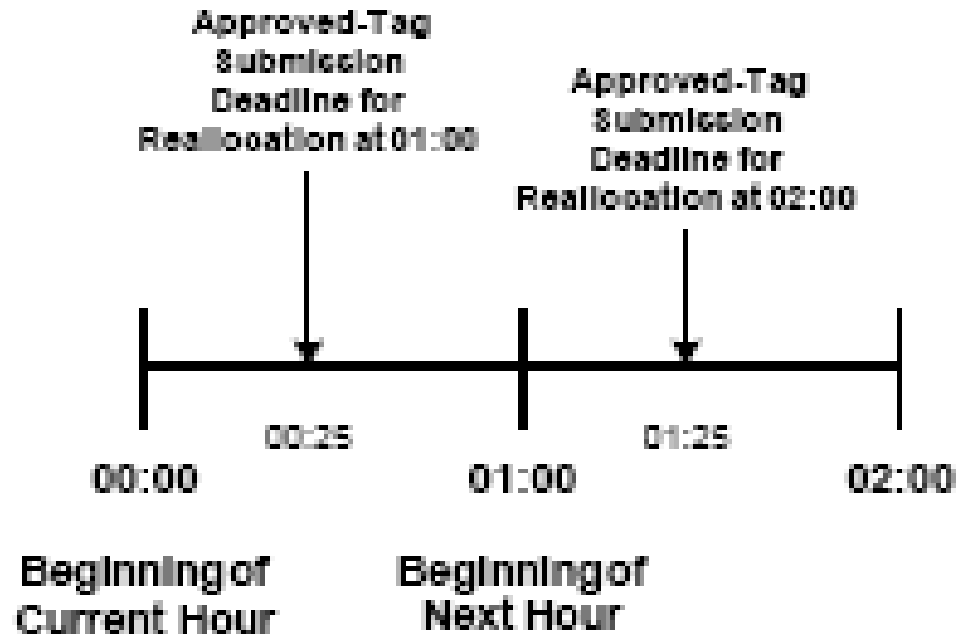
- Transactions used for reallocation are those at or above the Curtailment Threshold for which a TLR 2 or higher is called
- Curtailed transactions are reloaded prior to starting new or increasing existing transactions
- Transactions submitted prior to a TLR 2 or 3A, but held from starting because of the submission deadline, will be considered as curtailed and will be reloaded at the same time as the curtailments

## Requirements:

- All eligible transactions shall reload or start on a pro-rata basis
- A transaction that meets the submission deadline for reallocation will be considered for reallocation for the upcoming hour (Firm Point-to-Point service will start as scheduled)
- A transaction submitted after the deadline will be considered for reallocation the following hour
- If a Firm transaction is submitted after the deadline and after a TLR is declared, the Firm transaction is held and will start in the upcoming hour

## Requirements:

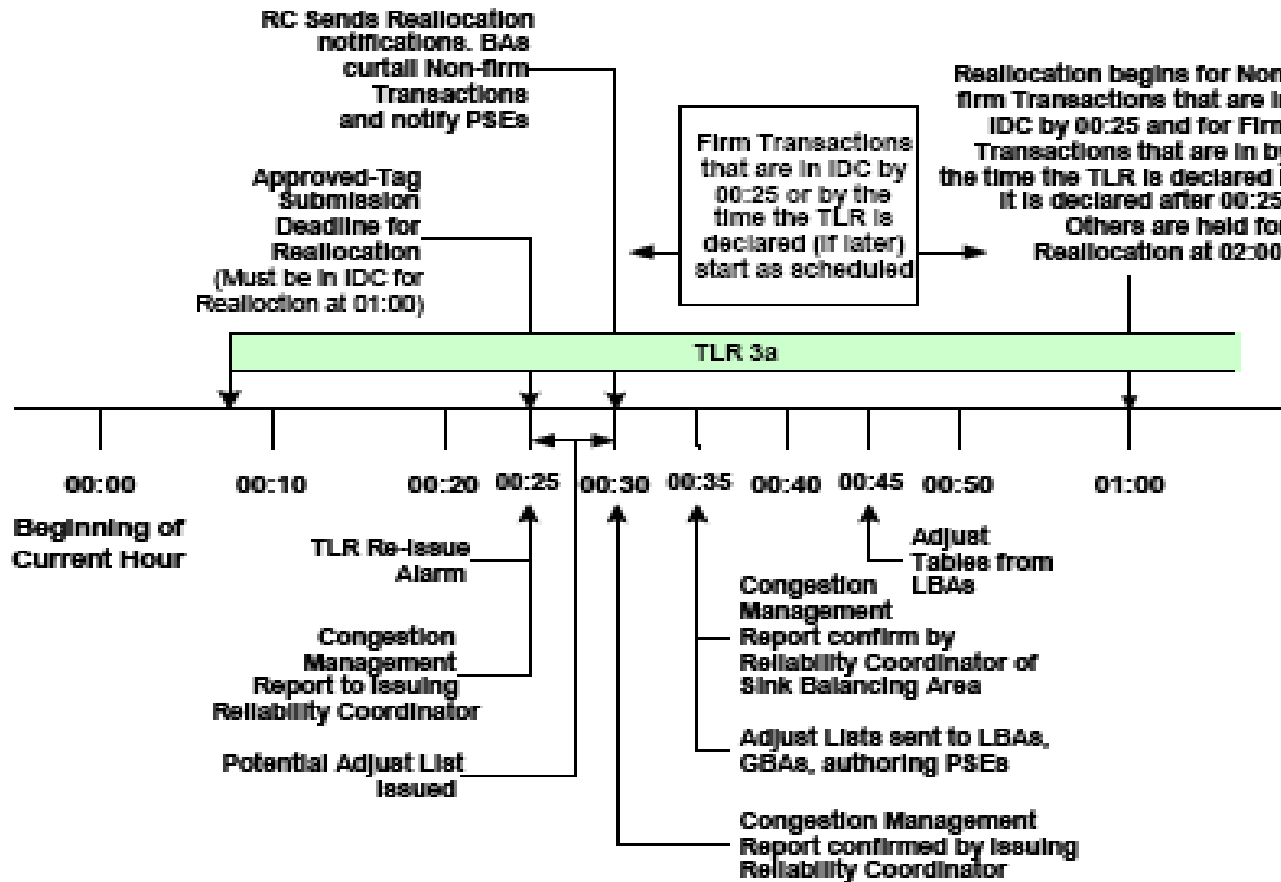
- A TLR Level 3A does not mean that transactions with Non-Firm service will be curtailed next hour
- Levels 3A and 5A trigger the tag submission deadline for reallocation allowing for a coordinated assessment of transactions starting the next hour
- Approved tag submission deadline for reallocation shall cease as soon as the TLR Level is reduced to a 1 or 0



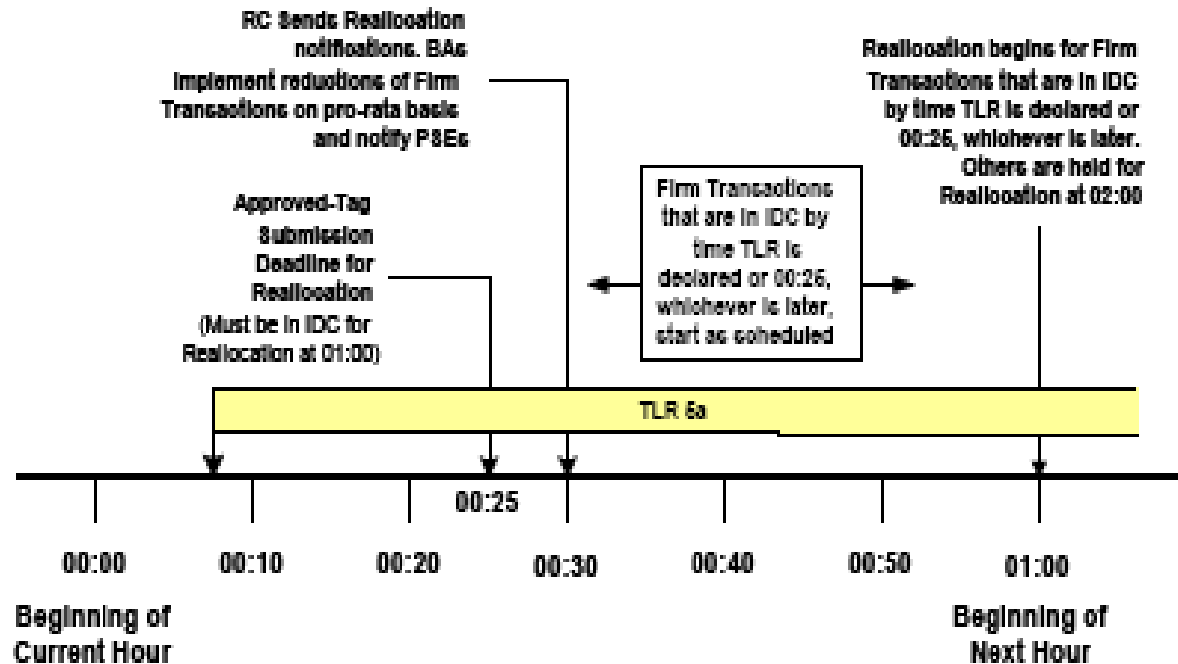
## Communication and Timing Requirements:

- Transactions with a start time other than xx:00 will be considered for reallocation at xx + 1:00
  - A transaction with a 1:05 start time and a submission time of 00:15 will be reallocated at 02:00
- Tags are evaluated for reallocation with an approval or rejection by 00:25
- At 00:25, the IDC shall be run to obtain a three-part list of transactions to include their status:
  - Transactions that start, increase, or reload will have a status of PROCEED

## Reallocation Timing for a TLR 3A Called at 00:08



## Reallocation Timing for a TLR 5A Called at 00:08



## Communication and Timing Requirements:

- Transactions that must be curtailed or their tags were submitted prior to a TLR Level 2 or higher but were not permitted to start or increase will have the status of CURTAILED
- Transactions entered into the IDC after 00:25 shall have a status of HOLD and be considered for reallocation the following hour
- Communications of the list from the initiating RC to the sink RC's, via the IDC, who will in turn communicate the list to the sink Balancing Authorities by 00:30

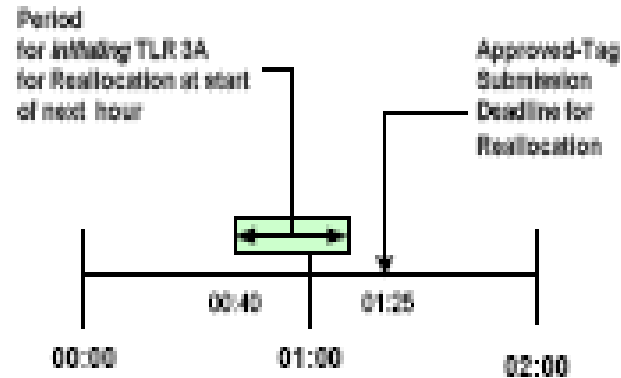
## Communication and Timing Requirements:

- A TLR Level 2 does not initiate the approved tag submission deadline for reallocation, but a Level 3A or 5 A does
- A Level 2 does determine the status of a held transaction:
  - CURTAILED if tagged before the TLR was called
  - HOLD if tagged after the TLR was called
  - The initiating RC has the option of specifying the maximum loading of a constrained facility by all transactions using Point-to-Point service

## Customer Preferences on Timing to Call a TLR 3A/5A:

- Reliability Coordinators shall proceed from a TLR 2 and call a TLR 3A as soon as possible with a maximum time limit of 30 minutes to initiate the Approved-Tag Submission Deadline and start reallocating transactions
- Preferred period of time for declaring a TLR 3A or 5A is between 00:40 and 1:15 allowing transmission customers 15 to 35 minutes to prepare and submit tags

## “Ideal” Time for Issuing a TLR 3A for Reallocation at 02:00



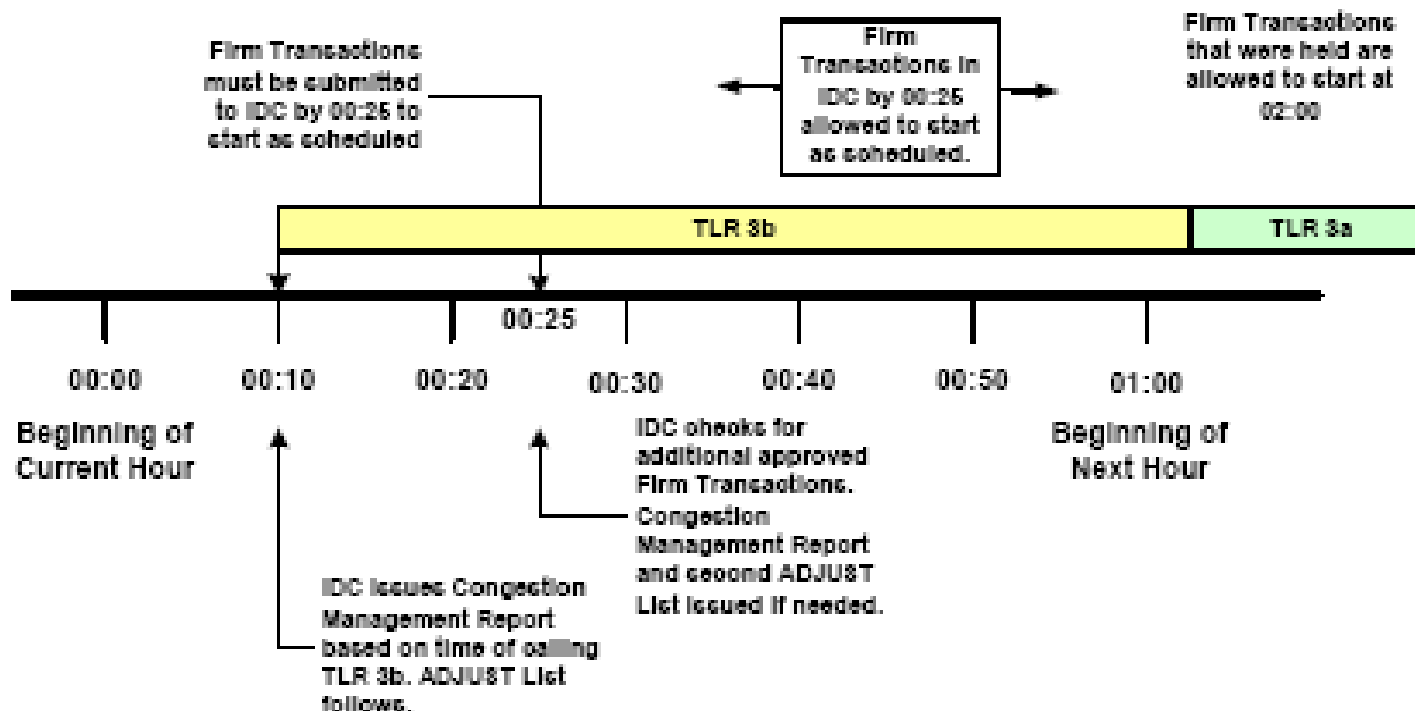
## Interchange Curtailments During a TLR Level 3B:

- Used to curtail Non-Firm Point-to-Point transactions that are at or above the Curtailment Threshold to assist recovery from SOL or IROL violations
- New Non-Firm Point-to-Point transactions that are at or above the Curtailment Threshold will be held or halted
- Firm Point-to-Point service will be allowed to start if the schedules are submitted to the IDC within the specific time limits, otherwise, the service will be held
- During a TLR 3B, Non-Firm Point-to-Point service will not be reallocated

## Interchange Curtailments During a TLR Level 3B:

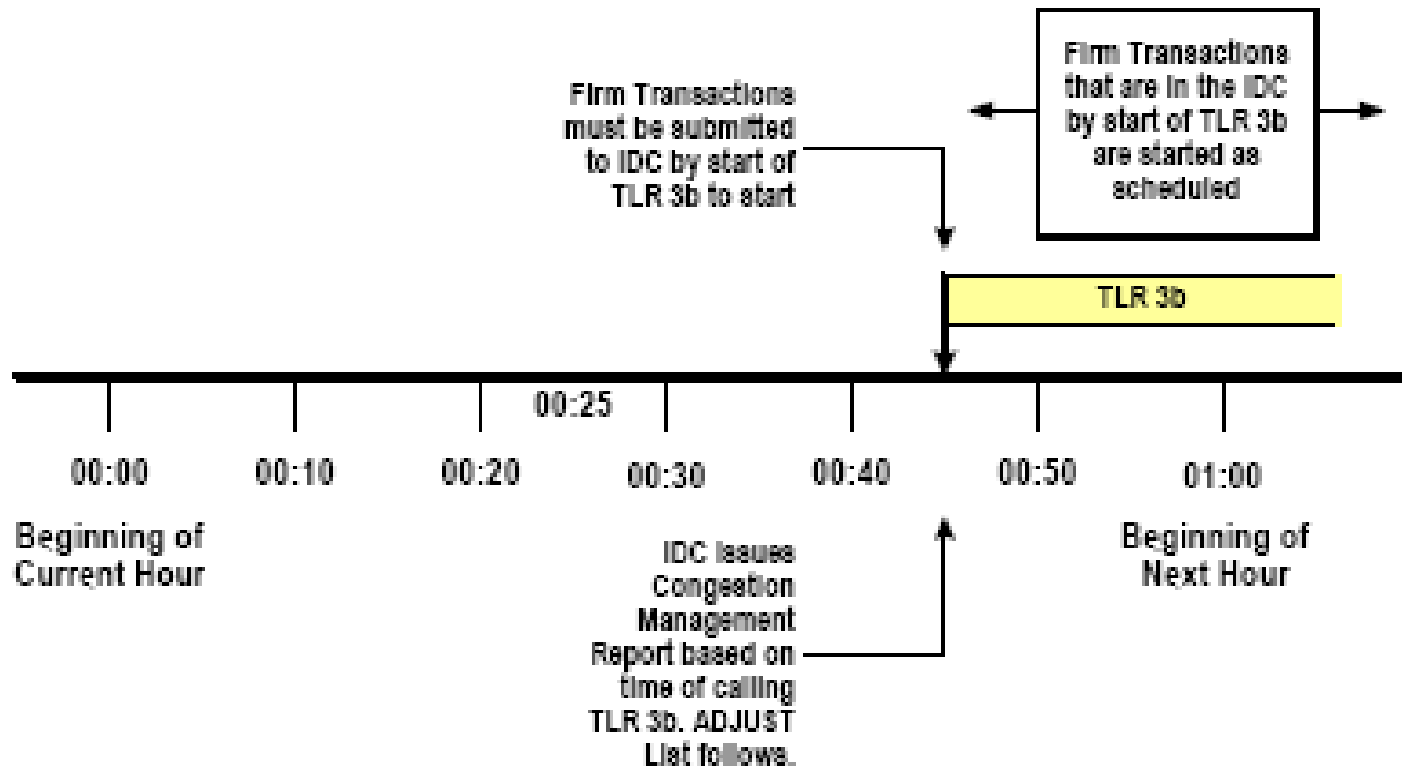
- The IDC will issue ADJUST lists to Generation and Load Balancing Authority Areas and the Purchasing-Selling Entity submitting the tag to include:
  - Non-Firm Point-to-Point service to be curtailed, halted, or held during the current and next hours
  - Firm Point-to-Point service that was entered after 00:25 or the issuance of a TLR Level 3B
- Sink Balancing Authority will send the ADJUST lists back to the IDC to ensure accurate calculations for actions resulting from the TLR Level 3B

**Case 1: TLR 3b is called between 00:00 and 00:25 and the Interchange Transaction using Firm Point-to-Point Transmission Service is submitted to IDC by 00:25.**



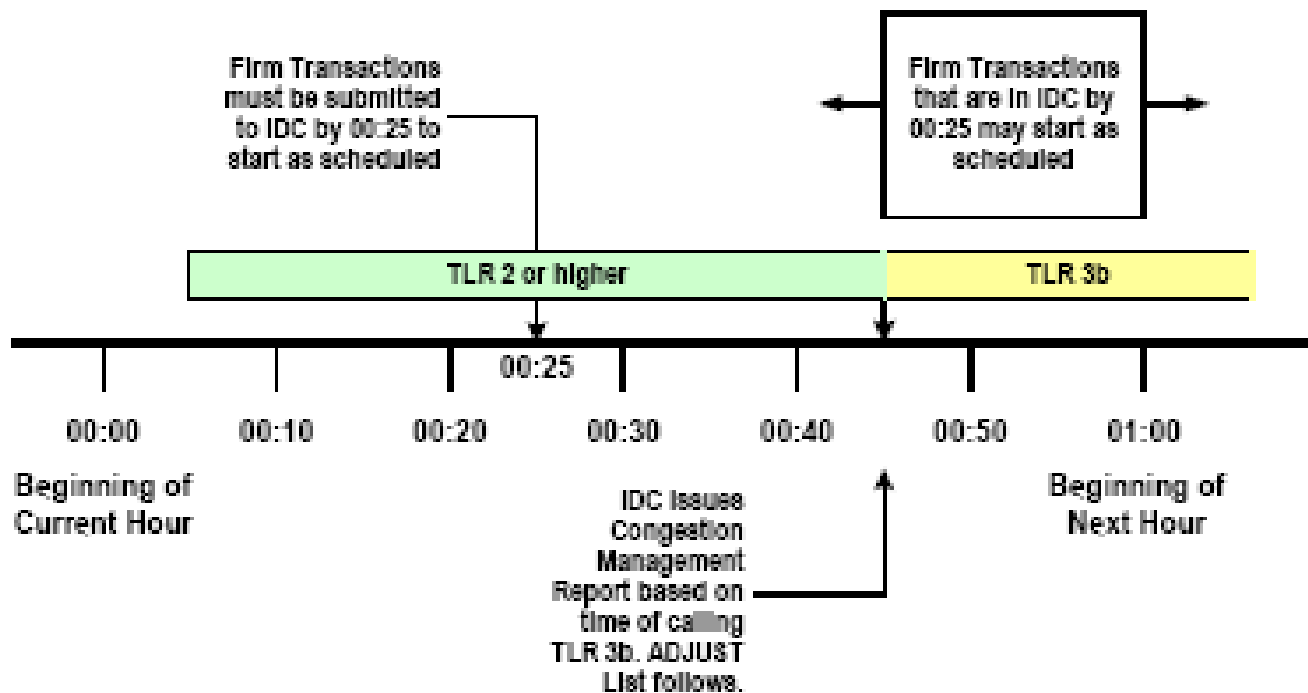
# Firm Transmission Service during a TLR 3B

**Case 2: TLR 3b is called after 00:25 and the Interchange Transaction using Firm Point-to-Point Transmission Service is submitted to the IDC no later than the time at which the TLR 3b is called.**



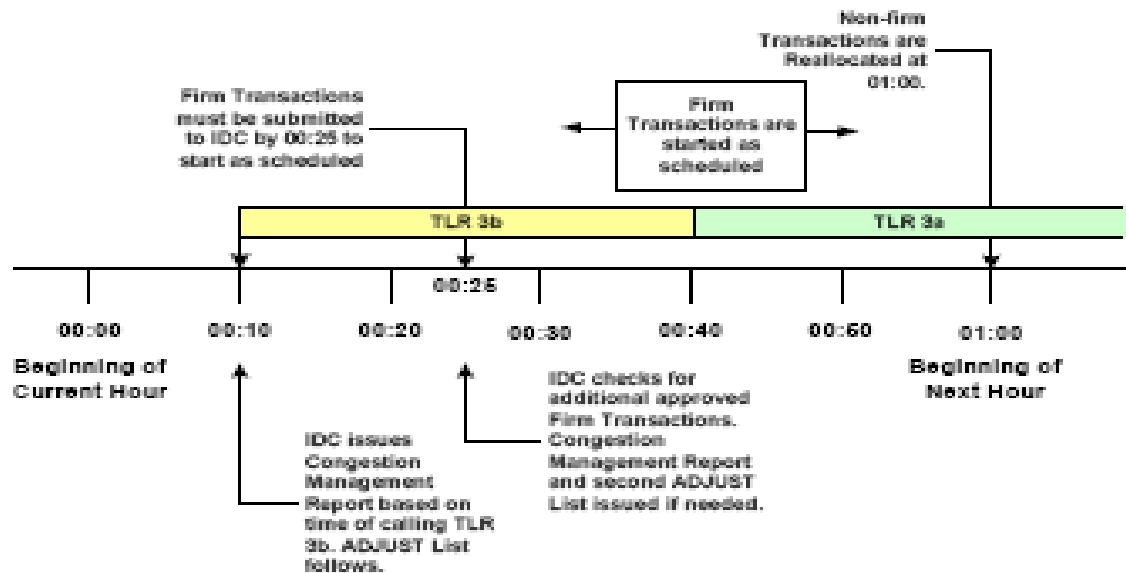
# Firm Transmission Service during a TLR 3B

**Case 3. TLR 2 or higher is in effect, a TLR 3b is called after 00:25, and the Interchange Transaction using Firm Point-to-Point Transmission Service is submitted to the IDC by 00:25.**



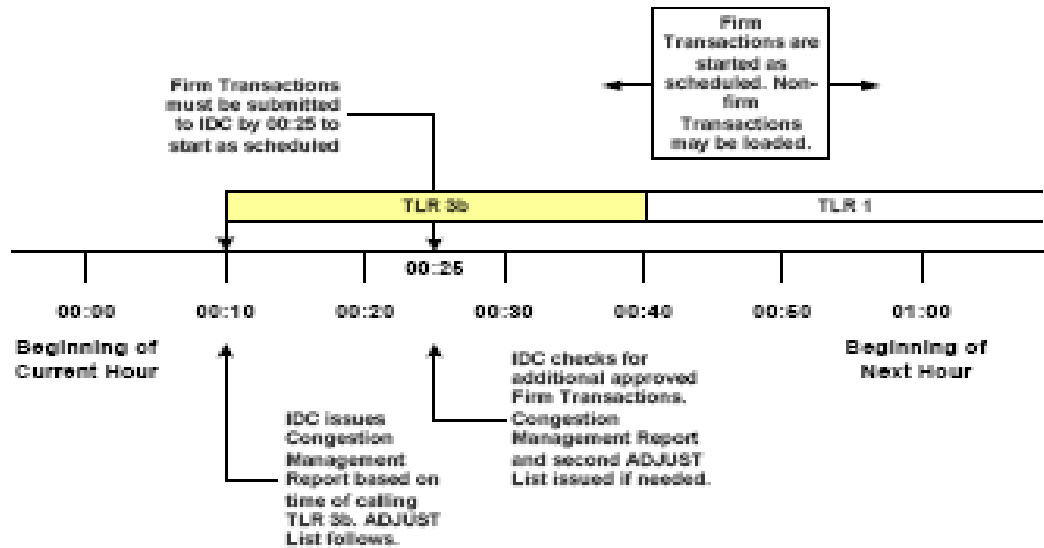
# Firm Transmission Service during a TLR 3B

**Case 4. TLR 3b is called before 00:25 and the Interchange Transaction is submitted to the IDC by 00:25. TLR 3a is called at 00:40.**



# Firm Transmission Service during a TLR 3B

Case 5. TLR 3b is called before 00:25 and the Interchange Transaction is submitted to the IDC by 00:25. TLR 1 is called at 00:40.



## Definitions:

- **Transfer Distribution Factor:** The portion of an interchange transaction, typically expressed in per unit, that flows across a transmission facility
- **Generation Shift Factor: (GSF)** Factor applied to a generator's expected change in output to determine the amount of flow contribution that the change in output will impose on a identified transmission facility
- **Generator-to-Load Distribution Factor: (GLDF)** Algebraic sum of a GSF and Load Shift Factor to determine the total impact of an interchange transaction on an identified transmission facility

## Definitions:

- **Load Shift factor: (LSF)** Factor applied to a load's expected change in demand to determine the amount of flow contribution that change in demand will impose on an identified transmission facility
- **Curtailment Threshold: Minimum Transfer Distribution Factor** which, if exceeded, will subject an interchange transaction to curtailment to relieve a transmission facility constraint
- **Firm Transmission Service:** Highest priority service offered to customers under a filed rate schedule that anticipates no planned interruption
- **Non-Firm Transmission Service:** Reserved on an as-available basis and subject to curtailment/interruption

## Definitions:

- Reallocation: The total or partial curtailment of transactions during a TLR Level 3a or 5a to allow transactions using higher priority to be implemented
- Network Integration Transmission Service: Allows a customer to integrate, plan, economically dispatch, and regulate its network reserves in a manner that compares to how a Transmission Owner serves its Native Load or end-use customers

## Purpose:

- To ensure that each Reliability Coordinator's operations are coordinated such that they will not have an Adverse Reliability Impact on other Reliability Coordinator areas and to preserve the reliability benefits of interconnected operations

## Applicability:

- Reliability Coordinators

## Requirements:

- Coordinator shall have operating procedures, processes, or plans in place for activities that require notification, information exchange, or coordination of actions with other RC's to support Interconnection reliability
- The procedures, processes, or plans shall address scenarios that affect other areas as well as those developed in coordination with other RC's and shall include, as a minimum, the following:
  - Communications and notifications
  - Energy and capacity shortages

## Requirements:

- Planned or unplanned outage information
- Voltage control, including the coordination of reactive resources
- Coordination of information exchange to support reliability assessments
- Authority to act to prevent and correct instances of causing Adverse Reliability Impacts to other areas

## Requirements:

- Each Coordinator's operating procedure, process, or plan that requires one or more other RC's to take action shall be:
  - Agreed to by all Coordinators and distributed to all Coordinators required to take the indicated action
- Each Coordinator's operating procedure, process, or plan developed to support a RC-to-RC procedure, process, or plan shall include:
  - Reference to the associated procedure, process, or plan
  - Agreed-upon actions from the associated procedure, process, or plan

## Requirements:

- Each of the operating procedures, processes, and plans addressed in this Reliability Standard shall:
  - Include a version control number or date
  - Include a distribution list
  - Be reviewed, at least once every three years, and updated if needed

## **Purpose:**

- To ensure that each Reliability Coordinator's operations are coordinated such that they will not have an Adverse Reliability Impact on other RC areas and to preserve the reliability benefits of interconnected operations

## **Applicability:**

- Reliability Coordinators

## **Requirements:**

- Coordinator shall make notifications to other Coordinators of conditions in its area that may impact other areas

## Requirements:

- Coordinator shall participate in agreed-upon conference calls and other communication forums with adjacent Reliability Coordinators
  - Frequency of the conference calls shall be agreed upon by all involved RC's and shall be at least weekly
- Coordinator shall provide reliability-related information as requested by other Reliability Coordinators

## Purpose:

- To ensure that each Reliability Coordinator's operations are coordinated such that they will not have an Adverse Reliability Impact on other RC areas and to preserve the reliability benefits of interconnected operations

## Applicability:

- Reliability Coordinator

## Requirements:

- A Coordinator that identifies a potential, expected, or actual problem that requires the actions of one or more RC's shall contact the other RC's to confirm that a problem exists and discuss options and decide upon a solution to prevent or resolve the problem

## Requirements:

- If the involved Coordinators agree on the problem and the actions to take to prevent or correct the condition, each involved Coordinator shall implement the agreed-upon solution, and notify the other RC's
- If the involved Coordinators cannot agree, each RC shall re-evaluate the causes of the disagreement
  - Time permitting, this re-evaluation shall be done before taking corrective actions
  - If time does not permit, then each RC shall operate until the conflicting system status is resolved

## Requirements:

- If the involved RC's cannot agree on a solution, the more conservative solution shall be implemented
- The Coordinator shall document, through operator logs or other data sources, its actions taken for either the event or for the disagreement on the problems or both

- All entities within the Eastern Interconnection are required to provide information to their Reliability Coordinator on a daily basis for system studies by what time?
  - a) 1300 PST
  - b) 1200 CST
  - c) 1100 PST
  - d) 1400 CST

- If, at 1445, a Balancing Authority discovers that a single contingency will cause a severe overload on a tie-line facility, according to NERC policy, by what time is the Balancing Authority required to have mitigated this Operating Security Limit Violation?
  - a) 1600
  - b) 1545
  - c) 1500
  - d) 1745

- Who is responsible for initiating a NERC Transmission Loading Relief procedure?
  - a) Transmission Operator
  - b) Generation Operator
  - c) Transmission Service Provider
  - d) Reliability Coordinator

- Attention to parallel flows is important so that no control area places undue burden on an adjacent control area.  
True or False?
  - a) True
  - b) False

- Reliability Coordinator next day study results shall be shared with other Reliability Coordinators by what time?
  - a) 1200 Eastern
  - b) 1500 Eastern
  - c) 1200 Central
  - d) 1500 Central

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# Questions ???