Functional Entity Roles and Responsibilities

NWPP MC Phase 3
Operations Integration Work Group

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1. **Purpose**

This document summarizes the roles and responsibilities of registered entities as they relate to the Balancing, Generator Operation, Transmission Operations, Transmission Service and Reliability Operations functions and describes certain aspects of the relationships between these functional entities. This document will serve as a reference source for various NWPP MC work groups to use when developing other project documentation.

2. **Roles and Responsibilities of Functional Entities**

The *NERC Reliability Functional Model Version 5* and *Reliability Standards for the Bulk Electric Systems of North America* describe the roles and responsibilities of a Balancing Authority (BA), Generator Operator (GOP), Reserve Sharing Group (RSG), Transmission Operator (TOP), Transmission Service Provider (TSP) and Reliability Coordinator (RC) as follows:

2.1. **Balancing Authority (BA)**

The BA’s mission is to maintain the balance between loads and resources within its BA Area by keeping its actual Interchange equal to its scheduled Interchange and meeting its Frequency Bias obligation. Key BA responsibilities include but are not limited to:

- Formulating an operational plan (generation commitment, outages, etc.) for reliability evaluation (this includes reviewing generation commitments, dispatch and load forecasts).
- Coordinating current-day, next-day and seasonal operations with neighboring BAs and TOPs and with its RC (including coordination of scheduled outages).
- Planning to meet scheduled system configuration, generation dispatch, Interchange scheduling and demand patterns; unscheduled changes in system configuration and generation dispatch (minimum N-1 Contingency planning) in accordance with mandatory reliability standards and local requirements; and capacity, energy, voltage and reactive reserve requirements.
- Operating within Interconnection Reliability Operating Limits (IROL) and System Operating Limits (SOL).
- Knowing the status all generation and transmission resources available for use and monitoring system frequency, applicable transmission line status, Real and Reactive Power flows, voltage, load-tap changer settings and the status of rotating and static reactive resources.
- Calculating Area Control Error (ACE) for the BA Area and maintaining the minimum Operating Reserve required to maintain load-interchange-generation balance within the
BA Area and comply with Control Performance Standard (CPS) and Disturbance Control Standard (DCS).\(^1\)
- Participating in manual Time Error Corrections.
- Approving Arranged Interchange and implementing Confirmed Interchange.
- Determining the need for and deploying reliability-related services.
- Providing balancing and energy accounting (including hourly checkout of Confirmed Interchange, Implemented Interchange and actual Interchange) and administering inadvertent energy paybacks.
- Notifying its RC and other potentially affected BAs and TOPs of any condition that could threaten reliability of its BA Area or when firm loading shedding is anticipated.
- Developing, maintaining and implementing Operating Plans, Procedures and Processes as required to mitigate operating emergencies on the transmission system and insufficient generating capacity (includes coordination with adjacent/impacted entities).
- Providing TOPs, other BAs and its RC with data and information required to perform operational reliability assessments and coordinate reliable operations (real-time system status points, forecasting and outage information, etc.).

BAs must comply with reliability directives issued by an RC or TOP unless such actions would violate safety, equipment, regulatory or statutory requirements. BAs may direct GOPs and Load-Serving Entities (LSE) to take actions necessary to ensure balancing in real time; TOPs to reduce voltage or shed load if needed to ensure balance within its BA Area; and GOPs to re-dispatch generation for congestion management as directed by an RC.

### 2.2. Generator Operator (GOP)

GOPs are responsible for operating generating unit(s) and supplying certain energy and reliability related services. Key GOP responsibilities include but are not limited to:
- Formulating a daily generation plan and providing generation commitment data to the BA.
- Coordinating (where confidentiality agreements allow) current-day, next-day and seasonal operations with its Host BA and TSP.
- Providing operating/availability status of generating units to the Host BA and TOP(s) for reliability analysis (includes outage information and forecast of expected power output to assist in operations planning if requested).
- Operating generators to provide Real and Reactive Power or reliability-related services per contracts or arrangements (includes operating in automatic voltage control mode

\(^1\) For BAs that received a waiver of CPS2 compliance requirement for participation in the Reliability-Based Control (RBC) field trial, this includes operating within established BA ACE Limits (BAAL).
when possible and maintaining generator voltage and Reactive Power schedules as
directed).

- Monitoring the status of generating facilities and reporting changes to
  operating/availability status of units and related equipment such as automatic voltage
  regulators to the Host BA and TOPs.
- Supporting Interconnection frequency.
- Developing procedures for Blackstart Resources and agreements with applicable TOP(s)
  to specify terms and conditions for use of Blackstart Resources during system
  restoration events.
- Complying with reliability directives issued by the RC or a TOP unless such actions would
  violate safety, equipment, regulatory or statutory requirements.

2.3. Reserve Sharing Group (RSG)

An RSG consists of two or more BAs that collectively maintain, allocate and supply Operating
Reserves required for each BA’s use in recovering from contingencies within the group. The
NERC Functional Model does not recognize reserve sharing as a separate function but considers
it a business arrangement among organizations to change how a function is performed. The key
responsibilities of an RSG are captured in NERC Standard BAL-002-1 – Disturbance Control
Performance.

2.4. Transmission Operator (TOP)

Each TOP is responsible for the real-time operating reliability of the transmission assets under its
purview and has authority to take the actions necessary to ensure its TOP Area operates
reliability. Key TOP responsibilities include but are not limited to:

- Coordinating current-day, next-day and seasonal operations with neighboring BAs and
  TOPs and with its RC (including coordination of scheduled outages).
- Knowing the status all generation and transmission resources available for use and
  monitoring system frequency, applicable transmission line status, Real/Reactive Power
  flows, voltage, load-tap changer settings and the status of rotating and static reactive
  resources.
- Monitoring the status of and deploying transmission assets within the TOP Area
  (including associated equipment such as protective relaying systems, Special Protection
  Schemes, etc.).
- Establishing SOLs and Total Transfer Capabilities (TTC) and operating within those limits
  and established IROLs.
- Calculating Available Transfer Capacity (ATC) or Available Flowgate Capacity (AFC).
- Deploying reactive resources within the TOP Area to maintain transmission voltage
  within defined limits (including established reactive margins).
• Notifying its RC and impacted TOPs of generation and transmission facility outages that occur within its area and coordinating the impact of removing such facilities from service.

• Taking immediate actions to alleviate operating emergencies including curtailing transmission service or energy schedules, operating equipment, shedding firm load, etc. (includes providing emergency assistance as requested unless such actions would violate safety, equipment, regulatory or statutory requirements).

• Notifying its RC and potentially affected BAs and TOPs of any condition that could threaten the reliability of its TOP Area or when firm loading shedding is anticipated.

• Providing BAs, other TOPs and its RC with data and information required to perform operational reliability assessments and coordinate reliable operations (real-time system status points, outage information, etc.) This includes notification of degradation to Special Protection Schemes

• Developing agreements with applicable GOPs to specify terms and conditions for use of Blackstart Resources during system restoration events.

• Developing, maintaining and implementing Operating Plans, Procedures and Processes as required to provide for transmission reliability during normal system conditions and to mitigate operating emergencies as they occur on the transmission system (includes coordination with adjacent/impacted entities).

TOPs must comply with reliability directives issued by an RC unless such actions would violate safety, equipment, regulatory or statutory requirements. TOPs may issue reliability directives to BAs, GOPs, DPs and LSEs as necessary to maintain reliable system operations.

2.5. Transmission Service Provider (TSP)

TSPs administer transmission tariffs and provide Transmission Service to Transmission Customers under applicable service agreements. Key TSP responsibilities include but are not limited to:

• Coordinating current-day, next-day and seasonal operations with its TOP(s).

• Calculating ATC or AFC values using the methodology selected by its TOP(s) (known SOLs and IROLs within its area and neighboring areas must be included in the determination of transfer capabilities in accordance with filed tariffs and regional processes).

\[\text{2 In accordance with NERC Standard EOP-005-2 – System Restoration for Blackstart Resources, each TOP must have a restoration plan approved by its RC. Following a disturbance in which one or more areas of the Bulk Electric System (BES) shuts down and the use of Blackstart Resources are required to return the system to normal.}\]
• Confirming Transmission Service arrangements associated with Arranged Interchange have adjacent TSP connectivity, are valid and prevailing transmission system limits will not be violated.
• Complying with reliability directives issued by an RC or TOP unless such actions would violate safety, equipment, regulatory or statutory requirements.

2.6. Reliability Coordinator (RC)

The RC is responsible for maintaining the real-time operating reliability of its RC Area. The RC must identify operating conditions that require mitigation, coordinate mitigating actions amongst affected entities and direct corrective action as required. Key RC responsibilities include but are not limited to:

• Conducting next-day reliability analyses for its RC Area to ensure the Bulk Electric System (BES) can be operated reliability in anticipated normal and emergency conditions.
• Monitoring Interconnection frequency and BA performance to identify large ACE contributing to Frequency Error, Time Error or Inadvertent Interchange and determining corrective action (includes issuing directives to comply with CPS/DCS or return ACE within acceptable bounds).
• Monitoring each BA’s Operating Reserve to ensure the required amount is available to meet CPS/DCS and identifying actual or potential Capacity and Energy Emergencies (includes directing BAs to arrange for assistance and issuing Energy Emergency Alerts for deficient entities).
• Monitoring IROLs and SOLs to identify an actual or expected exceedance and determining viable mitigating actions (includes implementing Operating Plans, Procedures or Processes to prevent an IROL exceedance and directing corrective actions required to alleviate SOL/IROL violations).
• Monitoring the current status of BES elements (transmission or generation including critical auxiliaries such as Automatic Voltage Regulators and Special Protection Systems) and system loading (this includes monitoring post-Contingency element conditions to identify credible contingency events that could result in an SOL/IROL violation).
• Monitoring Reactive Reserve levels to identify deficiencies and determining corrective action.
• Monitor Interconnection-wide transmission load relief procedures (includes actively or passively approving requests for Step 4 or greater of the WECC Unscheduled Flow Relief Procedure).
• Initiating manual Time Error Corrections.
• Coordinating transmission and generation outages with impacted TOPs, BAs and GOPs as needed to maintain reliable system operation (includes resolving potential conflicts).
• Monitoring and coordinating system restoration activities including resynchronization of major system islands and restoring normal operations following events that result in system separation or islanding (this includes serving as the primary contact for disseminating information to neighboring RCs and BA and TOPs not immediately involved in the restoration activities).

• Issuing alerts to impacted BAs and TOPs without delay upon foreseeing a transmission problem (SOL/IROL violation, loss of reactive reserve, etc.) and disseminating information received from other RCs to entities within the RC Area as necessary.

• Developing, maintaining and implementing Operating Plans, Procedures and Processes as required to mitigate operating emergencies on the transmission system and insufficient generating capacity.

The RC may issue reliability directives to BAs, TOPs and GOPs to take immediate action as necessary to preserve the integrity and reliability of the BES. These entities must comply with reliability directives issued by the RC unless such actions would violate safety, equipment, regulatory or statutory requirements.

3. Relationships between Functional Entities

The relationships between registered entities as they relate to the Balancing, Transmission Operations, Generator Operation, Interchange and Transmission Service functions can be summarized as follows:

3.1. Balancing Operations

The BA and RC functions each have a role in maintaining generation-demand balance. Each BA is responsible for integrating resource plans ahead of time, maintaining load-interchange-generation balance within its BA Area and supporting Interconnection frequency. Every generator, transmission facility and end-use customer is in a BA Area. The RC must ensure that the generation-demand balance is maintained within its RC area, which, in turn, ensures that Interconnection frequency remains within acceptable limits.

BAs must coordinate with the following functional entities to perform their respective duties:

• **Balancing Authority to Balancing Authority** – BAs must develop agreements with adjacent BAs for ACE calculation parameters; confirm Implemented Interchange and Confirmed Interchange with adjacent BAs after the hour for checkout; and provide information to and receive information from adjacent BAs as requested to monitor and assess system reliability.

• **Balancing Authority and Generator Operator** – the BA receives operating/availability status of generating units and operational plans and commitments from GOPs within its BA Area (includes annual maintenance plans). The BA also acquires reliability-related services from the GOP.
- **Balancing Authority and Generator Owner (GO)** – the BA receives annual maintenance plans and generator information from GOs within its BA Area.

- **Balancing Authority and Load-Serving Entity** – the BA receives load forecasts and information on self-provided reliability services from LSEs within its BA Area. The BA also implements generator commitment and dispatch schedules received from LSEs and coordinates use of each LSEs controllable loads.

- **Balancing Authority and Reliability Coordinator** – the BA receives reliability evaluations from its RC and notification of transmission problems that may adversely impact its BA Area. The BA submits integrated operational plans to its RC for reliability evaluation and provides the RC with data and information requested to monitor and assess system reliability.

- **Balancing Authority and Transmission Operator** – the BA provides information to and receives information from TOPs as requested to monitor and assess system reliability.

- **Balancing Authority and Transmission Service Provider** – the BA receives loss allocations from the TSPs.

### 3.2. Transmission Operations

The TOPs and RC have similar roles in ensuring the transmission system is operated in a reliable manner. Each TOP is responsible for its own defined area. The RC is responsible for the Interconnection as a whole.

TOPs must coordinate with the following functional entities to perform their respective duties:

- **Transmission Operator to Transmission Operator** – the TOP must coordinate with other TOPs to develop agreements for joint transmission facilities and exchange the information required to monitor and assess system reliability.

- **Transmission Operator and Balancing Authority** – the TOP provides information to and receives information from BAs as requested to monitor and assess system reliability and coordinates with the BA(s) as necessary to mitigate transmission limit exceedances.

- **Transmission Operator and Generator Operator** – the TOP notifies GOPs of transmission system problems that may affect generator operations.

- **Transmission Operator and Generator Owner** – the TOP receives maintenance requirements and construction plans/schedules from the GO. The TOP develops TTCs and SOLs based on facility information received from the GO and deploys reactive resources for GOs to maintain acceptable voltage profiles.

- **Transmission Operator and Reliability Coordinator** – the TOP receives reliability evaluations from its RC and notification of transmission problems that may adversely impact its TOP Area. The TOP also submits integrated operational plans to its RC for reliability evaluation and provides the RC with data and information requested to monitor and assess system reliability.

- **Transmission Operator and Transmission Owner** – the TOP receives maintenance requirements and construction plans/schedules from the TO. The TOP develops TTCs
and SOLs based on facility information received from the TO and deploys reactive resources for TOs to maintain acceptable voltage profile.

- **Transmission Operator and Transmission Service Provider** – the TOP provides the TSP with TTC and SOLs and coordinates ATC with the TSP.

### 3.3. Generation Operations

The GOP function is responsible for operating generating unit(s) and supplying information to the BA, TOP and RC as required to perform the Balancing and Transmission Operations functions.

GOPs must coordinate with the following functional entities to perform their respective duties:

- **Generator Operator and Balancing Authority** – the GOP provides unit commitment schedules, generator status and operating/availability status of generating units to the BA.
- **Generator Operator and Generator Owner** – the GOP receives maintenance and performance verification schedules from the GO and develops operating and unit commitment plans based on the scheduled received.
- **Generator Operator and Purchasing-Selling Entity (PSE)** – the GO receives notice of Arranged Interchange approved by the PSE.
- **Generator Operator and Reliability Coordinator** – the GOP provides the RC with annual maintenance plans and operational data as requested.³
- **Generator Operator and Transmission Operator** – the GOP provides reliability-related services through arrangements or by direction from the TOP. The GOP provides maintenance schedules, generator status and Automatic Voltage Regulator (AVR) status to the TOP and receives notification of transmission system problems that may affect its generator(s) from the TOP.

### 3.4. Transmission Services

The TSP authorizes use of the transmission system under its authority and provides Transmission Service to Transmission Customers (e.g. PSEs, GOs, LSEs) under applicable service agreements with transmission information supplied by the Interchange Coordinator. The TSPs receive TTCs, SOLs and IROLs from other functional entities (RC, TOP, PC) and coordinates ATC with those entities and other TSPs; approve or deny transmission service requests from PSEs, LSEs and GOs; confirm validity of transmission service requests indicated in the Arranged Interchange with Interchange Coordinators; and receive final approval or denial of Arranged Interchange.

³ The NERC Reliability Functional Model Version 5 identifies the Generator Operator as providing operational data to and receiving reliability analyses from the Reliability Coordinator. The Peak Reliability Coordinator Data Request and Specifications for Data Provision dated February 13, 2014 states, “The RC recognizes that IRO-010-1a requires that BAs, TOPs, TOs, GOPs, GOs, and LSEs provide data to the RC. The RC data request under IRO-010-1a continues to request data from TOPs and BAs and it is expected that the other responsible entities are already providing the required data to their respective BAs and TOPs.”
Interchange from the Interchange Coordinator. TSPs also receive confirmed Interchange implementation including curtailments) from the Interchange Coordinators.

The following diagram was taken from the NERC Reliability Functional Model Version 5.
## Glossary of Acronyms

<table>
<thead>
<tr>
<th>ACRONYM</th>
<th>DEFINITION</th>
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<tbody>
<tr>
<td>ACE</td>
<td>Area Control Error</td>
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<td>AFC</td>
<td>Available Flowgate Capability</td>
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<td>AGC</td>
<td>Automatic Generation Control</td>
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<td>ATC</td>
<td>Available Transfer Capability</td>
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<td>AVR</td>
<td>Automatic Voltage Regulator</td>
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<td>BA</td>
<td>Balancing Authority</td>
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<td>BAAL</td>
<td>BA ACE Limit</td>
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<td>BES</td>
<td>Bulk Electric System</td>
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<td>CPS</td>
<td>Control Performance Standard</td>
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<td>DCS</td>
<td>Disturbance Control Standard</td>
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<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
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<td>GO</td>
<td>Generator Owner</td>
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<td>GOP</td>
<td>Generator Operator</td>
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<td>IROL</td>
<td>Interconnection Reliability Operating Limit</td>
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<tr>
<td>LSE</td>
<td>Load-Serving Entity</td>
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<td>NERC</td>
<td>North American Electric Reliability Corporation</td>
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<td>NWPP</td>
<td>Northwest Power Pool</td>
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<tr>
<td>Acronym</td>
<td>Definition</td>
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<tr>
<td>OIWG</td>
<td>Operations Integration Work Group</td>
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<td>PSE</td>
<td>Purchasing-Selling Entity</td>
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<td>Reserve Sharing Group</td>
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<td>Total Transfer Capability</td>
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