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## About this document

- This document describes interaction with the ISO-NE implementation of GEV's LEP (General Electric Vernova's Limit Exchange Portal), utilizing the TROLIE (Transmission Ratings and Operating Limits Information Exchange) API specification. This document describes the background about how the data in LEP is constructed which ultimately impacts what is present in LEP and used to create API calls/queries.
- This guide is based on TROLIE Version 1.0.3 and LEP API Version 1.3.0 [this is the version associated with LEP release 25R04].
  - Link to TROLIE Version specifications "<u>https://trolie.energy/spec-1.0</u>"
  - The LEP API version is the TROLIE Version plus customizations and items outside of the TROLIE specifications.
- The ISO-NE website project page will contain modified version of ISO-NE documentation for 881 under the "Technical Documentation, Rules, and Procedures" section.
  - If an updated version of that document does **not** exist, the currently approved version is provided.
  - Link: "<u>https://www.iso-ne.com/participate/support/participant-readiness-outlook/ferc-order-no-881-</u> <u>mtlr#technical-documentation-4</u>"
- For questions submit them via ASK ISO process: <u>https://askiso.iso-ne.com</u>

## Change Summary

Rev. No.	Date	Comments
1.0	06/24/2025	Initial user guide for the release of LEP-Operations 25R05

### Scope

- This document is intended to be used by ISO-NE employees, Equipment Owners, and other parties with valid LEP access as an aid in interacting with and developing interfaces to access ISO-NE implementation of LEP.
- The following topics are covered by this document:
  - $\circ$  Relationship between NX Application forms, ISO-NE's network model, and models deployed to LEP
  - Actions required to request access and a description on how users will authenticate with ISO-NE's implementation of LEP
  - Description of the data that needs to be entered by a Ratings Provider
  - Identification of parameters used in LEP REST API requests
  - o Guidelines for creating a commonly used API submission (entering data into LEP)
  - $\circ$   $\;$  Get effective rating snapshots from LEP  $\;$
  - Navigating and using the LEP UI
  - Retrieving historical data from LEP-Historian
  - List of the API End Points

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

### Terms

- AAR: acronym meaning <u>A</u>mbient <u>A</u>djusted <u>R</u>atings
- API: acronym meaning <u>Application Programming Interface</u>
- CAMS: <u>Customer and Asset Management System application</u>
- Clearinghouse Provider: is the entity that creates Effective Ratings Snapshots.
- HTTP: acronym meaning <u>Hypertext Transfer Protocol</u>
- HTTPS: acronym meaning <u>Hypertext Transfer Protocol Secure</u>
- HTTP header: a key-value pair that carries metadata about an HTTP request or response
- JSON: acronym meaning <u>JavaScript</u> Object <u>Notation</u>
- LEP: Limit Exchange Portal application(s)
  - LEP-Operational: this portion of LEP is where parties will mainly interact with to provide data and harvest data.
  - LEP-Historian: this portion of LEP is only written to by LEP-Operational with the sole purpose of data retention.
- LEP UI: LEP includes a web user interface that acts as a supplement to the APIs. It can be used for certain manual data entry tasks as well as monitoring and manual intervention.
- Network Segment: a.k.a. Segment this represents an individual piece of equipment associated with a single NX9 Form. This is the level that ratings are submitted against via Proposals.
- Proposals: these are the seasonal, forecasted, or real time rating values submitted to LEP by the Ratings Provider for a Network Segment. These are inputs into the process for determining the Effective Rating for a Transmission Facility based on the model uploaded to LEP.
- Ratings Provider: This is a software specific term that identifies who has the obligation of entering in data to LEP. This is modeled based on the approved NX9 form's Participant ID field, which aligns with the CAMS Customer ID filed, for a Segment.
  - $\circ$   $\;$  This is called "provider" in the REST API  $\;$
- REST: acronym meaning <u>Representational State Transfer</u>
- SA: acronym meaning <u>Security Administrator in CAMS</u>
- Snapshots: these are the Effective Ratings for Transmission Facilities that were determined based on the submitted proposals and recourse rating hierarchy. There are three different snapshot options Real Time, Forecast, and Seasonal.
- Transmission Facility: a.k.a. Element this is made of up one or more Network Segments. This record holds the Effective Ratings that are determined by the Clearinghouse Provider and are used in Snapshots.
- UUID: acronym meaning Universally Unique Identifier

# NX Application forms, ISO-NE's network model, and models deployed to LEP

- The NX Application will act as an equipment registration system where NX9 Forms are created based on the requirements of ISO-NE's Operating Procedure No. 16 (OP-16) document.
  - Link "<u>https://www.iso-ne.com/participate/support/participant-readiness-outlook/ferc-order-no-881-</u> mtlr#technical-documentation-4"

ISO new england	ISO New England Limit Exchange Portal (LEP) User Guide	
©2025	Rev # 1.0	Effective Date: 06/24/2025

• Upon the creation of a new NX9 Form an Equipment Reference Number is created that never changes for the life of that piece of equipment via that form. Even when a revision is made, the Equipment reference Number will remain unchanged. The Equipment Reference Number can be determined via an Equipment Search.

NOTE: In the 881 version of the NX Application the Equipment Reference Number will be displayed on the NX9 Form.

- The data presented in LEP is based on models that are deployed to LEP. For ISO-NE's implementation of LEP there will be 3 sources for model submission, two of the models are created and deployed by ISO-NE.
  - 1. Equipment that requires an NX9 form submitted based on ISO-NE's OP-16 and is represented in the ISO-NE Network Model.
    - a. This model comes directly from an export of an EMS application model.
    - b. The associated Model Authority Set is:
      - i. Sandbox: ISONE
      - ii. Production: <<will enter later>> (possible name: ISONE-Modeled)
  - 2. Equipment that requires an NX9 form submitted based on ISO-NE's OP-16, but it is **not** represented in the ISO-NE Network Model.
    - a. This model will be based on the NX9 forms that are not a part of the ISO-NE Network Model
    - b. The associated Model Authority Set is:
      - i. Sandbox: <<will enter later>>
      - ii. Production: <<will enter later>> (possible name: ISONE-Not\_Modeled)

NOTE: the capability to upload a model of this nature into LEP does **not** work and is **not** expected to work until late 2025.

3. Local Transmission Service: this is fully done by the applicable Transmission Owner. A unique Model Authority Set would be created by the system for the Ratings Provider upon upload of an LTS model into LEP.

## Access and Authentication for LEP

- Authentication to LEP is based on the utilization of Digital Certificates, this is like the access to the NX Application.
- Access is controlled by a Companies SA and the assignment of roles in CAMS.
- Currently there are two roles that can be assigned in CAMS by the SA for LEP:
  - Power System Limits Exchange Portal Sandbox / Submitter submits ambient adjusted ratings (AARs) compliant with FERC Order No. 881 requirements. [I believe that it is not just AARS, but all data. Will need to work with LEP Team to get clarification]
  - 2. Power System Limits Exchange Portal Sandbox / Viewer views submitted ambient adjusted ratings (AARs). [I believe that it is not just AARS, but all data. Will need to work with LEP Team to get clarification]
- The ssl-client-cert HTTP header must contain the entire PEM certificate string, including the -----BEGIN CERTIFICATE----- and -----END CERTIFICATE----- delimiters.

# Description of the data that needs to be entered into LEP by a Ratings Provider

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

Always required to be entered:

- Reasonability Limits: The Low and High Reasonability Limit values entered are used to perform an automatic validation of all rating data in LEP and are written to EMS software to perform an automatic validation of rating data in EMS software. This is used to meet the "general validation system" requirement contained in FERC Order 881.
  - Low Reasonability Limit: required to be entered for a Network Segment before any ratings are entered.
    - Must be greater than 0 and less than the High Reasonability Limit.
    - This represents the lowest rating value that LEP and EMS will accept for that Network Segment.
  - High Reasonability Limit: required to be entered for a Network Segment before any ratings are entered.
    - Must be greater than the Low Reasonability Limit.
    - This represents the highest rating value that LEP and EMS will accept for that Network Segment.
- Nominal Ratings updates: This is the last recourse rating and would be used if no other ratings (e.g., seasonal, forecast) are provided for the Network Segment. Initial Nominal Ratings are provided via the associated NX9 form. Updates to Nominal Ratings are entered into LEP.
  - $\circ$   $\;$  Values must be between Low & High Reasonability Limits and met nesting requirements:
    - Low Reasonability Limit < Normal < LTE < STE < DAL < High Reasonability Limit</p>
- AAR Exemption status: by default, all Network Segments are set to "not-exempt". If the Ratings Provider identifies that a
  Network Segment is **not** applicable to the AAR requirements of FERC Order 881, they will set the Network Segment as
  "exempt" and provide a reason why it is exempt. See Section IV.D Exceptions and Alternate Ratings within the FERC
  Order for more information.
  - If a Network Segment is marked as "exempt", the AAR Exempt status will need to be evaluated at lease every 5 years. A "re-evaluation" date is automatically generated for a Network Segment upon being set as "exempt" or "re-approved".
- Seasonal Ratings: there are 12 Seasons, one for each month.
  - Network Segments with an identified companion element (e.g., ratings for Line X with Line Y in service or out of service), as specified on the associated NX9 form, will have Conditional Seasonal Ratings. Conditional Seasonal Ratings API submissions are not defined in the TROLIE standard specifications, they follow a LEP specification that is detailed in this document.
  - $\circ$  Values must be between Low & High Reasonability Limits and met nesting requirements:
    - Low Reasonability Limit < Normal < LTE < STE < DAL < High Reasonability Limit
- Scenario Ratings: these are the rating sets that will be used by ISO-NE Planning (Study\_Case\_1) and ISO-NE Operations Support Services (Study\_Case\_2) for TOG verification work.
  - $\circ$  Values must be between Low & High Reasonability Limits and met nesting requirements:
    - Low Reasonability Limit ≤ Normal ≤ LTE ≤ STE ≤ DAL ≤ High Reasonability Limit
  - The specifics for these are found in 881 version of PP7. Link "<u>https://www.iso-ne.com/participate/support/participant-readiness-outlook/ferc-order-no-881-mtlr#technical-documentation-4</u>"

ISO new england	ISO New England Limit Exchange Portal (LEP) User Guide	
©2025	Rev # 1.0	Effective Date: 06/24/2025

- Temporary AAR Exceptions: a.k.a. Temporary Ratings a temporary rating would be provided when a condition arises that requires the use of a rating that is not the typical a forecast ratings (AAR) or current seasonal rating for a Network Segment. See Section IV.D Exceptions and Alternate Ratings within the FERC Order for more information.
  - A start date & time and reason are required to create a Temporary Rating. An end date & time is not required when initially creating a Temporary Rating entry, but it can be entered if known.
  - $\circ$   $\:$  Values must be between Low & High Reasonability Limits and met nesting requirements:
    - Low Reasonability Limit < Normal < LTE < STE < DAL < High Reasonability Limit
  - Examples of conditions that could warrant the entry of a Temporary Rating:
    - A de-rate is required due to an issue identified
    - A cable has a Heat Exchanger placed in service
    - A change in flow speed/GMP
    - For an outage with a change in topology that impacts the ratings that should be used (e.g., a terminal breaker is opened, a companion cable is out of service, a device by-pass is being used)

Only required if AAR submission is required (e.g., the Network Segment is not-exempt):

- Forecast Ratings: refers to the 72-hour-ahead forecasted AAR data set mandated by FERC Order 881. While this is a forecast of ratings as they would be in real-time, in practice these are often used for various processes involved in day-ahead markets, other look-ahead resource commitment processes, Total Transfer Capability Thermal calculations for specific Interfaces, and outage coordination.
  - This function would be used for a Network Segment that is required to provide AAR ratings.
  - Values must be between Low & High Reasonability Limits and met nesting requirements:
    - Low Reasonability Limit < Normal < LTE < STE < DAL < High Reasonability Limit</p>
- Real-Time Ratings: refers to the ratings that are provided for the current hour.
  - $\circ$  This function would be used for a Network Segment that is required to provide AAR ratings.
  - Values must be between Low & High Reasonability Limits and met nesting requirements:
    - Low Reasonability Limit < Normal < LTE < STE < DAL < High Reasonability Limit

# Identification of parameters used in LEP REST API requests

- "provider": This identifies the Ratings Provider or Clearinghouse Provider for the associated object. For Ratings Providers this is the Participant ID associated with the Participant on the NX9 form, this ID number ultimately comes from the CAMS Customer ID field.
- "last-updated": indicates the wall-clock time at the "provider" when the object was last modified. This is not the time of sending or receiving.
- "origin-id": is the identifier used by the "provider" to uniquely identify the source of the object. This was initially created with the idea that a URI would be used, but it is not required. A Uniform Resource Identifier is a string of characters that identifies a resource, whether it is a web page, a file, or even an abstract concept, and can include a name, a location, or both.
  - Recommendation is to use an "orign-id" that aligns with the process you used to submit for that API.

Rev. 1.0

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

- For Forecast Proposals: this time should matchup with the first "period-start" time
- For Real-Time Proposals: this time should align with the current hour using GMT Offset
- Snapshots: This section will be completed at a later date after Snapshot functionality is enabled.
- "default-emergency-durations": this can be determined using "{{lep-url}}/reference-data/emergency-durations"



NOTE: must use capital letters as shown above.

- "resource-id": defined under "X-LEP-NAME-TYPE". It is currently set to "NETMOMCompositeId"
  - Found using
    - API: "{{lep-url}}/reference-data/network-segments"
    - UI: "Aliases" section on the "Network Segments" display "Details" tab
  - The "resource-id" items that can be used:
    - NETMOMCompositeId: this is the combination of the parent Transmission Facility NETMOMCompositeID, a period, and the ISOEquipID. This was done to create a unique "NETMOMCompositeId" for each Network Segment.
      - Due to the changes made by GE to incorporate the ISOEquipID, these are now unique for all Network Segments. ISO-NE recommends the use of NETMOMCompositeId as the "resource-id"
    - NX\_ERN: this contains the NX9 Equipment Reference Number
      - This can be used as the "resource-id", but without manipulating this value there will be duplicate values for:
        - Equipment with topology modeling (e.g., terminal breaker out ratings)
        - Three winding transformers
           NOTE: ISO-NE is currently looking at ways to make this unique even for the situations noted above.
    - ParticipantEquipID: this contains what was entered in the "Participant Equip ID" field on the NX9 form.
    - ISOEquipId: this contains a unique identifier for each Network Segment.
    - CIMMRID: This contains the master resource identifier of the object in the associated IEC CIM IdentifiedObject
- "authority": this is the name of the Model Authority Set.
  - The names of the Model Authority Sets can be identified by using {{lep-url}}/reference-data/model-authoritysets
  - For each Network Segment this can be identified using the line item "model-authority-set-name" when "{{lepurl}}/reference-data/network-segments" is used.

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

- "condition-name": this is **not** typically used and is only used in a seasonal proposal script for a Network Segment that has "altering-conditions" modeled.
  - The "altering-conditions" can be identified via:

0

 $\cap$ 

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- UI: "Basic Information" section on the "Network Segments" display "Details" tab.
  - What you would see if that Network Segment does **not** have an "altering-conditions" modeled:



• What you would see if that Network Segment **does** have an "altering-conditions" modeled:

```
Altering condition
143 with 142 In,143 with 142 Out
```

- API: "{{lep-url}}/reference-data/network-segments" on the "altering-conditions" row for that segment.
  - What you would see if that Network Segment does **not** have an "altering-conditions" modeled:

```
"altering-conditions": [],
```

• What you would see if that Network Segment **does** have an "altering-conditions" modeled:

"alterin	g-con	ditio	ons":	]
"143	with	142	In",	
"143	with	142	Out"	
],				

• If a Network Segment has modeled "altering-conditions", then seasonal ratings are updated using Conditional Seasonal Ratings specifications.

# Guidelines for creating a commonly used API submission (entering data into LEP)

The following items are what is included in a "request":

- ".uri": This contains the API URL as specified in the TROLIE specifications
- ".header": these are key-value pairs that also provide metadata about the request. Items that can be in "headers":
  - o "X-LEP-Name-Type": this is used to define the "resource-id"
  - "Content-Type": this is the content type that is specified in the TROLIE specifications
  - "X-LEP-Active-GridOperator": this functionality can only be used by the Clearinghouse Provider to mimic a Ratings Provider [for testing purposes]
  - Other items?
- ".method": these are fundamental HTTP methods that are used in REST APIs. The currently defined methods available to be used are:
  - GET: The GET method is used to retrieve data from the server. This is a read-only method, so it has no risk of mutating or corrupting the data
  - POST: Creates a new resource on the server. It is used when submitting data to create new entries or entries.

ISO new england	ISO New England Limit Exchange Portal (LEP) User Guide	
©2025	Rev # 1.0	Effective Date: 06/24/2025

- PUT: Replaces an existing resource with new data. It's typically used when you want to update a resource entirely.
- PATCH: Partially updates an existing resource. It's used for making selective changes to specific fields of a resource.
- DEL: The DELETE method is used to delete a resource specified by its URI.

Example with explanations:

// Create HTTP request with headers
HttpRequest request = HttpRequest.newBuilder()
.uri(URI.create(apiUrI))
.header("X-LEP-Name-Type", "NETMOMCompositeId") // Required header
.header("ssl-client-cert", pemCertificate) // Attach SSL client certificate
.header("Accept", "\*/\*") // Accept all responses
.header("Content-Type", "application/vnd.trolie.rating-forecast-proposal.v1+json") // Required content type
.header("X-LEP-Active-GridOperator", "50051") // This X-LEP-Active-GridOperator header will be used only
by ISO-NE personnel
.method("PATCH", HttpRequest.BodyPublishers.ofString(jsonBody)) // PATCH request with JSON payload
.build();

Environment API URL endpoint, where {{lep-url}} will be:

- For Sandbox: https://sandboxsmd.iso-ne.com/lep-operations
- For Production: << will be entered after the production environment is created>>

Item "{id}" used in specific API URLs below means that path parameter need to be entered based on TROLIE Specs. This is the ID of the associated object, that could be the:

- UUID of an existing Temporary AAR Exception
- Resource ID for a Network Segment

### **Reasonability Limits**

- There are 2 PATCH requests that can be used:
  - 1. Single Network Segment:
    - Specific API URL for PATCH: {{lep-url}}/reference-data/network-segments/{id}
      - The ID is the "resource-id" based on the "X-LEP-Name-Type" defined in the header
    - Content Type: application/vnd.lep.network-segment-overrides.v1+json
    - This is **not** part of the TROLIE standard specifications, below is a LEP payload example:

"reasonabilityLimitLowerBoundMVA": <<value>>,
"reasonabilityLimitUpperBoundMVA": <<value>>

ISO new england	ISO New England Limit Exchange Portal (LEP) User Guide	
©2025	Rev # 1.0	Effective Date: 06/24/2025

#### 2. Multiple Network Segments

- Specific API URL for PATCH: {{lep-url}}/reference-data/network-segments
- Content Type: application/vnd.lep.network-segment-overrides-set.v1+json
- This is **not** part of the TROLIE standard specifications, below is a LEP payload example:



#### Nominal Ratings

- There are 2 PATCH requests that can be used:
  - 1. Single Network Segment:
    - Specific API URL for PATCH: {{lep-url}}/reference-data/network-segments/{id}
      - The ID is the "resource-id" based on the "X-LEP-Name-Type" defined in the header
    - Content Type: application/vnd.lep.network-segment-overrides.v1+json
    - This is **not** part of the TROLIE standard specifications, below is a LEP payload example:

1	
"nominal-ratings": {	
<pre>"continuous-operating-limit": {</pre>	
"mva": < <value>&gt;</value>	
1	
J) "emengency encypting limits", [	
emergency-operacing-iimits . [	
1	
"duration-name": "LTE",	
"limit": {	
" <u>mv</u> a": < <value>&gt;</value>	
}	
},	
{	
"duration-name": "STE".	
"limit"· {	
3	
j.	
{	
"duration-name": "DAL",	
"limit": {	
"mya": < <value>&gt;</value>	
}	
}	
l	
}	
λ,	

- 2. Multiple Network Segments
  - Specific API URL for PATCH: {{lep-url}}/reference-data/network-segments
  - Content Type: application/vnd.lep.network-segment-overrides-set.v1+json
  - This is **not** part of the TROLIE standard specifications, below is a LEP payload example:

Rev. 1.0	Page: 9 of 19	Hard Copy is Uncontrolled
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ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

"resourceId": "enter resource ID here", "nominal-ratings": { "continuous-operating-limit": { "mva": <<value>> emergency-operating-limits": [ "duration-name": "LTE", "limit": { "mva": <<value>> }, "duration-name": "STE", "limit": { "<u>mva</u>": <<value>> }, "duration-name": "DAL", "limit": { "mva": <<value>>

AAR Exemption status

- There are 2 PATCH requests that can be used:
  - 1. Single Network Segment:
    - Specific API URL for PATCH: {{lep-url}}/reference-data/network-segments/{id}
      - The ID is the "resource-id" based on the "X-LEP-Name-Type" defined in the header
    - Content Type: application/vnd.lep.network-segment-overrides.v1+json
    - This is **not** part of the TROLIE standard specifications, below is a LEP payload example for initial exemption:



- 2. Multiple Network Segments
  - Specific API URL for PATCH: {{lep-url}}/reference-data/network-segments
  - Content Type: application/vnd.lep.network-segment-overrides-set.v1+json
  - This is **not** part of the TROLIE standard specifications, below is a LEP payload example for initial exemption:



ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

NOTE: Reasonability Limits, Nominal Ratings, and AAR Exemption can be entered all in the same payload:



Seasonal Proposal

- Specific API URL for PATCH: {{lep-url}}/rating-proposals/seasonal
- For a Network Segment that **does not** have any modeled "altering-conditions", it will use the Default Seasonal Ratings Refer to the TROLIE Specs for the required payload information
  - Content type: application/vnd.trolie.seasonal-ratings-proposal.v1+json
- For a Network Segment that **does** have modeled "altering-conditions", it uses Conditional Seasonal Ratings a LEP payload requirement for this proposal with an example will be posted on the ISO-NE website project page.
  - Content type: application/vnd.lep.scenario-ratings-proposal.v1+json
- Using Zulu time (00:00:00Z) [commonly referred to Coordinated Universal Time (UTC)] works better than using an Offset (e.g., -4 or -5).
- The "period-start" and "period-end" fields contain the applicable year (YYYY) and that needs to be updated to reflect the year that season will occur in, you cannot submit for a season that has passed (e.g., if the current month is June, you cannot submit for January 2025 you be submitting a change for January 2026).

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

- "period-end" "period-start" "season-name" January YYYY-01-01T00:00:00Z YYYY-02-01T00:00:00Z February YYYY-02-01T00:00:00Z YYYY-03-01T00:00:00Z March YYYY-03-01T00:00:00Z YYYY-04-01T00:00:00Z April YYYY-04-01T00:00:00Z YYYY-05-01T00:00:00Z YYYY-05-01T00:00:00Z YYYY-06-01T00:00:00Z May June YYYY-06-01T00:00:00Z YYYY-07-01T00:00:00Z July YYYY-07-01T00:00:00Z YYYY-08-01T00:00:00Z YYYY-08-01T00:00:00Z YYYY-09-01T00:00:00Z August September YYYY-09-01T00:00:00Z YYYY-10-01T00:00:00Z October YYYY-10-01T00:00:00Z YYYY-11-01T00:00:00Z YYYY-11-01T00:00:00Z YYYY-12-01T00:00:00Z November December YYYY-12-01T00:00:00Z YYYY-01-01T00:00:00Z
- Relationship of "season-name" and "period-start" & "period-end" fields:

• Example based on the date 23 June 2025:

"season-name"	"period-start"	"period-end"	Explanation of YYYYs used
January	2026-01-01T00:00:00Z	2026-02-01T00:00:00Z	Month has passed, use 2026/2026
February	2026-02-01T00:00:00Z	2026-03-01T00:00:00Z	Month has passed, use 2026/2026
March	2026-03-01T00:00:00Z	2026-04-01T00:00:00Z	Month has passed, use 2026/2026
April	2026-04-01T00:00:00Z	2026-05-01T00:00:00Z	Month has passed, use 2026/2026
May	2026-05-01T00:00:00Z	2026-06-01T00:00:00Z	Month has passed, use 2026/2026
June	2025-06-01T00:00:00Z	2025-07-01T00:00:00Z	Current month, use 2025/2025
July	2025-07-01T00:00:00Z	2025-08-01T00:00:00Z	Future month, use 2025/2025
August	2025-08-01T00:00:00Z	2025-09-01T00:00:00Z	Future month, use 2025/2025
September	2025-09-01T00:00:00Z	2025-10-01T00:00:00Z	Future month, use 2025/2025
October	2025-10-01T00:00:00Z	2025-11-01T00:00:00Z	Future month, use 2025/2025
November	2025-11-01T00:00:00Z	2025-12-01T00:00:00Z	Future month, use 2025/2025
December	2025-12-01T00:00:00Z	2026-01-01T00:00:00Z	Future month, use 2025/2026

#### Scenario Proposal

- Specific API URL for PATCH: {{lep-url}}/rating-proposals/scenario
- Content type: application/vnd.lep.scenario-ratings-proposal.v1+json
- For a Network Segment t that **does not** have any modeled "altering-conditions", it will use Default Scenario Ratings.
  - This is **not** part of the TROLIE standard specifications, a LEP payload requirement for this proposal with an example will be posted on the ISO-NE website project page.
- For a Network Segment that **does** have modeled "altering-conditions", it will use Conditional Scenario Ratings.
  - -- Known issue -- This function does **not** work using the UI or API.
  - This is **not** part of the TROLIE standard specifications, a LEP payload requirement for this proposal with an example will be posted on the ISO-NE website project page after the functionality issue is addressed.

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

Temporary AAR Exception Ratings

- Specific API URL for:
  - Create a new (POST): {{lep-url}}/temporary-aar-exceptions
  - Update an existing (PUT): {{lep-url}}/temporary-aar-exceptions/{id}
  - Delete a specific (DEL): {{lep-url}}/temporary-aar-exceptions/{id}
- Content type: application/vnd.trolie.temporary-aar-exception.v1+json
- Refer to the TROLIE Specs for the required payload information
  - $\circ~$  A "start-time" is required to be entered
  - An "end-time" may be NULL
  - o A "reason" is required to be entered
- Using an Offset (e.g., -4 or -5) works better than using Zulu time (Z) [commonly referred to Coordinated Universal Time (UTC)]

Forecast Proposals:

- A Proposal is required to contain all 72 hours for a Network Segment.
- Specific API URL for PATCH: {{lep-url}}/rating-proposals/forecast
- Content type: application/vnd.trolie.rating-forecast-proposal-status.v1+json
- The "resource-id" based on "X-LEP-Name-Type" is defined in the header
- Refer to the TROLIE Specs for the required payload information
- Submission needs to consider the LEP "cutoff-period" setting. For a given hour, the time before that hour at which data must be submitted. For example, with a "cutoff-period" setting of 15 minutes (the default), proposals for hour 1300 must be submitted before 1245. Settings:
  - Sandbox: 15 minutes
  - Production: this will be documented when the production environment is created
- Using an Offset (e.g., -4 or -5) works better than using Zulu time (Z) [commonly referred to Coordinated Universal Time (UTC)]

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

Real Time Proposal

- Specific API URL for POST: {{lep-url}}/rating-proposals/realtime
- Content type: application/vnd.trolie.rating-realtime-proposal.v1+json
- The "resource-id" based on "X-LEP-Name-Type" is defined in the header
- Refer to the TROLIE Specs for the required payload information
- Using an Offset (e.g., -4 or -5) works better than using Zulu time (00:00:00Z) [commonly referred to Coordinated Universal Time (UTC)]

### Seasonal Override Ratings

→ Rating Providers can update Seasonal Ratings via the API. This function was created for other entities that were not providing the capability to updated Seasonal Ratings directly. If we determine that we do not want people to use this functionality, this section will be updated to state that.

#### Monitoring Sets

- Specific API URL for:
  - Create a new (POST): {{lep-url}}/monitoring-sets
  - Update an existing (PUT): {{lep-url}}/monitoring-set/{id}
  - Delete a specific (DEL): {{lep-url}}/ monitoring-set/{id}
- Content type: application/vnd.lep.monitoring-set.v1+json
- TROLIE specifications only provide details about GET submissions. LEP specifications provide payload requirements for POST, PUT, and DEL. A LEP payload requirement for these proposals will be posted on the ISO-NE website project page.

### Get effective rating snapshots from LEP

### Seasonal Snapshot

- Specific API URL: url}}/seasonal-ratings/snapshot
- Content type: application/vnd.trolie.seasonal-rating-snapshot.v1+json
- A Seasonal Snapshot is created each time seasonal ratings for a Network Segment is updated.

Page: 14 of 19	Hard Copy is Uncontrolled
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ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

#### Forecast Snapshot

- Specific API URL: {{lep-url}}/limits/forecast-snapshot
- Content type: application/vnd.trolie.forecast-limits-snapshot.v1+json
- Forecast Snapshot creation:
  - For a MAS with "used-for-operations" set to true: the output of ISO-NE Forecast Dynamic Ratings application creates and writes this to LEP once an hour.
  - For a MAS with "used-for-operations" set to false: LEP can be configured to create a Forecast Snapshot

**NOTE**: Forecast Snapshots are **not** being developed on SANDBOX at this time.

#### Real-Time Snapshot

- Specific API URL: {{lep-url}}/limits/realtime-snapshot
- Content type: application/vnd.trolie.realtime-limits-snapshot.v1+json
- Real-Time Snapshot creation:
  - For a MAS with "used-for-operations" set to true: the output of ISO-NE Real Time Dynamic Ratings application creates and writes this to LEP after every successful execution. RTDYN is set to run every 5 minutes.
  - For a MAS with "used-for-operations" set to false: LEP can be configured to create a Real-Time Snapshot.

**NOTE**: Real-Time Snapshots are **not** being developed on SANDBOX at this time.

## Navigating and using the LEP UI

To view the view the Network Segments associated with a Transmission Facility:

- Log into the LEP UI
- Click "Transmission Equipment & Ratings"
- Locate the Transmission Facility
- Click on the ">" to show the associated Network Segments

To enter or update data (e.g., ratings, AAR Exemption) for a Network Segment

- Log into the LEP UI
- Click "Transmission Equipment & Ratings"
- Locate and click on the Network Segment
   NOTE: both Reasonability Limits must be entered before attempting any changes to a Network Segment
- If updating the Reasonability Limits, all other ratings need to be within the bounds of the updated values you are going to enter. After entering in your change, click the "Update" button.
- If entering or updating ratings, the values entered must be between the Reasonability Limits and meet nesting requirements. After entering in your change, click the "Update" button.

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

- On the Seasonal Ratings display tab the seasons are displayed based on the Start Date. So the current monthly season will be at the top.
- If setting the AAR Exemption status to Exempt for the first time:
  - Click the toggle so it changes to "Exempt"
  - o Enter in a Reason
  - Click "Update"
- If you need to perform the 5 year review of the AAR Exemption status:
  - Click the "Re-approve" button
  - Enter in the reason text on the pop up.
  - Click "Accept"

To create a new Temporary Rating

- Log into the LEP UI
- Click "Temporary Ratings"
- Click "Create"
- Select the Network Segment from the dropdown
- Enter a Reason required
- Enter a start date and time required
- Enter the Normal, LTE, STE, and DAL ratings required
  - The values entered must be between the Reasonability Limits and meet nesting requirements
- Enter an end date and time option; can be update later

#### Update a Temporary Rating

- Log into the LEP UI
- Click "Temporary Ratings"
- Click on the previously created Temporary Rating
- If applicable, modify the reason
- If applicable, modify the Normal, LTE, STE, and DAL ratings
  - The values entered must be between the Reasonability Limits and meet nesting requirements
- If applicable, enter or modify the end date and time

# Retrieving historical data from LEP-Historian

This section will be completed at a later date after LEP-Historian has been installed and configured.

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ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

# List of the API End Points

List below is for the current SANDBOX 24R11.

S.NO	Name	Method	API Endpoint
1	Get Monitoring Set By ID	GET	https://sandboxsmd.iso-ne.com/lep-operations/monitoring-sets/:id
2	Update Existing Monitoring Set	PUT	https://sandboxsmd.iso-ne.com/lep-operations/monitoring-sets/:id
3	Delete Monitoring Set	DELETE	https://sandboxsmd.iso-ne.com/lep-operations/monitoring-sets/:id
4	Get Monitoring Sets	GET	https://sandboxsmd.iso-ne.com/lep-operations/monitoring-sets
5	Create Monitoring Set	POST	https://sandboxsmd.iso-ne.com/lep-operations/monitoring-sets
6	Limits Forecast Snapshot	GET	https://sandboxsmd.iso-ne.com/lep-operations/limits/forecast-snapshot
7	Limits Real Time Snapshot	GET	https://sandboxsmd.iso-ne.com/lep-operations/limits/realtime-snapshot
8	Seasonal Rating Snapshot	GET	https://sandboxsmd.iso-ne.com/lep-operations/seasonal-ratings/snapshot
9	Get Forecast Proposal Status	GET	https://sandboxsmd.iso-ne.com/lep-operations/rating-proposals/forecast
10	Post a new RealTime Rating Proposal	POST	https://sandboxsmd.iso-ne.com/lep-operations/rating-proposals/realtime
11	Get Real Time Proposal Status	GET	https://sandboxsmd.iso-ne.com/lep-operations/rating-proposals/realtime
12	Get Proposals for Real Time Ratings	GET	https://sandboxsmd.iso-ne.com/lep-operations/rating-proposals/realtime
13	Get Real Time Rating Proposal by ID	GET	https://sandboxsmd.iso-ne.com/lep-operations/rating- proposals/realtime/:proposal-id
14	Patch Seasonal Proposal	PATCH	https://sandboxsmd.iso-ne.com/lep-operations/rating-proposals/seasonal
15	Named Season Seasonal Proposal	PATCH	https://sandboxsmd.iso-ne.com/lep-operations/rating-proposals/seasonal
16	Get Named Season Seasonal Proposals	GET	https://sandboxsmd.iso-ne.com/lep-operations/rating-proposals/seasonal
17	Get all Temporary AAR Exceptions	GET	https://sandboxsmd.iso-ne.com/lep-operations/temporary-aar-exceptions
18	Create a new temporary AAR Exception	POST	https://sandboxsmd.iso-ne.com/lep-operations/temporary-aar-exceptions
19	Get a temporary AAR exception by Id	GET	https://sandboxsmd.iso-ne.com/lep-operations/temporary-aar-exceptions/:id
20	Delete a temporary AAR exception by Id	DELETE	https://sandboxsmd.iso-ne.com/lep-operations/temporary-aar-exceptions/:id
21	Update an existing temporary AAR exception	PUT	https://sandboxsmd.iso-ne.com/lep-operations/temporary-aar-exceptions/:id
22	Get all Seasonal Overrides	GET	https://sandboxsmd.iso-ne.com/lep-operations/seasonal-overrides
Rev. 1.0			Page: 17 of 19 Hard Copy is Uncontrolled

ISO new england	ISO New England Limit Exchange Portal (LEP) User	Guide
©2025	Rev # 1.0	Effective Date: 06/24/2025

23	Create a new seasonal override	POST	https://sandboxsmd.iso-ne.com/lep-operations/seasonal-overrides
24	Get a seasonal override by Id	GET	https://sandboxsmd.iso-ne.com/lep-operations/seasonal-overrides/:id
25	Delete a seasonal override by Id	DELETE	https://sandboxsmd.iso-ne.com/lep-operations/seasonal-overrides/:id
26	Update an existing seasonal override	PUT	https://sandboxsmd.iso-ne.com/lep-operations/seasonal-overrides/:id
27	Override Transmission Facility Properties	РАТСН	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/transmission- facilities/:id
28	Override Network Segment Properties	РАТСН	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/network- segments/:id
29	Get Transmission Facilities	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/transmission- facilities
30	Get Transmission Facility by ID	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/transmission- facilities/:id
31	Get Transmission Facility by CIMMRID	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/transmission- facilities/:id
32	Get Network Segments	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/network- segments
33	Get Network Segment by ID	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/network- segments/:id
34	Get Naming Schemes	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/naming-schemes
35	Get Model Authority Sets	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/model-authority- sets
36	Get Model Versions	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/model-versions
37	Delete Model Version	DELETE	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/model- versions/:id
38	Get Substations	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/substations
39	Get CIM Types	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/cim-types
40	Get Voltage Levels	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/voltage-levels
41	Get Emergency Durations	GET	https://sandboxsmd.iso-ne.com/lep-operations/reference-data/emergency- durations
42	Test Mode Enabled	GET	https://sandboxsmd.iso-ne.com/lep-operations/test-mode
43	Upload DYNRTG Model	POST	https://sandboxsmd.iso-ne.com/lep-operations/habitat/model-import

ISO new engla	ISO New England Limit Exchange Portal (LEP) User Guide				
©2025	Rev # 1.0		Effective Date: 06/24/2025		
44	Get EMS Forecast Rating Proposals	GET	https://sandboxsmd.iso-ne.com/lep-operations/ems/rating- proposals/forecast?rating-info-start-time=2024-07-26T01:00:00-0700&rating- info-end-time=2024-08-05T02:00:00-0700		
45	Get EMS Real Time Rating Proposals	GET	https://sandboxsmd.iso-ne.com/lep-operations/ems/rating- proposals/realtime?rating-info-time-point=2024-07-26T11:20:00-0700&look- back-window=60		
46	Submit Forecast Snapshot from EMS	POST	https://sandboxsmd.iso-ne.com/lep-operations/ems/rating-snapshots/forecast		
47	Submit Forecast Audit Report from EMS	POST	https://sandboxsmd.iso-ne.com/lep-operations/ems/rating- snapshots/forecast/report		
48	Submit Real Time Snapshot from EMS	POST	https://sandboxsmd.iso-ne.com/lep-operations/ems/rating-snapshots/realtime		
49	Submit Real Time Audit Report from EMS	POST	https://sandboxsmd.iso-ne.com/lep-operations/ems/rating- snapshots/realtime/report		