



Special eDART Forum: FERC Order 881 eDART 2023 Train Enhancements

February 28, 2024

- Overview
- 2023 eDART Train Implementation
 - Temp Set Details
 - Zonal Forecast
 - Emergency Duration Values
 - Facility Change Tickets
 - Lookup Tables
 - Projected Conditional Tickets
- Future Meetings
- General Q&A

Overview

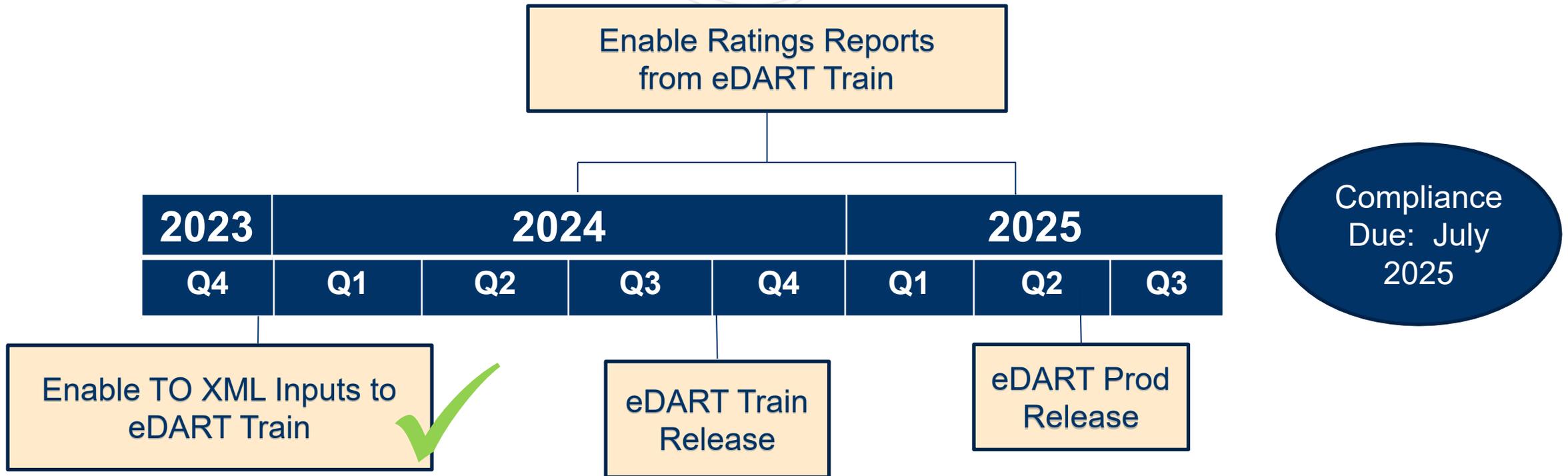
- <https://www.ferc.gov/media/e-1-rm20-16-000>
- Improve the accuracy and transparency of electric transmission [facility] ratings used by transmission providers by moving away from seasonal or static temperature assumptions that may:
 - understate the near-term transfer capability, restricting flows and potentially increasing congestion costs
 - Overstate the near-term transfer capability, creating potential reliability and safety problems
- Adopt requirements for greater use of Ambient-Adjusted Ratings (AAR) in both near-term (10-day) and longer term, while allowing for temporary ratings for safety and reliability as well as AAR exceptions

DISCLAIMER: Presentation contains summary information above & throughout regarding FERC Order 881. FERC Order 881 requirements and language take priority over any information herein which may unintentionally misconstrue or deviate from FERC Order obligations.

Revisions to the *pro forma* Open Access Transmission Tariff (OATT) and the Commission's regulations under the Federal Power Act to improve accuracy and transparency of electric transmission line ratings.

- Impacts eDART TERM Application and pjm.com OASIS thermal ratings reports
- eDART Project began January 2023
- Compliance due July 2025

High Level Timeline: eDART Order 881 Enhancements*



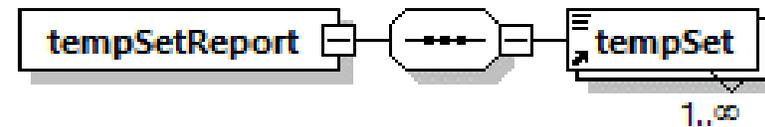
* Scope and timelines are tentative.



2023 eDART Train Implementation

- Release Date: 12/21/2023
- Scope:
 - TO XML uploads and supporting downloads
 - XML ‘stub’ or generic responses; uploaded data is not currently being processed. e.g:
 - `<response>OK</response>`
 - `<response>Successfully uploaded Zonal Forecasts 1234</response>`
- Files posted at [pjm.com/pub/etools/edart/xmldocs/xmldoc.html](https://www.pjm.com/pub/etools/edart/xmldocs/xmldoc.html)

- See [Glossary of Terms](#) for definition
- **Temp Set** Business rules:
 - AAR facility type (Temp Set reflecting ambient condition: temp + day/night)
 - Rating Set Lookup Table in 5°F increments ranging from -55F to 130F plus D or N
 - AAR Exception [**EXCPTN**] facility type
 - Singular Rating Set (can be submitted as Rating Set across full AAR Temp Set)
 - Conditional [**CND#**] sub-types (applies to either AAR or AAR Exception facilities)
 - Conditional Rating Sets (up to 10), if applicable for the facility
 - Download type = **tempset**
- To be used in Zonal Forecast and Lookup Tables
- Schema

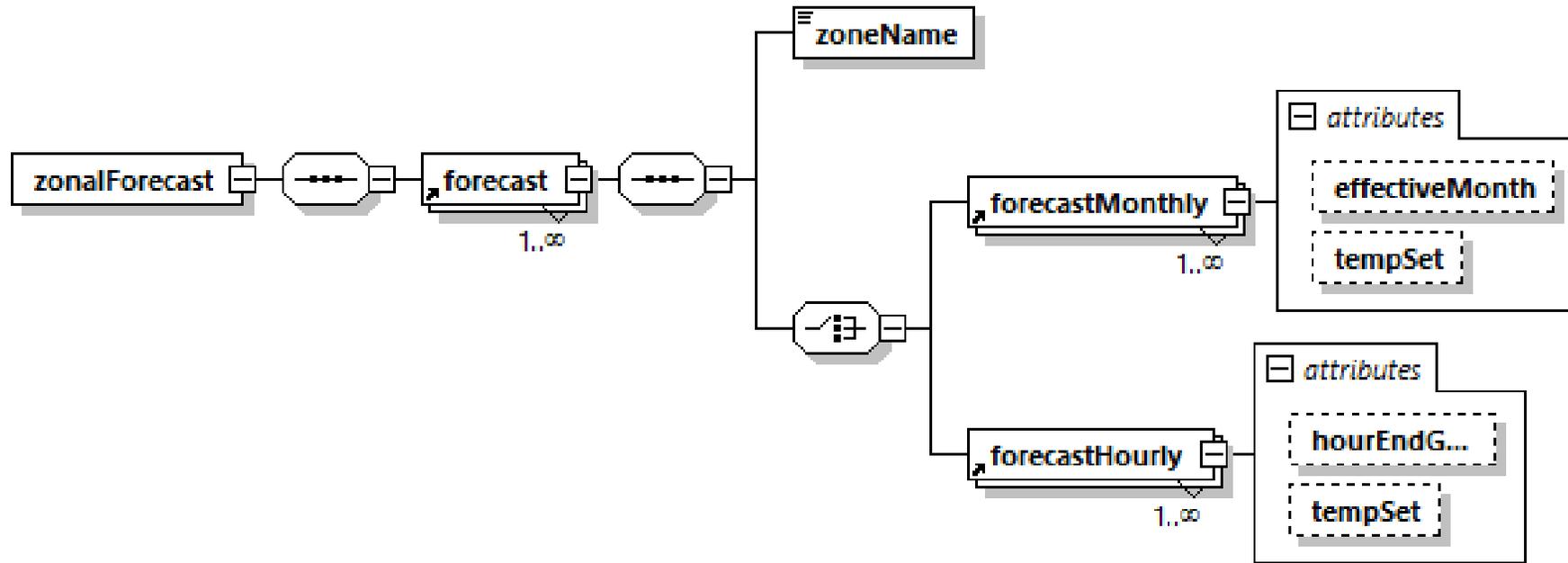


```
<tempSetReport xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.pjm.com/external/schemas/tempset/v1 tempsetreport.xsd">  
  <tempSet>-55D</tempSet>  
  <tempSet>-55N</tempSet>  
  <tempSet>-50D</tempSet>  
  <tempSet>-50N</tempSet>  
  <tempSet>-45D</tempSet>  
  <tempSet>-45N</tempSet>  
  <tempSet>-40D</tempSet>  
  <tempSet>-40N</tempSet>  
  <tempSet>-35D</tempSet>  
  <tempSet>-35N</tempSet>  
  <tempSet>-30D</tempSet>  
  <tempSet>-30N</tempSet>  
  <tempSet>-25D</tempSet>  
  <tempSet>-25N</tempSet>  
  <tempSet>-20D</tempSet>  
  <tempSet>-20N</tempSet>  
  <tempSet>-15D</tempSet>  
  <tempSet>-15N</tempSet>  
  <tempSet>-10D</tempSet>  
  <tempSet>-10N</tempSet>
```

```
<tempSet>120N</tempSet>  
<tempSet>125D</tempSet>  
<tempSet>125N</tempSet>  
<tempSet>130D</tempSet>  
<tempSet>130N</tempSet>  
<tempSet>EXCPTN</tempSet>  
<tempSet>CND1</tempSet>  
<tempSet>CND2</tempSet>  
<tempSet>CND3</tempSet>  
<tempSet>CND4</tempSet>  
<tempSet>CND5</tempSet>  
<tempSet>CND6</tempSet>  
<tempSet>CND7</tempSet>  
<tempSet>CND8</tempSet>  
<tempSet>CND9</tempSet>  
<tempSet>CND10</tempSet>  
</tempSetReport>
```

- See [Glossary of Terms](#) for definition
- Zonal Forecast business rules:
 - Provided forecast hour or month must be in the future in time for use
 - i.e., *Forecast* must be outside window of use. Cannot submit a forecasted rating for a timespan that is in effect.
 - For monthly(seasonal) forecast upload, **effectiveMonth** format = mm-yyyy
 - For hourly forecast upload, **hourEndGmt** format = yyymmddhh24mi
 - effectiveMonth and hourEndGmt values must be sequential
 - And, must begin with upcoming forecasted hour or month
 - Monthly and Hourly forecasts cannot be submitted at the same time
 - Forecast can be submitted for multiple zones at the same time

Zonal Forecast Upload - Schema Diagram



Generated by XMLSpy

www.altova.com

Monthly Forecast

```

<?xml version="1.0" encoding="UTF-8"?>
<zonalForecast xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="zonalforecast.xsd">
  <forecast>
    <zoneName>ABC</zoneName>
    <forecastMonthly effectiveMonth="03-2024" tempSet="50D"/>
    <forecastMonthly effectiveMonth="04-2024" tempSet="55D"/>
  </forecast>
  <forecast>
    <zoneName>DEF</zoneName>
    <forecastMonthly effectiveMonth="03-2024" tempSet="50D"/>
    <forecastMonthly effectiveMonth="04-2024" tempSet="55D"/>
    <forecastMonthly effectiveMonth="05-2024" tempSet="55D"/>
  </forecast>
</zonalForecast>

```

From tempest download

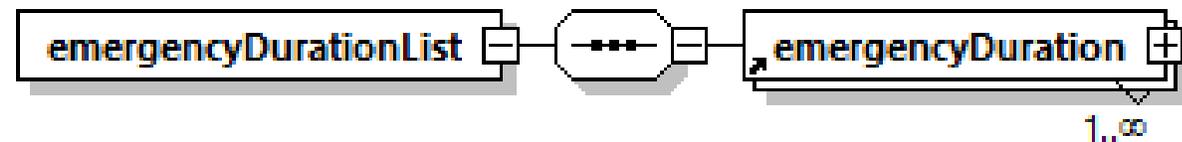
Hourly Forecast

```

<?xml version="1.0" encoding="UTF-8"?>
<zonalForecast xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="zonalforecast.xsd">
  <forecast>
    <zoneName>ABC</zoneName>
    <forecastHourly hourEndGmt="202403291500" tempSet="60D"/>
    <forecastHourly hourEndGmt="202403291600" tempSet="60D"/>
    <forecastHourly hourEndGmt="202403291700" tempSet="60D"/>
    <forecastHourly hourEndGmt="202403291800" tempSet="60N"/>
  </forecast>
</zonalForecast>

```

- See NERC [Glossary of Terms](#) & FERC [Order 881](#), Paragraph 299
- Emergency Rating that reflects operation for a specified, *finite* period, rather than reflecting continuous operation.
- **Emergency Duration** is the ‘specified, finite period’.
- To be used in Facility Change Tickets
- Schema



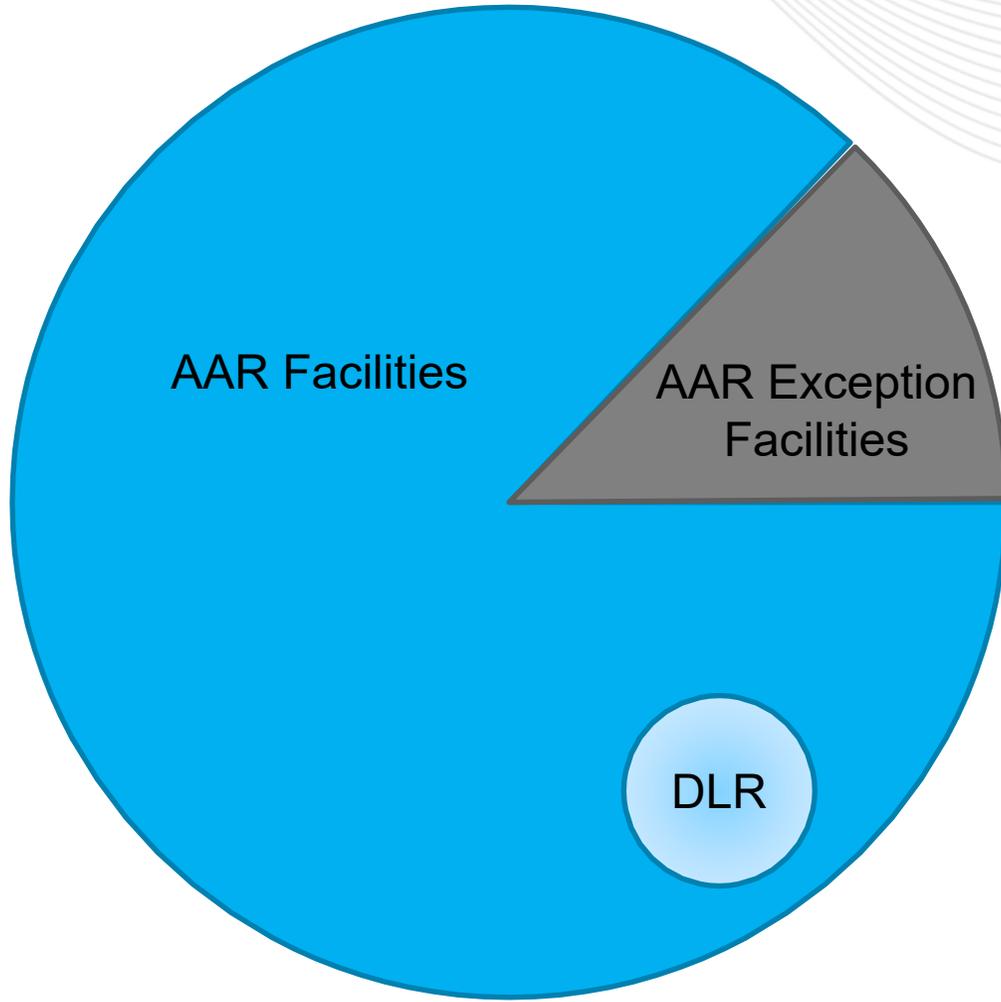
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Emergency Duration Values Download - Example

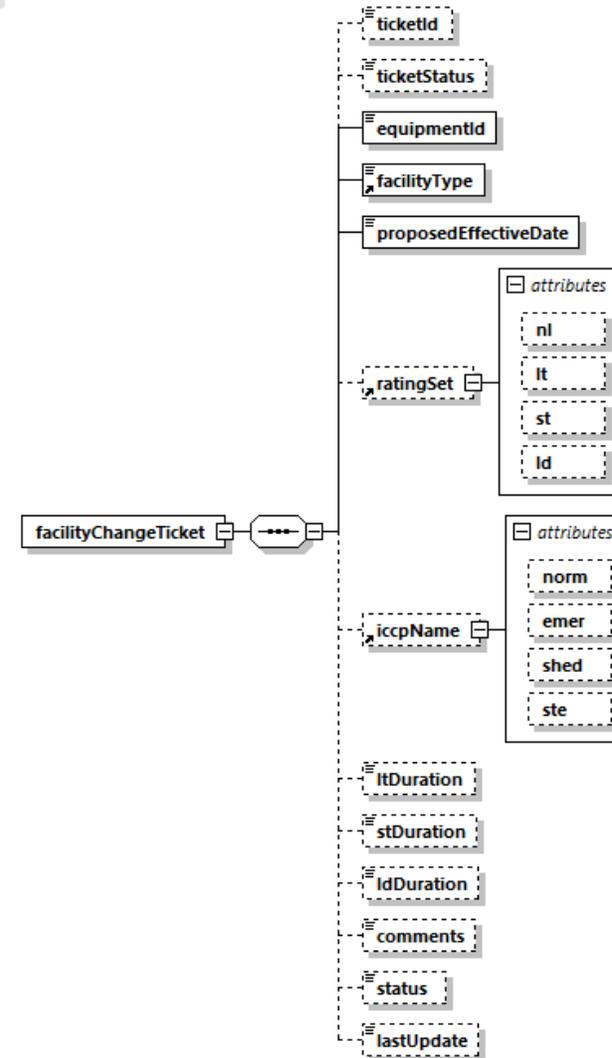
```
<emergencyDurationList xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.pjm.com/external/schemas/emergencyduration/v1 emergencyduration.xsd">  
  <emergencyDuration id="0" description="PJM Default 4 hours"/>  
  <emergencyDuration id="1" description="30 minutes"/>  
  <emergencyDuration id="2" description="1 Hour"/>  
  <emergencyDuration id="3" description="1 Hour 30 minutes"/>  
  <emergencyDuration id="4" description="2 Hours"/>  
  <emergencyDuration id="5" description="2 Hour 30 minutes"/>  
  <emergencyDuration id="6" description="3 Hours"/>  
  <emergencyDuration id="7" description="3 Hour 30 minutes"/>  
</emergencyDurationList>
```



- Thermal Transmission Facilities :
- ✓ Line, Transformer, Series Device, Phase Angle Regulator, & Flow Devices
 - ✓ Monitored Priority 1, 2 & 6

See [Glossary of Terms](#) for definitions

- Request to set up a facility as AAR, AAR Exception or DLR as of the effective date provided.
- <equipmentId> is the same as used for TERM tickets today
- <facilityType> = AAR, AAR Exception or DLR (case insensitive)
- Schema → →



- Business rules:
 - <ratingSet> is required for AAR Exception facilities
This is the single rating set assigned to them
 - <iccpName> is required for DLR facilities
 - proposedEffectiveDate format = yyyy-mm-dd

AAR Facility

```
<?xml version="1.0" encoding="UTF-8"?>
<!--Sample XML file generated by XMLSpy v2020 sp1 (x64) (http://www.altova.com)-->
<facilityChangeTicket xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="facilitychangeticket.xsd">
  <equipmentId>3692</equipmentId>
  <facilityType>AAR</facilityType>
  <proposedEffectiveDate>2023-12-04</proposedEffectiveDate>
  <comments>881 upload test</comments>
</facilityChangeTicket>
```

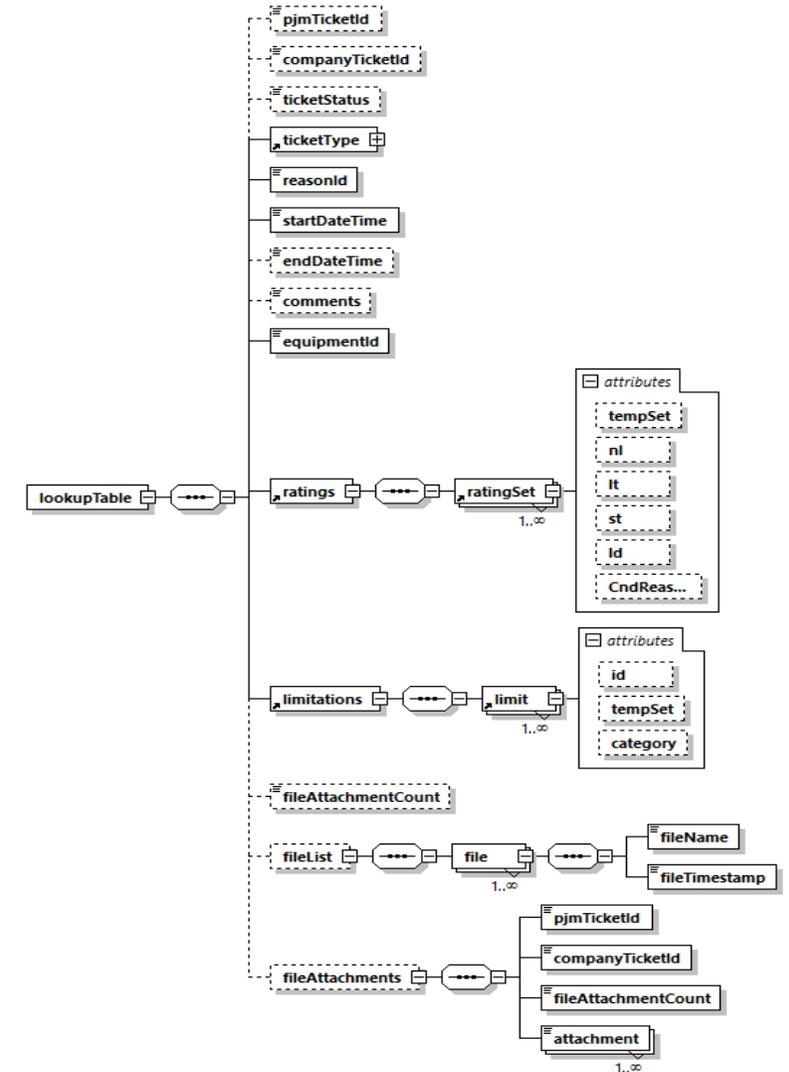
AAR Exception Facility

```
<?xml version="1.0" encoding="UTF-8"?>
<facilityChangeTicket xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="facilitychangeticket.xsd">
  <equipmentId>3692</equipmentId>
  <facilityType>AAR Exception</facilityType>
  <proposedEffectiveDate>2023-12-14</proposedEffectiveDate>
  <ratingSet nl="111" lt="234" st="456" ld="678"/>
  <comments>881 upload test</comments>
</facilityChangeTicket>
```

DLR Facility

```
<?xml version="1.0" encoding="UTF-8"?>
<facilityChangeTicket xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="facilitychangeticket.xsd">
  <equipmentId>3692</equipmentId>
  <facilityType>DLR</facilityType>
  <proposedEffectiveDate>2023-12-24</proposedEffectiveDate>
  <iccpName norm="PJM1" emer="PJMtwo2" shed="PJMthree3" ste="PJMfour4" />
  <comments>881 upload test</comments>
</facilityChangeTicket>
```

- See [Glossary of Terms](#) for definition
- Business rules:
 - Date format: yyyy-mm-ddThh:mm:ss
 - <CndReason> is required if
<tempset> = CND1, CND2, CND10
 - Use <tempSet> = EXCPTN for AAR
Exception facility lookup tables
 - <ratingSet> for all active <tempSet>s are
required for AAR facility lookup tables



```

<?xml version="1.0" encoding="UTF-8"?>
<lookupTable xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="lookuptable.xsd">
  <companyTicketId>881LTcreate1</companyTicketId>
  <ticketType implementation="planned" type="temporary"/>
  <reasonId>14</reasonId>
  <startDateTime>2024-03-29T15:00:00</startDateTime>
  <endDateTime>2024-04-29T15:00:00</endDateTime>
  <comments>upload1</comments>
  <equipmentId>3692</equipmentId>
  <ratings>
    <ratingSet tempSet ="EXCPTN" nl="120" lt="230" st="450" ld="670"/>
    <ratingSet tempSet ="CND1" nl="123" lt="234" st="456" ld="678" CndReason="TESTING one"/>
  </ratings>
  <limitations>
    <limit id="1" tempSet="75D" category="ld"/>
  </limitations>
</lookupTable>

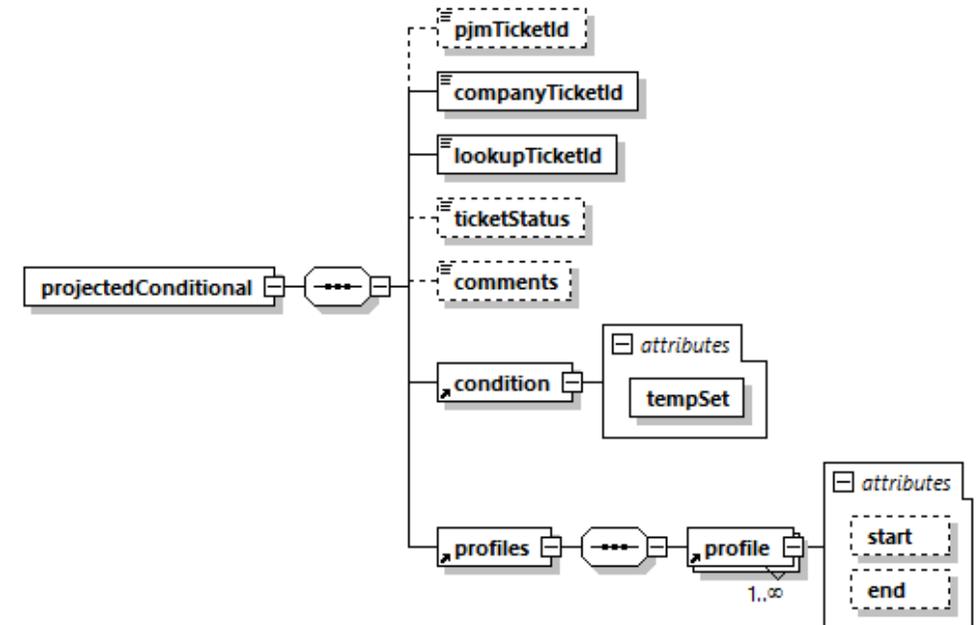
```

```

<?xml version="1.0" encoding="UTF-8"?>
<lookupTable xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="lookuptable.xsd">
<companyTicketId>881LTcreate2</companyTicketId>
  <ticketType implementation="planned" type="temporary"/>
  <reasonId>14</reasonId>
  <startDateTime>2023-12-30T09:00:00</startDateTime>
  <endDateTime>2024-04-29T15:00:00</endDateTime>
  <comments>upload2</comments>
  <equipmentId>3692</equipmentId>
  <ratings>
    <ratingSet tempSet ="-55D" nl="120" lt="230" st="456" ld="675"/>
    <ratingSet tempSet ="-55N" nl="120" lt="230" st="456" ld="675"/>
    <ratingSet tempSet ="-50D" nl="120" lt="234" st="456" ld="675"/>
    <ratingSet tempSet ="-50N" nl="120" lt="234" st="456" ld="675"/>
    <ratingSet tempSet ="-45D" nl="121" lt="234" st="456" ld="675"/>
    <ratingSet tempSet ="-45N" nl="121" lt="234" st="456" ld="675"/>
    <ratingSet tempSet ="-40D" nl="121" lt="234" st="456" ld="675"/>
    <ratingSet tempSet ="-40N" nl="121" lt="234" st="456" ld="675"/>
    <ratingSet tempSet ="-35D" nl="121" lt="234" st="456" ld="675"/>
    <ratingSet tempSet ="-35N" nl="121" lt="234" st="456" ld="675"/>
    <ratingSet tempSet ="-30D" nl="122" lt="234" st="456" ld="678"/>
    <ratingSet tempSet ="-30N" nl="122" lt="234" st="456" ld="678"/>
    <ratingSet tempSet ="-25D" nl="123" lt="234" st="456" ld="678"/>
    <ratingSet tempSet ="-25N" nl="123" lt="234" st="456" ld="678"/>
    ...
    ...
    ...
    ...

```

- Ticket submitted to inform PJM when predefined conditions deviating from an AAR or AAR Exception Lookup Table will be in effect.
- Business rules:
 - Date format: yyymmddhh24mi
 - At least one profile start and end must be defined during which the condition is in effect



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```
<?xml version="1.0" encoding="UTF-8"?>
<projectedConditional xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="projectedconditional.xsd">
  <companyTicketId>PC create 1</companyTicketId>
  <lookupTicketId>1</lookupTicketId>
  <comments>881 test </comments>
  <condition tempSet="CND1"/>
  <profiles>
    <profile start="202403291100" end="202403311600"/>
    <profile start="202407261500" end="202407281500"/>
    <profile start="202408261500" end="202408281500"/>
  </profiles>
</projectedConditional>
```

- Upcoming [eDART Forum](#) Meetings
 - [March 21, 2024](#)
 - [June 12, 2024](#)
- Future Meeting Topics:
 - What is changing in eDART
 - 2024 Releases

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- [Special eDART Forum – FERC Order 881](#)
- [eDART XML Documents](#)
 - [Temperature Set Details – Download](#)
 - [Zonal Forecasts - Upload](#)
 - [Emergency Duration Values – Download](#)
 - [Facility Change Tickets Create and Revise – Upload](#)
 - [Lookup Tables – Upload](#)
 - [Projected Conditional Tickets – Upload](#)



Glossary of Terms

Thermal Transmission Facility (aka, Thermal Facility or Facility) – Any PJM designated Facility of the appropriate Facility Type (lines, transformers, series devices, phase angle regulators and flow devices) and Monitored Priority (MP1, MP2 & MP6) combination which require thermal Facility Ratings, including an associated Rating Set Lookup Table.

Rating Set (aka, Thermal Rating Set) - Array representing the Normal (NL or continuous) and emergency (Long Term Emergency [LT/LTE], Short Term Emergency [ST/STE] & Load Dump [LD]) thermal Facility Ratings for a given condition or time of use.

Temperature Set (aka, Temp Set) – Identification for a given Rating Set within a Lookup Table, denoted by temperature in Fahrenheit and solar gain time of use (i.e., NIGHT or DAY) or optionally a defined Conditional Rating. The single temperature denoted within a Temperature Set name represents a band of ambient temperatures for a given zone. Facilities are defined within the model at a given TO zone. TO areas are defined by one or more zones to which a Temp Set is applied at any given Operations timeframe.

Conditional Rating – Optional special Temp Sets for a given Facility, including a description for use, which align to a pre-identified conditions driving Rating Set(s) use. Typical use is to capture and assist administration transparency around the use of PJM’s Transmission Operating Procedures manual M-03B thermal ratings, such as Directional Ratings and Common Trench.

AAR (aka, Ambient-Adjusted Rating) - A Thermal Transmission Facility Rating that: Applies to a time period of greater than one hour.; Reflects an up-to-date forecast of ambient air temperature across the time period to which the rating applies.; Reflects the absence of solar heating during nighttime periods, where the local sunrise/sunset times used to determine daytime and nighttime periods are updated at least monthly, if not more frequently.; Is evaluated at least each hour, if not more frequently. [PJM Tariff proposed [term](#)]

AAR Exception - Where the Transmission Owner determines, consistent with Good Utility Practice, that the Thermal Transmission Facility Rating of a Transmission Facility is not affected by ambient air temperature or solar heating, the Office of the Interconnection and Transmission Owner may use a Thermal Transmission Facility Rating for that Transmission Facility that is not an AAR or Seasonal Facility Rating. [PJM Tariff proposed [term](#)]

Lookup Table (aka, Rating Set Lookup Table or Temp Set Lookup Table) - Array of Rating Sets distinguished by, actual or forecasted, day/night timeframe and ambient conditions expressed in degrees Fahrenheit. Used in the establishment of AAR, identification of AAR Exceptions, establishment of Temporary Ratings, and derivation of Operational Seasonal Ratings. Also utilized as a backup for any Dynamic Line Rating facilities. AAR Exceptions have a flat Rating Set consisting of a single array.

Seasonal Facility Rating (aka, Operational Seasonal Rating) – A Thermal Transmission Facility Rating that: Applies to a specified season, where seasons are defined by the Office of the Interconnection to include not fewer than four seasons in each year, and to reasonably reflect portions of the year where expected high temperatures are relatively consistent.; Reflects an up-to-date forecast of ambient air temperature across the relevant season over which the rating applies.; Is evaluated annually, if not more frequently, for each season in the future for which Transmission Service can be requested. [PJM Tariff proposed [term](#)]

Thermal Transmission Facility Rating (aka, Facility Rating)– the maximum transfer capability of a Transmission Facility, computed in accordance with a written Thermal Transmission Facility Rating methodology and consistent with Good Utility Practice, considering the technical limitations on conductors and relevant transmission equipment. Relevant transmission equipment may include, but is not limited to, circuit breakers, line traps and transformers. [PJM Tariff proposed [term](#)]

Dynamic Line Rating (aka, DLR) – Facility Ratings that are directly telemetered from the TO to PJM, for which the TO provides all or a portion of the required forecasted ratings, and in real-time hourly adjusted at minimum.

Permanent Ticket – Within eDART, a default Lookup Table containing all known AAR (or AAR Exception) based ratings, including Conditional Ratings.

Temporary Ticket – Within eDART, a Facility Rating override utilized for the safety & reliability of the transmission system, including both known and emergency applied Conditional Ratings, superseding any other rating across the defined timeframe until the ticket reaches a final state (Closed, Restored, Retired, Cancelled by PJM, Cancelled, Denied).

Hourly Rating Sets (aka, 10-Day (240-hour) Forecasted Thermal Rating Sets) – Forecasted hourly Rating Sets¹ for all PJM Thermal Transmission Facilities (DLR, AAR & AAR Exceptions) sourced from a composite of DLR, Permanent and Temporary ticket-based projections across the next 240 hours.

Seasonal Rating Sets – Forecasted monthly projections of the most conservative Rating Set¹ utilized across a given Operational time horizon future month. Most conservative determination is based upon the lowest LTE projected for the given timeframe across all Permanent and Temporary tickets projected for use during the given month.

TO SCADA Zone – Named TO Zone or sub-zone, defined by the PJM EMS modeled substations that makeup the given zone as well as one or more weather stations used to determine actual and forecasted AAR. Substations can only be mapped to a single TO SCADA Zone. Weather stations can be mapped to multiple TO SCADA Zones.

Zonal Forecast – Forecasted Hourly or Seasonal Temp Set projections for one or more TO SCADA Zones. Utilized in the derivation of Rating Sets for those Facilities following AAR for the given timeframe within the given TO SCADA Zone. Provided either by a TO (optionally) directly in full/part or by PJM through its weather services.

¹ *Submitted, Approved, Received and Revised states will be utilized for forecasting purposes. Implemented & Implemented w/o Approval states are utilized in real-time.*