WHITE PAPER

PJM Interconnection AFC/ATC Approach with Transmission Owner Business Processes

DRAFT

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2/18/03	All pages updated	Changed title, added new sections on the instantaneous decrementing and 15 minute AFC recalculation. Received comments from the AFC/ATC working group throughout the document.
4/29/03	Appendix pages	Created new appendix to document business processes for Transmission Owners

1 Introduction

The purpose of this paper is to explain how the **A**vailable **F**lowgate **C**apability (AFC) and **A**vailable **T**ransfer **C**apability (ATC) will be determined by PJM. Determining AFC/ATC will be a centralized calculation for the entire PJM footprint. The AFC/ATC process is a multi-step integrated process.

The basic engine used to compute the PJM AFC/ATC values is the **P**ower **T**echnologies **I**ncorporated (PTI) **P**ower **S**ystem **S**imulator (PSSe) software and the PTI **M**anaging and **U**tilizing **S**ystem **T**ransmission (MUST) software. As part of this developing this process the PTI software was enhanced by PTI and PowerGEM. Automatic interface routines that incorporate certain data retrieved from the NERC web site, the PJM OASIS, and neighboring OASIS into the PTI software were developed by PowerGEM.

Calculating the PJM AFC/ATC values is accomplished by splitting the calculation into several pieces. The first step is to run the process that obtains data from the external sites, the second step is to compute the PJM AFC and the third is to convert the AFC to ATC values. These values, as well as certain other system attributes, are then supplied to the PJM OASIS.

After the PJM OASIS receives the AFC/ATC values and other associated system attributes, the OASIS maintains ATC currency until the next full AFC/ATC run is made

The next several sections of this document describe the calculation process in detail.

2 Calculation Process

2.1 System Flow Diagram / Overview

The process for the PJM AFC/ATC calculation is illustrated in Exhibit 1. The following text describes the inputs, outputs and processes performed within each of the sub-processes contained in Exhibit 1.

Determining the PJM ATC is a multi-step integrated process. An overview of the major facets of this process is described below:

- Seasonal base cases, NERC SDX files, generation dispatch files, generic load profiles, base case Reservations, Schedules and forecasted load levels are inputs

into the PSS/e model builder portion of the AFC/ATC Engine. The model builder develops monthly, weekly, daily, and hourly AFC base cases, as specified by the operator. These cases serve as inputs to the PTI MUST based AFC calculator.

- The PTI MUST based AFC Calculator, applies the impacts of non-base case transmission reservations and calculates the Available Flowgate Capability by determining the capacity remaining on individual flowgates for further transmission service activity. AFC is derived from the following equation:

  AFC = Flowgate rating – (base case flow) – (impacts of existing reservations or schedules as appropriate) – TRM – CBM.

- The PJM AFC discrimination process will utilize the MISO calculated AFC values for MISO flowgates that are calculated by the PJM. AFC values for MISO flowgates calculated by the MISO overwrite values that the PJM process determines for these flowgates. In the absence of MISO calculated values, the PJM process will utilize the PJM generated values for MISO flowgates.

- PJM supplies MISO with similar values for PJM Flowgates for inclusion in the MISO AFC process.

- Using transfer response factors for specific POR/POD pairs the AFC – ATC converter translates the flowgate AFC values into ATC values for posting to the OASIS.

- Values provided to the OASIS from the PJM AFC/ATC process are continually updated on the OASIS to reflect the reservations that were accepted since the last complete calculation cycle.

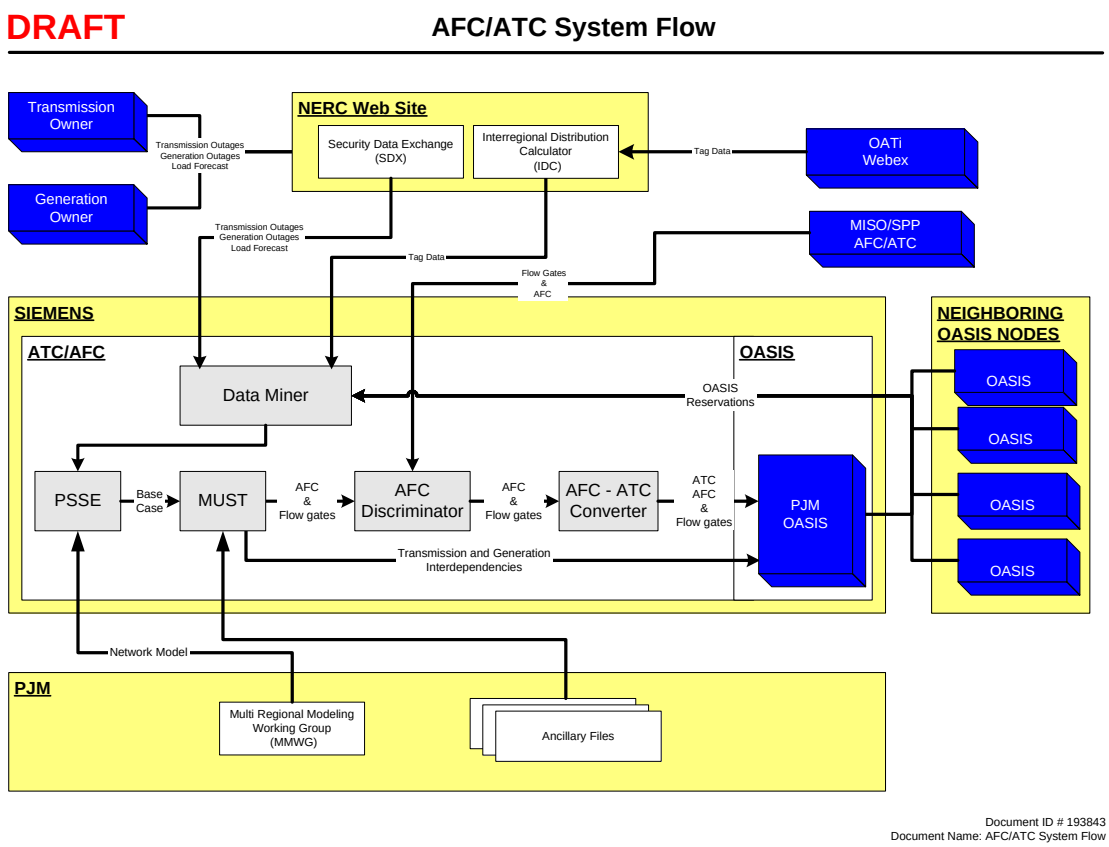


Exhibit 1

3 Model Preparation – Seasonal Base Case Preparation

Base Case Preparation

PJM will develop and maintain seasonal models for the next 18 months. These seasonal models will be developed from the most recent NERC MMWG case library modified for any known model updates.

All PJM AFC/ATC calculations will be based on these seasonal models. The model builder portion of the PJM AFC/ATC engine will modify these seasonal base cases to reflect anticipated conditions such as load levels, outages, and base transfers for the AFC/ATC time horizon. Base case models for monthly (next 18 monthly models), weekly (next 5 weekly models), daily (next 35 days), and hourly (next 168 hours) time frames will be developed. Systems outside PJM retain the seasonal level of detail at a minimum. Where appropriate, a greater detail for close in systems will be included. As new seasonal models are developed, PJM member systems will review the new model to determine if any changes need to be made.

The NERC MMWG cases will be modified to remove all relevant transfers that are modeled through reservations or schedules that may impact loading in or near the PJM footprint. Control area generation will be modified to ensure that there is sufficient available generation within the control areas to serve all loads within the individual control area. This may result in some control areas with modeled generation in excess of generation capabilities. The PJM AFC/ATC engine will adjust load levels and/or include user specified reservations to ensure that the AFC values are based on a physically feasible model.

The base case models are further refined within the engine to reflect transmission outages and generation unavailability as provided by the NERC SDX System. Control area load levels will also be adjusted to reflect the appropriate load levels for the modeled conditions using the NERC SDX data. Relevant Control Areas external to the PJM footprint will be modeled at the appropriate load level with the generation scaled to match Control Area loads.

Interfaces to SDX data will be necessary. Generators that are identified as PJM capacity resources or PJM designated network resources will be modeled on in the base case as determined by an economic dispatch. Transmission capacity will be held for accepted or confirmed reservations not modeled in the base case by decrementing flowgate capability.

Flowgates will be decremented for reservations if the reservation has a positive distribution factor on any flowgate. This decrementing is done regardless of the distribution factor magnitude. Only firm reservations or schedules will be used when determining firm AFC while both firm and non-firm reservations and schedules will be used for determining non-firm AFC. Reservations from the PJM and non-PJM OASIS sites are utilized. For the operating horizon (i.e. the next user selected 24- 48 hours).

Rollover rights for long term firm transmission service will not be assumed to be exercised in the ATC calculations. If a rollover right is exercised and there is insufficient ATC because of shorter term firm service sold prior to receipt of the rollover notification, the requested rollover will displace the shorter term transmission service. When a request for yearly service is evaluated, rollovers are taken into account in the manual assessment of the yearly request. See document #200616 for a description of the Long term transmission service request evaluation process.

In the base case models, phase shifter will be set as follows:

- Constant flow for operating horizon (next 24-48 hours)
- Constant angle beyond next 48 hours

4 Analysis

Flow based analysis will be used to determine and update flowgate loadings for reservations not modeled in the base case and to determine response factors on each flowgate. Flowgate loadings and response factors will be used to determine the individual path ATC values.

Single contingency – breaker to breaker, single unit, loss of tower - and other multiple contingencies that are consistent with the transmission owner planning and operating criteria will be used for determining ATC values. Normal operating procedures (procedures that are routinely implemented that do not detrimentally impact reliability) will be modeled in determining these values. Operating procedures that are implemented only under emergency conditions will not be simulated.

PJM will recognize physical network limitations (i.e. flowgates) on PJM and non-PJM systems in the determination of the path TTC/ATC values. Contract path limitations between and within the PJM Control Areas will not be recognized in the determination of the path TTC/ATC values. Contract path limits between PJM systems and neighboring systems will be determined by mutual agreement with the particular neighbor.

To determine response factors on flowgates, the PJM AFC calculation engine will simulate imports and exports as follows:

- Exports from a non-PJM control area will be modeled by scaling all generation (by mbase) not at their Pmax in the base case (both utility and merchant) within the applicable control area. Units used as source points for the modeled transfer will be allowed go beyond their Pmax.

- Exports from the PJM footprint will be modeled by scaling all available generation (by mbase) units not modeled at their Pmax in the base case associated with a specific POR (utility vs. merchant). Units used as source points will be allowed go beyond their Pmax.

- Import points (PODs) for PJM will be modeled by scaling generation. Import Points (PODs) for non-PJM systems will be modeled by scaling load.

Using the transfer simulation techniques described above, an enhanced version of the PTI MUST (**M**anaging and **U**tilizing **S**ystem **T**ransmission) software is used as the basic calculation tool to determine AFC values and distribution factors.

The ultimate points of power injection (sources) and power extraction (sinks) must directly correspond to the path "from" and 'to" directions being studied as specified in the table below.

Entity	**Source Points**	**Sink Points**
Load and Generation Control Area	Network Designated Resources with available capacity and if required, load within the "from" control area specified in the path direction	Load within the "to" area specified in the path direction for non-PJM areas. Generation within the 'to' areas within the PJM areas
Generation Only Control Area	Generation with available capacity within the "from" control area specified in the path direction	None
Load Only Control Area	None	Load within the "to" control area specified in the path direction not to exceed the forecast value.
Independent Power Producer	Generation Unit(s) associated with the same IPP specified in the "from" control area specified in the path direction	None

5 Use of Flowgates in a Flow-based Analysis and AFC to ATC conversion

5.1 Flowgate Definition

A PJM flowgate is defined as follows:

Thermal Flowgate - A thermal flowgate is to consist of only one monitored transmission element and (PTDF flowgate), or one or more contingency elements (OTDF flowgate). In addition, as part of the thermal flowgate definition, operating procedures that require one or more element opening or closings and/or isolation of generation (with designated resources to replace lost generation) is permissible.

Voltage/Stability Flowgate - A voltage or stability flowgate may consist of one or more monitored transmission elements and is modeled as an actual MW limit.

The capability of a PJM flowgate will utilize the use normal ratings for pre-contingency and emergency ratings for post contingency (as further adjusted by applicable TRM and CBM).

Note: Isolation of generation as part of the flowgate definition is allowed from specific agreements with the generation owner/operator.

5.2 Identification of New Flowgates

When ATC is determined via the use of flowgates, it is critical that studies be done to identify new flowgates, which might be required for complete analysis, since the ATC process is not running a set of contingencies and then monitoring the full transmission system. The responsibility for new flowgate identification lies with both PJM and the Transmission Owners. PJM will identify new flowgates as PJM evaluates firm monthly and yearly transmission service requests and through the RTEP process. Transmission Owners will also identify new flowgates via their internal, regional or interregional planning and operation planning activities.

5.3 Flow-based Analysis

PJM will use a flow-based analysis to determine a flowgate's AFC. A flowgate represents a critical transmission facility and the associated contingency if any, that may limit transfer capability. Flowgates having a transfer distribution factor that is equal to or greater than a specified cutoff (usually 3-5%) are valid limits in the PJM AFC/ATC process. Non-PJM flowgates will be monitored at the distribution factor cutoff specified by the entity submitting the flowgate's AFC to PJM.

A typical full network analysis being performed for a study area is a flow-based analysis which monitors all transmission facilities for all valid contingencies. Performing such a study is time consuming because of the number of contingencies that must be studied and the number of transmission facilities that must be monitored. In a flow-based analysis using flowgates, only the flowgates are taken into consideration. The flowgates are selected to reflect all known constraints (or choke-points). Since only the flowgates are being considered, studies can be completed faster than if a full network analysis is performed.

5.4 AFC to ATC Conversion

To calculate ATC, which represents a transfer capability in MW, available for sale, between a specific source and sink point, PJM will first calculate an AFC for each flowgate. An AFC is defined as follows:

- The available capacity in MW or MVA on a flowgate, determined by the transmission provider, is available for further commercial activity. The available capacity determined will be dependent on the generation, loads and transmission configuration assumed for the time period studied and therefore is referred to as a capability. The AFC will account for all thermal, voltage and stability limits under both pre and post contingency conditions, along with any existing transmission commitments, TRM and CBM. Since AFC is the amount of capacity remaining on the flowgate, there is no one set of source and sink points associated with an AFC.

- The AFC will be used to determine the amount of MWs that can be transferred between a specific set of source and sink points (i.e. the ATC with respect to the flowgate, can be derived by dividing the flowgate AFC by the

distribution factor on that flowgate for a specific source and sink). For the path being studied, an ATC will be determined for each flowgate. The path ATC value to be posted to the OASIS will be the lowest flowgate ATC value determined for that path.

Counterflow defined as flow created by reservations in the 'opposite' direction will be considered in the calculation of AFC. For determination of firm AFC, only counterflow in the base case model will be used. Counterflow caused by firm or non-firm reservations not modeled in the base case will not be used. For determination of non- firm AFC, all counterflow in base case model will be used. Fifty percent of counterflow from firm and zero percent of non-firm reservations not modeled in the base case will be used.

5.4.1 Coordination with Neighboring Systems

PJM will coordinate data with neighboring systems by providing transmission reservations, AFC values for PJM flowgates, base data, and providing data in support of the NERC Interregional Security Network. This coordination will result in comparable and consistent AFC values while minimizing the potential for over-selling firm and non-firm transmission service, which may result in curtailments in real time operation. PJM utilizes similar information provided by neighboring systems.

5.4.2 Transmission Margins

PJM will include, as appropriate, in the AFC/ATC determination process, prudent levels of transmission margins to provide reasonable assurance that the transmission system will remain secure and that the Load Serving Entities within PJM have access to the transmission interconnection during generation emergencies. These margins are: The Transmission Reliability Margin (TRM), and the Capacity Benefit Margin (CBM)

Transmission Reliability Margin (TRM)

The Transmission Reliability Margin (TRM) utilized within PJM is defined as:

The amount of transmission transfer capability necessary to provide a reasonable level of assurance that the interconnected transmission network will be secure. TRM accounts for the inherent uncertainty in system conditions and its associated effects on ATC

calculations, and the need for operating flexibility to ensure reliable system operation as system conditions change. All transmission system users benefit from the preservation of TRM.

PJM will use the TRM values provided by the new Transmission Owners (AEP, ComEd DPL and VP) that were reviewed and approved under the Regional methodologies until a new PJM TRM methodology is developed for all PJM members.

TRM is applied as a rating reduction to the limiting element(s) of the flowgate.

Capacity Benefit Margin (CBM)

The Capacity Benefit Margin (CBM) is defined as:

The amount of firm transmission transfer capability preserved by PJM for Load Serving Entities (LSEs) within a control area to enable access by the LSEs to generation from interconnected systems to meet generation reliability requirements. Preservation of CBM for each LSE allows that entity to reduce its installed generation capacity below that which may otherwise have been necessary without interconnections to meet its generation reliability requirements. The transmission transfer capability preserved as CBM is intended to be used by the LSE only in times of emergency generation deficiencies.1

PJM will use the CBM values provided by the new Transmission Owners (AEP, ComEd DPL and VP) that were reviewed and approved under the Regional methodologies until a new PJM CBM methodology is developed for all PJM members.

The CBM is applied as a rating reduction to the limiting element(s) of the flowgate.

Incorporating Margins when calculating the Total Transfer Capability (TTC) for a given path is described below:

[1] This definition consistent with the NERC Planning Standards Section 1E2 as drafted for due process in October 1999

CBM, TRM and TTC are determined as follows:

$CBM_{AB} = FG_{CBM}/DF_{AB}$ or Cap Path CBM_{AB} value

$TRM_{AB} = FG_{TRM}/DF_{AB}$

$TTC_{AB} = ATC_{AB} + Resv_{Only\ A\ to\ B}$ (not net of reservations, includes all reservations used to calculate the path ATC) $+CBM_{AB}$ $+TRM_{AB}$ or Cap Path TTC_{AB}

TTC will be based on the non- firm calculation and then be used for the firm and non-firm TTC posting.

6 OASIS

6.1 Calculation Frequency for all Paths on OASIS

AFC and ATC values will be recalculated by the AFC/ATC engine according to the following schedule:

ATC for the next 168 Hours will be calculated every 2 hours

Daily ATC Values will be determined for days 8 through 35 once per day.

Weekly ATC values for the next 5 weeks will be calculated three times per week or as required by system conditions.

Monthly ATC values for the next 18 months will be calculated once per week or as required by changes in system conditions

The most recent TTC/ATC values determined by the ATC/AFC converter for each path are posted on the OASIS.

6.2 Using OASIS to Process Transmission Service Requests (TSRs)

The PJM OASIS will receive new AFC, ATC and POR/POD reference distribution factor values from the AFC/ATC engine every time it is executed. The POR/POD reference distribution factors are converted to path distribution factors for all flowgates being monitored.

The OASIS will automatically process and accept the following TSRs based on ATC:

All non-firm

All daily and weekly firms

The automated evaluation process will also be utilized to screen the monthly TSRs which will be further analyzed by an off-line via a full network analysis (i.e. simulate valid contingencies and monitor all relevant transmission):

All yearly TSRs will be analyzed off-line via a full network analysis.

TSRs evaluated via the automated process will be studied using the following criteria:

Transmission service can only be requested for a posted path

The requested amount will be accepted or refused based on the posted path ATC

A flowgate to path distribution factor cutoff will be used (currently 3-5%)

6.3 Refreshing AFC and ATC Values on the OASIS

To update the AFC/ATC values The OASIS will use factors developed by the AFC engine to update the AFC/ATC values on a more frequent basis. These processes are the instantaneous decrement, and the 15 minute AFC/ATC recalculation. The instantaneous decrementor uses path sensitivity factors supplied by the AFC/ATC engine to update ATC for paths affected by a given reservation. The 15 minute AFC/ATC recalculation uses factors supplied by the AFC/ATC engine to update flowgate AFC based on all reservation received by the PJM OASIS since the last update and recalculates the path ATC based on the most limiting flowgate. This process is depicted below:

AFC/ATC 15 Minute and Instantaneous Decrement Process

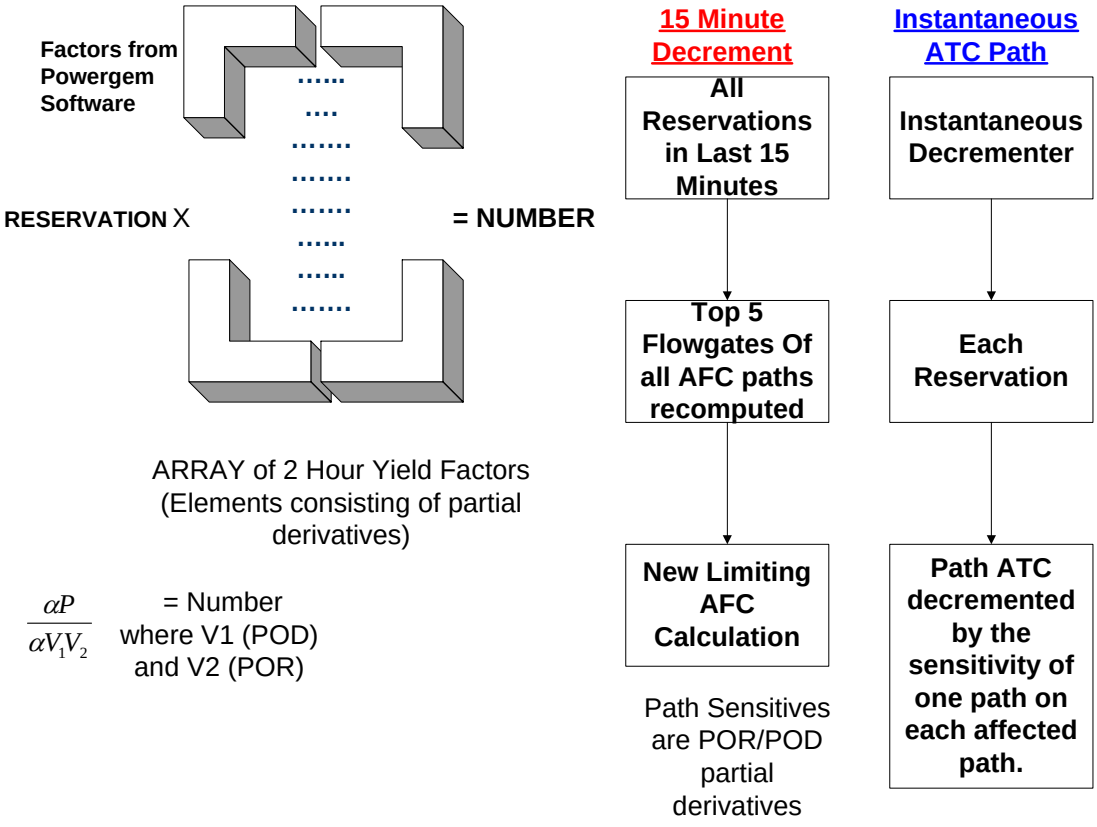


Exhibit 2

The instantaneous decrementor will update ATC values upon acceptance of each reservation. The requested path will be decremented by the amount of the reservation while all other paths that are negatively impacted will be decremented using sensitivity factors that were calculated during the last execution of the AFC/ATC engine.

The AFC/ATC recalculator runs every 15 minutes. The AFC values of the top several limiting flowgates for a path are recalculated to reflect all transmission service accepted on the PJM OASIS since the last update, and the path ATC is recalculated based on the now most limiting flowgate for that path. AFC's are decremented regardless of the distribution factor magnitude. AFC's are fully updated each time new values are received from the AFC/ATC engine.

7 Appendix – Description of Business Processes for Transmission Owners (AEP/ComEd/DPL)

7.1 Introduction

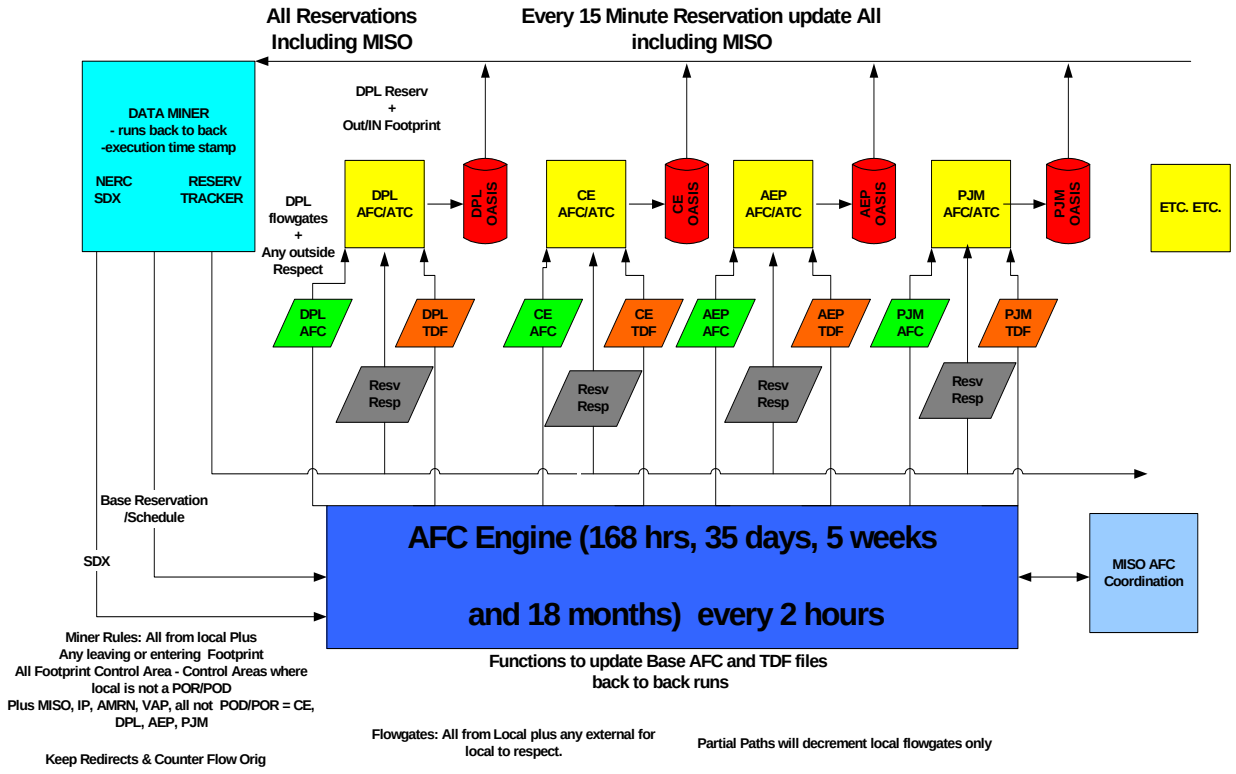
The June 1st implementation will consist of new ATC values being provided to AEP, CE, and DPL. These new values will be generated by PJM's revised AFC Engine process and will be posted to the TO's respective OASIS. The systems included in the AFC Engine will include the PSSE, MUST, AFC Discriminator, AFC/ATC Converter, Data Miner, the individual OASIS nodes, and various bridges. The 6/1 implementation is a signifigant milestone towards Market Integration for the above-mentioned Transmission Owners (TOs). During the interim period of time between the 6/1 implementations and full market integration, the PJM AFC Engine will be generating AFC numbers specifically for each TO. TO Transmission Service Integration into the AFC/ATC process will conform to each TO's business rules and practices.

AEP Specific Business Process Description (Add Input here)

ComEd Specific Business Process Description (Add Input here)

DPL Specific Business Process Description (Add Input here)

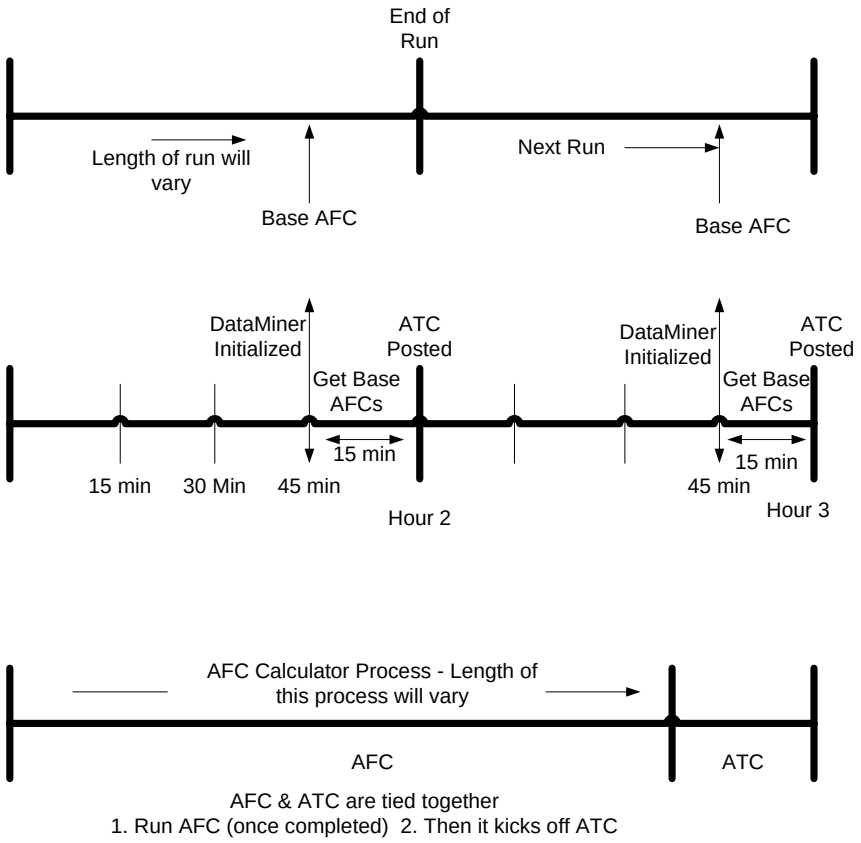
7.2 AFC Diagrams



The diagram shown above depicts the general AFC processes that will be used for the 6/1 implementation. The AFC process begins with the Data Miner. The Data Miner is planned to run approximately every 30 minutes and will pull all reservations made since the last run from each of the OASIS nodes listed above. The mined reservations will be evaluated, and depending on which paths are affected, the reservation information will be placed in the correct OASIS. During this process, values will be passed through the data miner and into the AFC/ATC converter. The converted ATC values will then be passed to the respective OASIS nodes. The reservations from the data miner will be processed

by the OASIS node, ensuring that ATC values across all nodes accurately reflect other control areas. The process will loop back around and be passed to the Data Miner, where the process will continue every 30 minutes. The AFC Engine will run every 4 hours and will process (among other information) SDX (Security Data Exchange), Base Reservations, schedules from the Data Miner, and MISO AFC Coordination information. Upon completion of the AFC Engine process, new AFC and TDF values will be sent to each AFC/ATC converter, and then on to the OASIS nodes.

AFC Timeline



Process 1 - AFC Engine Calculates Base AFC's and Builds Load Flow models. Runs start to finish. As soon as it completes, it starts again. At the end of each run, the calculation process begins.

Process 2 - ATC Engine (15 minute process that runs once an hour). Estimated to take 15 mins to run. Will Calculate ATC's for the 4 ATC Sites (DPL, CE, AEP, PJM etc). Cycle Begins with Data Miner, Reservation Tracker will then run. Use's whatever Base AFC's are available for input.

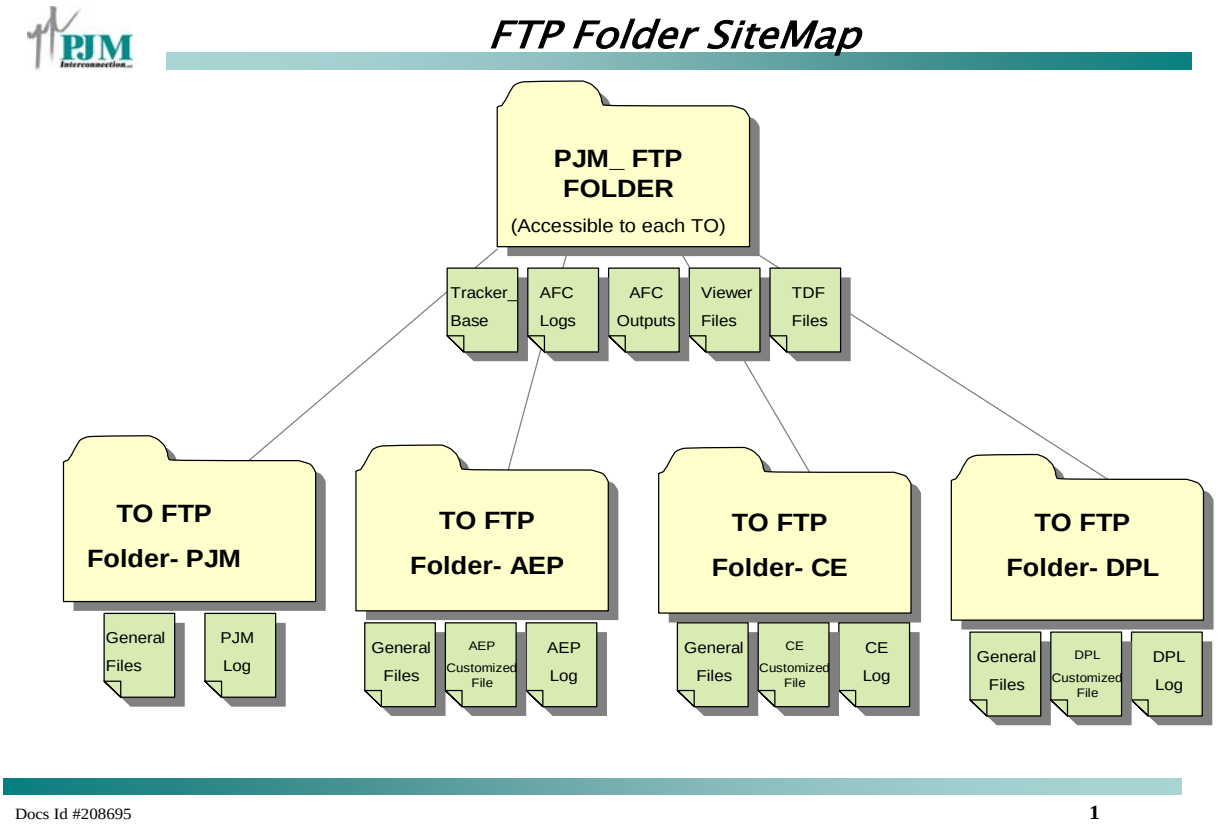
Process 3 - (Specifically for ComEd) Starts with initializing the AFC Calculator. Upon completion, initiates ATC calculator with Data Miner. Runs once a day, starting at Midnight. AFC & ATC are tied together. This process terminates with ATC's being posted to ComEd FTP site.

As shown in the diagram above, there are three processes within the AFC Engine. The first process calculates base AFC's and builds Load Flow Models. This process runs continuously, and the output is sent to the individual AFC/ATC Converters upon completion.

During the second process, the AFC/ATC Converter will receive reservation information from the data miner, and send the converted ATC values to the four OASIS sites. This process will take approximately 15 minutes to complete. This process begins with the initialization of the Data Miner, where Base AFCs are grabbed. The Data Miner automatically collects transmission and ancillary reservations and offerings from the

nodes on a periodic basis. The Data Miner will provide the reservation tracker will the following information: reservations for available flow gate capacity and available transfer capacity calculations. The reservation information will be included in the Base Case. This process will generate a timestamp file (PJMrunatc.csv), which indicates the files to be mined by the Data Miner. The reservation tracker will follow once the Data Miner is initialized.

7.3 PJM FTP Folder SiteMap



PJM_FTP Folder

The PJM_FTP folder is the General Folder which will contain the following files: Tracker_Base, AFC Logs, AFC Output Files, TDF Output Files and Viewer Files. These files will be accessible to each TO (PJM, AEP, CE and DPL).

- The Tracker_Base file - is a input file containing the schedules and base reservations. It is created prior to running the AFC Calculator.

- AFC (Available Flowgate Capability) Log - are the logs generated from the execution of the AFC Calculator.
- AFC Outputs - added by request--are the output files from the AFC Calculator.
- TDF Outputs - added by request--are the output files from the AFC Calculator.
- Viewer Files - are the static input files.

FTP Folder AEP

Each TO FTP folder will contain the following three files: General File, Customized File and the TO specific log.

General Files

The General File includes the tracker_respAEP input file containing reservations and Seven Types of Output Files from the AFC to ATC Converter (AFC, ATC, CBM, Sysinfo, TDF, TRM, and TTC). For each Type file there is a corresponding Product File (hourly_nfirm, daily_firm, daily_nfirm, weekly_firm, weekly_nfirm, monthly_firm, and monthly_nfirm,).

Customized Files

The Customized Files contains csv files that have been specified by each TO. These files will be specific to each TO.

TO Log

The TO Log contains the log files from the execution of the AFC to ATC Converter for each TO on the seven products (daily_firm, daily_nfirm, hourly_nfirm, monthly_firm, monthly_nfirm, weekly_firm, and weekly_nfirm).

General File

The General File contains the following Type csv files: AFC, ATC, CBM, Sysinfo, TDF, TRM, and TTC. Within each of the Type csv Files, there are Seven Product csv Files (daily_firm, daily_nfirm, hourly_nfirm, monthly_firm, monthly_nfirm, weekly_firm, and weekly_nfirm).

- The AFC file contains Available Flowgate Capability for each product (daily_firm, daily_nfirm, hourly_nfirm, monthly_firm, monthly_nfirm, weekly_firm, and weekly_nfirm).

- The ATC file contains Available Transfer Capability data for each of the seven products (daily_firm, daily_nfirm, hourly_nfirm, monthly_firm, monthly_nfirm, weekly_firm, and weekly_nfirm).

- The Capacity Benefit Margin or CBM information is contained in each product csv file (daily_firm, daily_nfirm, hourly_nfirm, monthly_firm, monthly_nfirm, weekly_firm, and weekly_nfirm). The Capacity Benefit Margin information is the amount of firm transmission transfer capability preserved by PJM for Load Serving Entities (LSEs) within a control area to enable access by the LSEs to generation in PJM for from interconnected systems to meet generation reliability requirements.

- Sysinfo files contains data for each of the seven products (daily_firm, daily_nfirm, hourly_nfirm, monthly_firm, monthly_nfirm, weekly_firm, and weekly_nfirm).

- TDF csv files contain information on the path decrement matrix where related paths are decremented according to submitted reservations. There are also seven product files for the TDF group file.

- The TRM files store Transmission Reliability Margins information for each of the seven products. The TRM csv files will contain information on the amount of transmission transfer capability necessary to provide a reasonable level of assurance that the interconnected transmission network will be secure.

- The TTC or Total Transfer Capability also contains seven files for each of the seven products.

AEP Customized Output File

The AEP Customized Output Files contains csv files that have been prepared at the same time as the General output files. The three files have been customized according to AEP specifications and file format.

- The atcrun.csv file contains three timestamps of when the reservation data minning was performed for each of the time horizons (hourly, daily, monthly, and weekly)

- The SystemDataFull.csv file stores the full set of values for hourly, daily, and monthly time horizon. The ATC values will cover the entire time period from hour 1 to the end of the 18th month and no time period overlaps will be included.

- The SystemData.csv file contains values that have changed by more than 10% from the last full set of ATC values according to the same time slots. This 10% comparison will be based on rounded-up values.

Each of the three files will contain the following:

- All time stamp information will be in GMT

- ATCs will be calculated for a defined list of paths (those posted on the AEP OASIS site). Current count of paths is 130.

AEP Log

The AEP Log contains historical data for the seven products (daily_firm, daily_nfirm, hourly_nfirm, monthly_firm, monthly_nfirm, weekly_firm, and weekly_nfirm).