



Available Transfer Capability Implementation Document (ATCID)

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Revision History

Date	Rev	Description	Author	Approved By
Apr. 2, 2020	0	New Document.	J. Leason	D. Ernst

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1.0 Purpose

The FortisBC Available Transfer Capability Implementation Document (ATCID) identifies the methodologies used by FortisBC for determining the Total Transfer Capability (TTC) or Total Flowgate Capability (TFC) and calculating Available Transfer Capability (ATC) or Available Flowgate Capability (AFC) for each applicable path in the FortisBC System. It includes information describing how the selected methodology has been implemented in such detail that, given the same information, the results of the ATC or AFC calculations can be validated.¹ This document is intended to provide documentation to comply with specific BC Mandatory Reliability Standards (MRS).²

2.0 Responsibility

FortisBC Control Centre management is responsible for maintaining this document. This operating order should be reviewed and updated as required by FortisBC Control Centre operating personnel and staff.³

This document shall be communicated to the following entities before implementing a new or revised ATCID:

- Alberta Electric System Operator (adjacent Planning Coordinator and adjacent Reliability Coordinator)
- British Columbia Reliability Coordinator (BCRC)
- BC Hydro (Planning Coordinator and adjacent Transmission Service Provider)
- Bonneville Power Administration (adjacent Planning Coordinator and adjacent Transmission Service Provider)
- California Independent System Operator – RC West (adjacent Reliability Coordinator)⁴

FortisBC is registered as both the Transmission Operator and Transmission Service Provider for the entire FortisBC electrical service area.⁵

3.0 Methodologies

FortisBC has selected the Rated System Path Methodology for all applicable ATC Paths within the FortisBC electrical system operating area.⁶ ATC Paths within the FortisBC area are defined in [Appendix A](#).

FortisBC utilizes Western Electricity Coordinating Council (WECC) published base case models that include data, assumptions, and consistent time periods to represent the Western Interconnection's generation and transmission system for calculating TTCs and include the following items:⁷

- The FortisBC electrical service area with detailed representation of facilities 60kV and above.⁸
- All neighbouring Transmission Operator areas (may be an equivalent representation).⁹

¹ (MOD-001-1a, R3.1)

² (MOD-001-1a, MOD-004-1, MOD-008-1, MOD-028-2, MOD-029-2a, and MOD-030-3)

³ (MOD-001-1a, R3)

⁴ (MOD-001-1a, R4, R4.1, R4.2, R4.4, R4.5, R4.6, and R5)

⁵ (MOD-001-1a, R4.3)

⁶ (MOD-001-1a, R1)

⁷ (MOD-029-2a, R1 and R1.1)

⁸ (MOD-029-2a, R1.1.1 and R1.1.1.1)

⁹ (MOD-029-2a, R1.1.1 and R1.1.1.2)

- 1 • Any other Transmission Operator area linked to the FortisBC system by joint operating
- 2 agreement (may be an equivalent representation).¹⁰
- 3 • Models all system Elements as in-service for the assumed initial conditions.¹¹
- 4 • Models all generation (may be either a single generator or multiple generators) that is greater
- 5 than 20 MVA at the point of interconnection in the studied area.¹²
- 6 • Models phase shifters in non-regulating mode, unless otherwise specified in this ATCID.¹³
- 7 • Uses Load forecast by the Balancing Authority (BC Hydro) or FortisBC Load forecasts for internal
- 8 ATC paths as applicable which may be based on the FortisBC calculated monthly Peak weekday
- 9 and/or Peak weekend forecast values for any hour.¹⁴
- 10 • Uses Transmission Facility additions and retirements.¹⁵
- 11 • Uses Generation Facility additions and retirements.¹⁶
- 12 • Uses Remedial Action Scheme (RAS) models where currently existing or projected for
- 13 implementation within the studied time horizon.¹⁷
- 14 • Models series compensation for each line at the expected operating level unless specified
- 15 otherwise in this ATCID.¹⁸
- 16 • Includes any other modeling requirements or criteria specified in this ATCID.¹⁹
- 17 • Uses Facility Ratings as defined in FortisBC Operating Order 7TR-101 (Facility Ratings).²⁰
- 18

19 FortisBC uses the following process to determine TTC:²¹

- 20
- 21 • Adjust base case generation and Load levels within the updated power flow model to determine
- 22 the TTC (maximum flow or reliability limit) that can be simulated on the ATC Path while at the
- 23 same time satisfying all planning criteria contingencies as follows:²²
 - 24 ○ When modeling normal conditions, all Transmission Elements will be modeled at or
 - 25 below 100% of their continuous rating.²³
 - 26 ○ When modeling contingencies the system shall demonstrate transient, dynamic and
 - 27 voltage stability, with no Transmission Element modeled above its Emergency Rating.²⁴
 - 28 ○ Uncontrolled separation shall not occur.²⁵
- 29 • Where it is impossible to actually simulate a reliability-limited flow in a direction counter to
- 30 prevailing flows (on an alternating current Transmission line), set the TTC for the non-prevailing
- 31 direction equal to the TTC in the prevailing direction. If the TTC in the prevailing flow direction is
- 32 dependent on a Remedial Action Scheme (RAS), set the TTC for the non-prevailing flow direction
- 33 equal to the greater of the maximum flow that can be simulated in the non-prevailing flow
- 34 direction or the maximum TTC that can be achieved in the prevailing flow direction without use of
- 35 a RAS.²⁶

10 (MOD-029-2a, R1.1.1 and R1.1.1.3)

11 (MOD-029-2a, R1.1.2)

12 (MOD-029-2a, R1.1.3)

13 (MOD-029-2a, R1.1.4)

14 (MOD-029-2a, R1.1.5)

15 (MOD-029-2a, R1.1.6)

16 (MOD-029-2a, R1.1.7)

17 (MOD-029-2a, R1.1.8)

18 (MOD-029-2a, R1.1.9)

19 (MOD-029-2a, R1.1.10)

20 (MOD-029-2a, R1.2)

21 (MOD-029-2a, R2)

22 (MOD-029-2a, R2.1)

23 (MOD-029-2a, R2.1.1)

24 (MOD-029-2a, R2.1.2)

25 (MOD-029-2a, R2.1.3)

26 (MOD-029-2a, R2.2)

- 1 • For an ATC Path whose capacity is limited by contract, set TTC on the ATC Path at the lesser of
- 2 the maximum allowable contract capacity or the determined reliability.²⁷
- 3 • For an ATC Path whose TTC varies due to simultaneous interaction with one or more other
- 4 paths, develop a nomogram describing the interaction of the paths and the resulting TTC under
- 5 specified conditions.²⁸
- 6 • FortisBC shall identify when the TTC for the ATC Path being studied has an adverse impact on
- 7 the TTC value of any existing path and shall include the resolution of this adverse impact in the
- 8 study report for the ATC Path.²⁹
- 9 • Where multiple ownership of Transmission rights exists on an ATC Path, allocate TTC of that
- 10 ATC Path in accordance with the contractual agreement made by the multiple owners of that ATC
- 11 Path.³⁰
- 12 • For ATC Paths whose path rating, adjusted for seasonal variance, was established, known and
- 13 used in operation since January 1, 1994, and no action has been taken to have the path rated
- 14 using a different method, set the TTC at that previously established amount.³¹

15
16 FortisBC will create a study report that describes the steps above that were undertaken, including the
17 contingencies and assumptions used, when determining the TTC and the results of the study. Where
18 three phase fault damping is used to determine stability limits, that report shall also identify the percent
19 used and include justification for use unless specified otherwise in this ATCID.³²

20
21 FortisBC is registered as both the Transmission Operator and Transmission Service Provider for the
22 entire FortisBC electrical service area including all ATC Paths, therefore the most current TTC values and
23 TTC study reports are communicated internally.³³

24
25 When calculating ATC and TTC, FortisBC uses assumptions no more limiting than those used in the
26 planning of operations for the corresponding time period studied, provided that such planning of
27 operations has been performed for that period.³⁴

28
29 FortisBC does not currently maintain a Capacity Benefit Margin (CBM) for any ATC Paths, therefore,
30 FortisBC sets CBM to zero for all of its ATC Paths for all time periods.³⁵

31
32 FortisBC does not currently maintain a Transmission Reliability Margin (TRM) for any ATC Paths,
33 therefore, FortisBC sets TRM to zero for all of its ATC Paths for all time periods.³⁶

34
35 FortisBC does not currently use the Area Interchange Methodology to calculate TTCs or ATCs for ATC
36 Paths.³⁷

37
38 FortisBC does not currently use the Flowgate Methodology to calculate TTCs or AFCs for AFC Paths.³⁸

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²⁷ (MOD-029-2a, R2.3)

²⁸ (MOD-029-2a, R2.4)

²⁹ (MOD-029-2a, R2.5)

³⁰ (MOD-029-2a, R2.6)

³¹ (MOD-029-2a, R2.7)

³² (MOD-029-2a, R2.8)

³³ (MOD-029-2a, R4)

³⁴ (MOD-001-1a, R6 and R7)

³⁵ (MOD-004-1)

³⁶ (MOD-008-1)

³⁷ (MOD-028-2)

³⁸ (MOD-030-3)

4.0 Outages

Planned system outages are studied in advance to assess the impact an outage may have on a specific path's TTC for the expected conditions during the outage. TTC values on FortisBC ATC paths are adjusted due to generation and transmission outages that affect the TTC values, which are documented in [Appendix A](#).³⁹ The TTC studies determine which system adjustments are necessary to maintain reliability. This provides quantification of the TTC impact and any potential curtailment requirements. Some paths also have operator guidelines on TTC impacts for unplanned outages.

4.1 Outages in Effect for Part of a Day

For an outage that is in effect part of a day, the hourly ATC will be reduced by the indicated amount for any hours after the start time and any hours prior to the end time. The daily ATC calculation will be set to the minimum hourly ATC.⁴⁰

4.2 Outages in Effect for Part of a Month

Outages in effect for part of a month will be determined from the starting date and time and ending date and time. The daily ATC for any days within the month will be set to the minimum ATC for any hour for the day and the monthly ATC will be set to the minimum daily ATC during the month.⁴¹

4.3 Other Outages

All transmission studies are performed as off-line studies with sufficient detail to assess impacts of outages from other Transmission Service Providers within the model. Outages of one Transmission Provider with known impacts on another Transmission Provider or Operator must be communicated sufficiently in advance to allow time for off-line studies to assess TTC and update ATC postings.⁴²

5.0 Allocation Processes

FortisBC uses the same methodology to allocate transfer capability among multiple lines or sub-paths within a larger ATC Path as it uses to allocate transfer capability among multiple owners or users of an ATC Path. FortisBC does not currently have any ATC Paths with multiple owners. FortisBC does not allocate transfer capabilities between Transmission Service Providers to address forward-looking congestion management and seams coordination.⁴³

³⁹ (MOD-001-1a, R3.6)

⁴⁰ (MOD-001-1a, R3.6.1)

⁴¹ (MOD-001-1a, R3.6.2)

⁴² (MOD-001-1a, R3.6.3)

⁴³ (MOD-001-1a, R3.5)

6.0 Calculations

FortisBC offers the following Transmission Service products as defined in the FortisBC Transmission Access Terms and Conditions Tariff Supplement No. 7:

1. **Long Term Firm Point-To-Point Transmission Service (LTPTP_F)**
Transmission Service that is reserved and/or scheduled between specified Points of Receipt and Delivery with a term of one (1) year or more.
2. **Short Term Firm Point-To-Point Transmission Service (STPTP_F)**
Transmission Service that is reserved and/or scheduled between specified Points of Receipt and Delivery with a minimum term of one (1) hour and a maximum term of less than one (1) year.
3. **Non-Firm Point-To-Point Transmission Service (PTP_{NF})**
Transmission Service that is reserved and scheduled on an as available basis and is subject to curtailment or interruption which is available on a stand-alone basis for periods ranging from one (1) hour to less than one (1) year.
4. **Network Integration Transmission Service (NITS_F)**
Transmission Service that allows the network customer to integrate, economically dispatch, and regulate the current and planned network resources to serve its network load in a manner comparable to that in which FortisBC utilizes the FortisBC Transmission System to serve its Native Load. Network Integration Transmission Service also may be used by the network customer to deliver economy energy purchases to its network load from non-designated resources on an as-available basis without additional charge.

6.1 Intervals and Update Frequency

FortisBC's calculated ATC values are calculated for the intervals and frequency as outlined below:

- Hourly values, once per hour, for the next 48 hours.
- Daily values, once per day, for the next 31 calendar days.
- Monthly values, once per week, for the next 12 months (months 2-13).⁴⁴

FortisBC calculates the ATC for each ATC Path, using the ATC spreadsheet, which is based on the FortisBC load forecast and Point-to-Point reservation components of the ATC algorithms as discussed below. FortisBC's calculation of ATC is performed and values are updated for the intervals listed above if there is a change in any value of any component in the ATC spreadsheet within the ATC algorithm.

⁴⁴ (MOD-001-1a, R2, R2.1, R2.2, R2.3, R8, R8.1, R8.2, and R8.3)

6.2 Calculating Firm Existing Transmission Commitments (ETC_F)

When calculating ETC_F for all time periods for ATC Paths, FortisBC uses the following algorithm:⁴⁵

$$\text{ETC}_F = \text{NL}_F + \text{NITS}_F + \text{GF}_F + \text{PTP}_F + \text{ROR}_F + \text{OS}_F$$

Where:

NL_F is the firm capacity set aside to serve peak Native Load forecast commitments for the time period being calculated, to include losses and Load growth, not otherwise included in TRM or CBM.

NITS_F is the firm capacity reserved for Network Integration Transmission Service serving Load, to include losses and Load growth, not otherwise included in TRM or CBM.

GF_F is the firm capacity set aside for grandfathered Transmission Service and contracts for energy and/or Transmission Service, executed prior to the effective date of the FortisBC Transmission Access Terms and Conditions Tariff Supplement No. 7.

PTP_F is the firm capacity reserved for confirmed Point-to-Point Transmission Service

In FortisBC's calculations, PTP_F is equal to the sum of the MVA Demands of Long Term Firm Point-To-Point Transmission Service (LTPTP_F) and Short Term Firm Point-To-Point Transmission Service (STPTP_F) reservations or schedules under FortisBC Tariff Supplement #7.

ROR_F is the firm capacity reserved for roll-over rights for contracts granting Transmission Customers the right of first refusal to take or continue to take Transmission Service when the Transmission Customer's Transmission Service contract expires or is eligible for renewal.

OS_F is the firm capacity reserved for any other service(s), contract(s), or Agreement(s) not specified above using Firm Transmission Service.

⁴⁵ (MOD-029-2a, R5)

6.3 Calculating Firm Available Transfer Capability (ATC_F)

When calculating ATC_F for ATC Paths for all time periods, FortisBC uses the following algorithm:⁴⁶

$$\mathbf{ATC_F = TTC - ETC_F - CBM - TRM + POSTBACKS_F + COUNTERFLOWS_F}$$

Where:

ATC_F is the firm Available Transfer Capability for the ATC Path for that period.

TTC is the Total Transfer Capability for that ATC Path for that time period.

FortisBC will use the lesser of the TTC value as calculated in Section 3 or any System Operating Limit (SOL) to calculate ATC for each defined Path.⁴⁷

ETC_F is the sum of existing firm commitments for that ATC Path during that period.

CBM is the Capacity Benefit Margin for the ATC Path during that period.

FortisBC does not maintain CBM, therefore, FortisBC sets CBM equal to zero for all ATC Paths for all time periods.

TRM is the Transmission Reliability Margin for the ATC Path during that period.

FortisBC does not maintain TRM, therefore, FortisBC sets TRM equal to zero for all ATC Paths for all time periods.

POSTBACKS_F are changes to ATC_F due to a change in the use of Transmission Service for that period, as defined in FortisBC business practices.

FortisBC does not use POSTBACKS_F for calculating ATC_F, therefore, FortisBC sets POSTBACKS_F equal to zero for all ATC Paths for all time periods.

COUNTERFLOWS_F are adjustments to ATC_F as determined by FortisBC and specified in the ATCID.

FortisBC does not use COUNTERFLOWS_F for calculating ATC_F, therefore, FortisBC sets COUNTERFLOWS_F equal to zero for all ATC Paths for all time periods.⁴⁸

As a result, FortisBC calculates ATC_F for all ATC Paths for all time periods as follows:

$$\mathbf{ATC_F = TTC - ETC_F}$$

⁴⁶ (MOD-029-2a, R7)

⁴⁷ (MOD-029-2a, R3)

⁴⁸ (MOD-001-1a, R3.2, R3.2.1, and R3.2.2)

6.4 Calculating Non-Firm Existing Transmission Commitments (ETC_{NF})

FortisBC calculates ETC_{NF} for all time periods for ATC Paths using the following algorithm:⁴⁹

$$\text{ETC}_{\text{NF}} = \text{NITS}_{\text{NF}} + \text{GF}_{\text{NF}} + \text{PTP}_{\text{NF}} + \text{OS}_{\text{NF}}$$

Where:

NITS_{NF} is the non-firm capacity set aside for Network Integration Transmission Service serving Load (i.e., secondary service), to include losses and Load growth not otherwise included in TRM or CBM.

GF_{NF} is the non-firm capacity set aside for grandfathered Transmission Service and contracts for energy and/or Transmission Service, where executed prior to the effective date of the FortisBC Transmission Access Terms and Conditions Tariff Supplement No. 7.

PTP_{NF} is non-firm capacity reserved or scheduled for confirmed PTP Transmission Service.

OS_{NF} is the non-firm capacity reserved for any other service(s), contract(s), or Agreement(s) not specified above using Non-Firm Transmission Service.

⁴⁹ (MOD-029-2a, R6)

6.5 Calculating Non-Firm Available Transfer Capability (ATC_{NF})

FortisBC calculates ATC_{NF} for all time periods for ATC Paths using the following algorithm:⁵⁰

$$\mathbf{ATC_{NF} = TTC - ETC_F - ETC_{NF} - CBM_S - TRM_U + POSTBACKS_{NF} + COUNTERFLOWS_{NF}}$$

Where:

ATC_{NF} is the non-firm Available Transfer Capability for the ATC Path for that period.

TTC is the Total Transfer Capability of the ATC Path for that period.

FortisBC will use the lesser of the TTC value as calculated in Section 3 or any System Operating Limit (SOL) to calculate ATC for each defined Path.⁵¹

ETC_F is the sum of existing firm commitments for the ATC Path during that period.

ETC_{NF} is the sum of existing non-firm commitments for the ATC Path during that period.

CBM_S is the Capacity Benefit Margin that has been scheduled for the ATC Path during that period.

FortisBC does not maintain CBM, therefore, FortisBC sets CBM equal to zero for all ATC Paths for all time periods.

TRM_U is the Transmission Reliability Margin for the ATC Path that has not been released for sale as non-firm capacity during that period.

FortisBC does not maintain TRM, therefore, FortisBC sets TRM equal to zero for all ATC Paths for all time periods.

POSTBACKS_{NF} are changes to ATC_{NF} due to a change in the use of Transmission Service for that period, as defined in FortisBC business practices.

FortisBC does not use POSTBACKS_{NF} for calculating ATC_{NF}, therefore, FortisBC sets POSTBACKS_{NF} equal to zero for all ATC Paths for all time periods.

COUNTERFLOWS_{NF} are adjustments to ATC_{NF} as determined by FortisBC and specified in the ATCID.

FortisBC does not use COUNTERFLOWS_{NF} for calculating ATC_{NF}, therefore, FortisBC sets COUNTERFLOWS_{NF} equal to zero for all ATC Paths for all time periods.⁵²

As a result, FortisBC calculates ATC_{NF} for all ATC Paths for all time periods as follows:

$$\mathbf{ATC_{NF} = TTC - ETC_F - ETC_{NF}}$$

⁵⁰ (MOD-029-2a, R8)

⁵¹ (MOD-029-2a, R3)

⁵² (MOD-001-1a, R3.2, R3.2.1, and R3.2.2)

7.0 Data Requests

FortisBC will begin to provide data as described below solely for use in the requestor's ATC or AFC calculations, within 30 calendar days of receiving a request by any Transmission Service Provider, Planning Coordinator, Reliability Coordinator, or Transmission Operator.⁵³ The data requested must be used or maintained by FortisBC in its transfer or Flowgate capability calculations, and will be provided in the format maintained by FortisBC for up to 13 months into the future, subject to confidentiality and security requirements.⁵⁴ FortisBC will make this data available on a schedule specified by the requestor but no more frequently than once per hour, unless by mutual agreement.⁵⁵

Data that will be provided is as follows:

- Expected generation and transmission outages, additions, and retirements.
- Load forecasts.
- Unit commitments and order of dispatch, to include all designated network resources and other resources that are committed or have the legal obligation to run, as they are expected to run, in one of the following formats chosen by the data provider:
 - Dispatch order.
 - Participation factors.
 - Block dispatch.
- Aggregated firm capacity set-aside for Network Integration Transmission Service and aggregated non-firm capacity set aside for Network Integration Transmission Service (i.e. Secondary Service).
- Firm and non-firm transmission reservations.
- Aggregated capacity set-aside for grandfathered obligations.
- Firm roll-over rights.
- Any firm and non-firm adjustments applied by the FortisBC to reflect parallel path impacts.
- Power flow models and underlying assumptions.
- Contingencies, provided in one or more of the following formats:
 - A list of Elements.
 - A list of Flowgates.
 - A set of selection criteria that can be applied to the transmission model used by the Transmission Operator and/or Transmission Service Provider.
- Facility Ratings.
- Any other services that impact Existing Transmission Commitments (ETCs).
- Values of Capacity Benefit Margin (CBM) and Transmission Reliability Margin (TRM) for all ATC and AFC Paths.
- Values of AFC and TFC for any Flowgates considered by FortisBC when selling transmission service.
- Values of TTC and ATC for all ATC Paths considered by FortisBC that do not consider Flowgates when selling transmission service.
- Source and sink identification and mapping to the model.

If FortisBC does not use the data requested in its transfer or Flowgate capability calculations, and does not maintain that data, FortisBC shall not be required to make that data available.⁵⁶

⁵³ (MOD-001-1a, R9)

⁵⁴ (MOD-001-1a, R9.1, R9.1.1, and R9.1.2)

⁵⁵ (MOD-001-1a, R9.2)

⁵⁶ (MOD-001-1a, R9.1.3)

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7.1 Data Received for ATC Calculation

FortisBC is registered as both the Transmission Operator and Transmission Service Provider for the entire FortisBC electrical service area and, therefore, provides its own data for use in calculating ATC.⁵⁷

7.2 Data Provided for Transfer Capability

FortisBC provides real-time data via ICCP and outage coordination data to the following neighbouring TOPs and TSPs for their use in calculating transfer capability:

- BC Hydro
- Bonneville Power Administration⁵⁸

⁵⁷ (MOD-001-1a, R3.3)

⁵⁸ (MOD-001-1a, R3.4)

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2
3**Appendix A – FortisBC ATC Paths List**

Path Name	TTC (MVA)	Comments
11L	100	All elements in-service Mar. 1 st to Oct. 31 st .
	90	All elements in-service Nov. 1 st to Feb. 29 th .
	90	34L out-of-service (OOS), 42L must be opened at OLI and 43L load must be supplied by BC Hydro on 56L from Nov. 1 st to Feb. 29 th .
	90	40L OOS, 42L must be opened at OLI and 43L load must be supplied by BC Hydro on 56L from Nov. 1 st to Feb. 29 th .
	90	42L OOS, 43L load must be supplied by BC Hydro on 56L from Nov. 1 st to Feb. 29 th .
	90	48L OOS, 43L load must be supplied by BC Hydro on 56L for all time periods. <ul style="list-style-type: none"> - 3 x WAN generators required online (reliability must run or RMR) from Nov. 1st to Feb. 29th. - 2 x WAN generators required online (RMR) from Mar. 1st to Oct. 31st.
	60	48L OOS, 43L load must be supplied by BC Hydro on 56L for all time periods. <ul style="list-style-type: none"> - 2 x WAN generators required online (reliability must run or RMR) from Nov. 1st to Feb. 29th. - 1 x WAN generators required online (RMR) from Mar. 1st to Oct. 31st.
	80	All time periods if ASM T1 or ASM T2 is OOS.

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