

Baseline 37.1 update Market Manual 3.7 Totalization Table Registration

Revenue Metering Standing Committee & Metering Service Providers Users Group

May 16, 2017

Market Manual 3.7 - Totalization Table Registration

- Baseline Plan 37.1 for Market Facing Documents changing includes implementation of Dynamic Loss Allocation in Market Manual 3.7: Totalization Table Registration which will take effect 7 June 2017
- Market Manual 3: Metering Part 3.7: Totalization Table Registration IMP PRO 0047 v18.1 was published 07 April 2017 and meter participants feedback was due 28 April 2017

<http://www.ieso.ca/-/media/files/ieso/document-library/pending-changes-docs/imppro0047v181.pdf?la=en>

- No comments have been received from market participants.

Market Manual 3.7 – Description of changes

- Section 2.2.6 - Added more detail to section 2.2.6 related to the application of TLF
- Section 2.3.4 - Added Section 2.3.4.1 to explain Dynamic Loss Allocation
- Appendix D - Updated figures in the Metering – Settlement Principles and added note 16 to the General Arrangement Section
- Appendix H – New; Models and Totalization Tables to support Dynamic Loss Allocation

Market Manual 3.7 - Section 2.2.6

2.2.6 Total Loss Factors (TLF)

TLFs take into account distribution losses for *embedded RWMs* to the *defined meter point*. TLF, as approved by the *Ontario Energy Board (OEB)* and communicated by the relevant LDC, can be applied to a physical *meter* or to a summary *meter*, as appropriate.

~~The values for Total Loss Factors must be entered in the same manner as described for MEC factors, above.~~

The IESO will apply the TLF, (the value of which will be as approved by the OEB), only to the delivered channel of the meter. For the received channel, if the value of the TLF has not been agreed upon by the participants (host and embedded), a default value of one (1) will be applied to the received channel.

~~Refer to Appendix D for details.~~

Market Manual 3.7 - Section 2.3.4

Where an agreement is reached amongst *metered market participants*, the Method #1 or Method #2 coefficients can be apportioned by either fixed factor loss allocation, or dynamic loss allocation, which are described in the following sections.

2.3.4.1 Fixed Factor Loss Allocation

The fixed factor loss allocation ratio for load losses could be different than the fixed factor loss allocation ratio for no load losses. The agreed amounts shall meet Chapter 9, Section 2.1A.4.2a of the *market rules* whereby the proportions provided by each *metering service provider* shall reflect agreement amongst all applicable *metering service providers* and shall only be accepted by the *IESO* if the proportions provided by all applicable *metering service providers* sum to one.

Market Manual 3.7 - Section 2.3.4

2.3.4.2 Dynamic Loss Allocation

Dynamic loss allocation is the principle whereby transformation losses and/or radial line losses are apportioned to each metered market participant proportionally by applying an apportionment factor. This factor is based on the ratio of each metered market participant's metered consumption to the sum of all metered market participants' metered consumption. The greater a metered market participant's load for an interval, the greater the proportion of transformation losses and/or radial line losses that will be attributed to that metered market participant.

Metered market participants may agree to allocate transformation load losses and/or radial line losses via dynamic loss allocation, while at the same time allocating the transformation no load losses and/or radial line no load losses via a fixed factor loss allocation.

The allocation ratio for each metered market participant is calculated as the ratios of the net active energy pertaining to that specific metered market participant to the sum of net active energy of all metered market participants sharing the transformation losses and/or radial line losses.

Market Manual 3.7 - Section 2.3.4

These ratios are calculated for each metering interval.

$$\text{ratio}_{\text{MMPi}} = \frac{\text{Abs}(\sum \text{Active Energy Delivered}_{\text{MMPi}} - \sum \text{Active Energy Received}_{\text{MMPi}})}{\sum_i^n \text{Abs}(\sum \text{Active Energy Delivered}_{\text{MMPi}} - \sum \text{Active Energy Received}_{\text{MMPi}})}$$

If the sum of net active energy of all metered market participants sharing the transformation losses and/or radial line losses is zero, the transformation load losses and/or radial line losses will be allocated equally amongst the metered market participants.

$$\text{ratio}_{\text{MMPi}} = \frac{1}{\sum_i^n \text{MMPi}}$$

The allocation ratios will be calculated by the MDMS system using a 'ratio point' as part of the totalization table. A ratio point (RP) accepts as inputs the same type of units of measure (kWh, V2h, etc.) in all channels and returns as a result the ratio between the input channel value and the sum of all input channels values. If the sum of all input channels value is zero, the result is 1/number of channels. The 'ratio point' is calculated by comparing the individual meter input to the total meter inputs for the transformation losses and/or radial losses.

$$\text{RP}_{\text{out}i} = \frac{|\text{RP}_{\text{in}i}|}{\sum_1^n |\text{RP}_{\text{in}i}|}$$

Market Manual 3.7 - Section 2.3.4

Dynamic loss allocation requires an agreement between metered market participants. Metering data will be available to all metered market participants sharing dynamic loss allocation. The totalization table submitted by each metered market participant's metering service provider will be considered an agreement if each of the tables identifies all meter points as part of the dynamic loss allocation.

All metered market participants connected to the common power system component (i.e. transformer and/or radial line) and using dynamic loss allocation must be directly connected metered market participants.

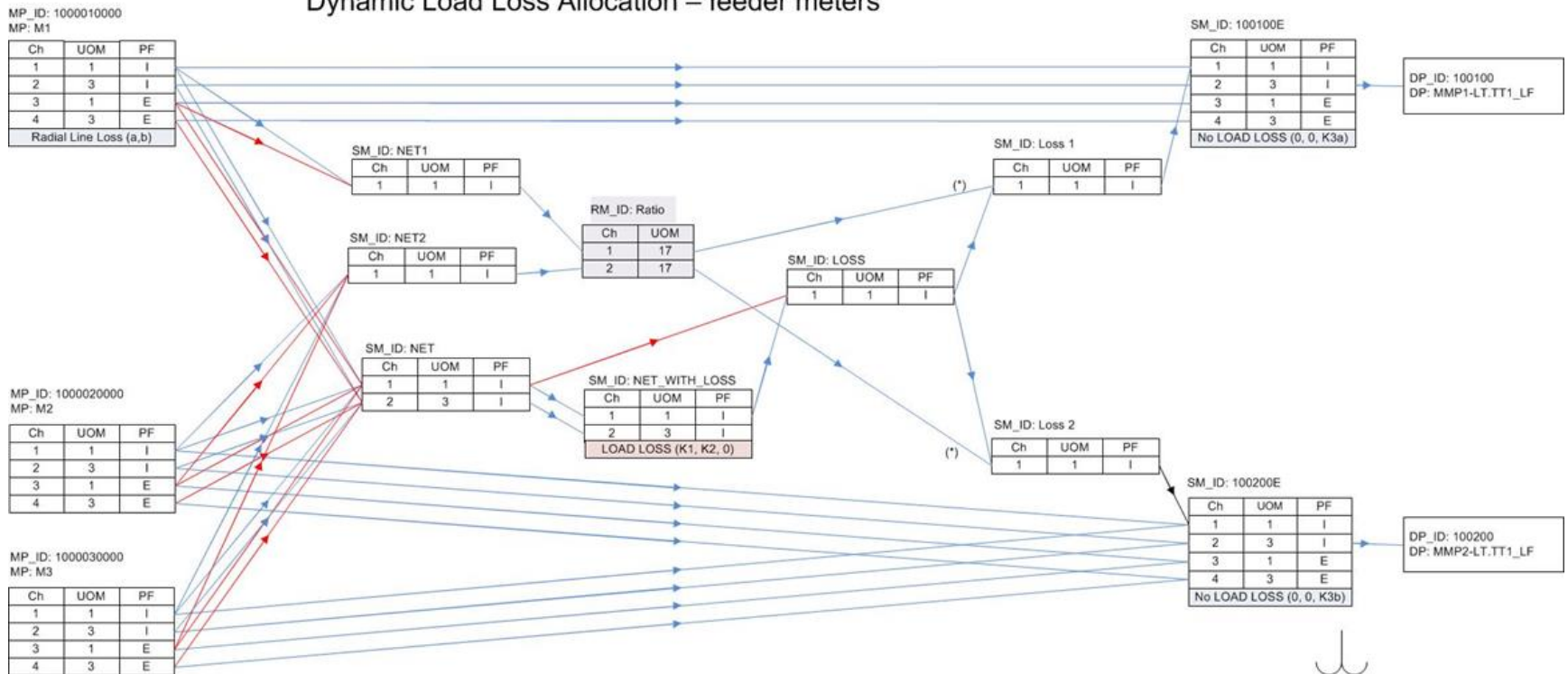
Samples of dynamic loss allocation models and totalization tables are presented in Appendix H.

Market Manual 3.7 - Appendix D - note 16

16. TLF factors are dependent on power flow direction. For the delivered channel, the TLF approved by OEB rate order will be applied. For the received channel, a default value of one (1) will be applied or any other value agreed by the participants

Market Manual 3.7 - Appendix H

Dynamic Load Loss Allocation – feeder meters



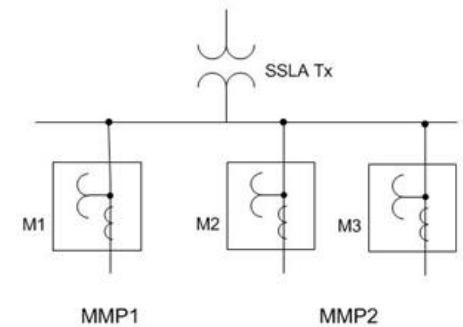
Load Loss - Dynamic allocation

$$\text{Ratio ch1} = \frac{M1 (ch1-ch3)}{M1 (ch1-ch3) + M2 (ch1-ch3) + M3 (ch1-ch3)}$$

$$\text{Ratio ch2} = \frac{M2 (ch1-ch3) + M3 (ch1-ch3)}{M1 (ch1-ch3) + M2 (ch1-ch3) + M3 (ch1-ch3)}$$

No Load Loss - Fix ratio allocation

$$K3 = K3a + K3b$$



Market Manual 3.7 - Appendix H



TOTALIZATION TABLE FORM

Facility Name Transformer TS
Effective Date TBD
MSP ID
Prepared By

MMP Name	Breaker Ratio	
	MMP Feeders	Total Feeders
MMP1	1	3
MMP2	2	3

Non-metered Station Service (kW) _____
 0

Factor	k1	k2	k3
T1 total	0.0373	0.0468	112.73
MMP1	Dynamic	Dynamic	37.5766
MMP2	Dynamic	Dynamic	75.1533

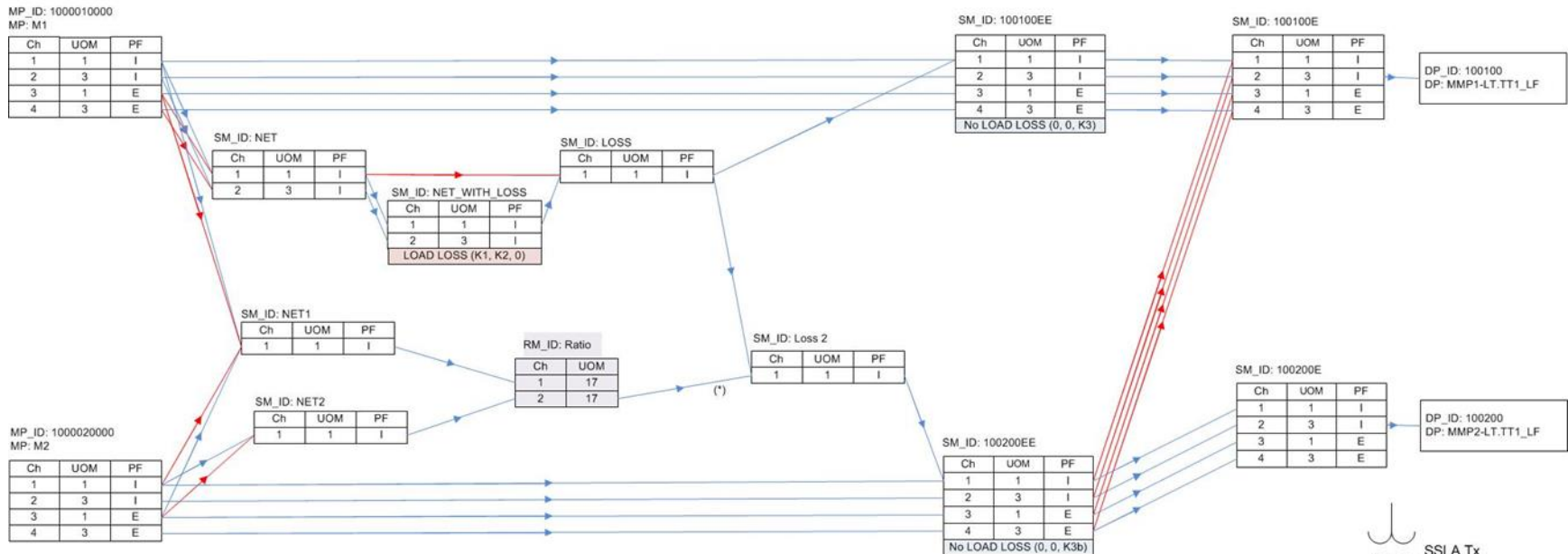
A. ENERGY MARKET

MMP #	DP ID	Summary 1	Summary 2	Meter Point ID	Channel No.	Operator (P or R)	LoIM	Energy Flow Direction	Description of Measured Circuit	Ratio (3 dec.)	MEC	Assumed Voltage	Assumed P.F.	Service Type	CT Ratio	PT Ratio	Transformation		Radial Line		Transformation			Radial Line			TLF							
																	a(V ²)	b(I ²)	e(V ²)	f(I ²)	k ₁	k ₂	k ₃	k ₁	k ₂	k ₃								
1	100100	100100E		1000010000	1	+	1	del	M1		0.0	120	0.95	WYE	80	140																		
					2	+	3	del																										
					3	+	1	rec																										
					4	+	3	rec																										
2	100200	100200E		1000020000	1	+	1	del	M2		0.0																							
					2	+	3	del																										
					3	+	1	rec																										
					4	+	1	rec																										
				1000030000	1	+	1	del	M3		0.0																							
					2	+	3	del																										
					3	+	1	rec																										
					4	+	3	rec																										

- Note 1. Apportioning of T1 Transformation No Load Loss based on load serving breakers (1/3 th for MMP1 and 2/3 for MMP2).
- Note 2. Apportioning of T1 Transformation Load Loss based on dynamic allocation between MMP1 (MPID 1000010000) and MMP2 (MPID 1000020000 and MPID 1000030000).
- Note 3. Radial Line loss coefficients are applied to M1 meter.

Market Manual 3.7 - Appendix H

Dynamic Load Loss Allocation – bus and feeder meters



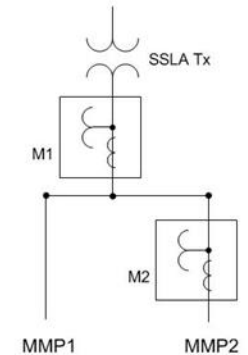
Load Loss - Dynamic allocation

$$\text{Ratio ch1} = M1 (\text{ch1}-\text{ch3}) - M2 (\text{ch1}-\text{ch3}) / M1 (\text{ch1}-\text{ch3})$$

$$\text{Ratio ch2} = M2 (\text{ch1}-\text{ch3}) / M1 (\text{ch1}-\text{ch3})$$

No Load Loss - Fix ratio allocation

$$K3 = K3a + K3b$$



Market Manual 3.7 - Appendix H



TOTALIZATION TABLE FORM

Facility Name Transformer TS
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MSP ID
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MMP Name	Breaker Ratio	
	MMP Feeders	Total Feeders
MMP1	1	2
MMP2	1	2

Non-metered Station Service (kW) _____ 0 _____

Factor	k1	k2	k3
T1total	0.0373	0.0468	112.73
MMP1	Dynamic	Dynamic	56.3650
MMP2	Dynamic	Dynamic	56.3650

A. ENERGY MARKET

MMP #	DPID	Summary 1	Summary 2	Meter Point ID	Channel No.	Operator (+ or -)	LoIM	Energy Flow	Description of Measured Circuit	Ratio (3 dec.)	MEC	Assumed Voltage	Assumed P.L.	Service Type	CT Ratio	PT Ratio	Transformation		Radial Line			TLF					
																	a(V ²)	b(I ²)	e(V ²)	f(I ²)	k ₁		k ₂	k ₃			
1	100100	100100EE	100100EE	1000010000	1	+	1	del	M1		0.0																
					2	+	3	del																			
					3	+	1	rec																			
					4	+	3	rec																			
		100200EE	1000020000	1	-	1	del	M2				0.0							T1Dynamic	T1Dynamic	56.365						
				2	-	3	del																				
				3	-	1	rec																				
				4	-	1	rec																				
2	100200	100200EE	100200EE	1000020000	1	+	1	del	M2		0.0							T1Dynamic	T1Dynamic	56.3650							
					2	+	3	del																			
					3	+	1	rec																			
					4	+	1	rec																			

- Note 1. Apportioning of T1 Transformation No Load Loss based on load serving breakers (1/2 th for MMP1 and 1/2 for MMP2).
 2. Apportioning of T1 Transformation Load Loss based on dynamic allocation between MMP1 (MPID 1000010000) and MMP2 (MPID 1000020000).

Questions

