Appendix C -

New England PMU Registration

Effective Date: March 5, 2024

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TABLE 1 - Substation Information

TABLE 1 - Substation Information Must be completed for each substation from which synchrophasors are provided.		
	Transmission Company:	
Substation Info	***Name:***	
	Location (Street Address):	
	Lat/Long:	
Registry Contact	***Name:***	
	Phone:	
	E-mail:	
PMU Info	***Make:***	
	Model & Number of Devices:	
	Dual/Multi-Function Device? Specify if Yes:	
	Performance Class (P or M) (protection or measurement):	

TABLE 2 - Phasor Information per PMU Device

TABLE 2 - Phasor Information per PMU Device **Must be completed for each device in the substation that provides synchrophasors in C37.118-2005 format.**			
STN (field #8):		***IDCODE (field #9):***	
PHNMR (field #11):		***Channel from which Frequency is derived:***	
CHNAM (field #14) (see Section C.1)	***Synchrophasor channel description including voltage level represented***		
Note: All field numbers refer to Configuration Frame 2 of IEEE Standard C37.118-2005 (See Section D).			

TABLE 3 - Analog Information per PMU Device

TABLE 3 - Analog Information per PMU Device **Must be completed for each device in the substation that provides analogs signals in C37.118-2005 format.**			
STN (field #8):		***IDCODE (field #9):***	
ANNMR (field #12):			
CHNAM (field #14) (see Section C.2)	***Analog channel description including voltage level represented***		
Note: All field numbers refer to Configuration Frame 2 of IEEE Standard C37.118-2005 (See Section D).			

TABLE 4 - Digital Information per PMU Device

TABLE 4 - Digital Information per PMU Device **Must be completed for each device in the substation that provides digital signals in C37.118-2005 format.**			
STN (field #8):		***IDCODE (field #9):***	
DGNMR (field #13):			
bit	***CHNAM (field #14) (see Section C.3)***	***Digital signal description including voltage level represented***	
Note: All field numbers refer to Configuration Frame 2 of IEEE Standard C37.118-2005 (See Section D).			

Section A – Company Abbreviations & PMU/PDC IDCODE*

***Range for New England:* 11,001 through 13,000**			
Company	***Abbreviation***	***Range***	***Total***
ISO New England	NX	11,001 – 11,049	49
Versant Power	BH	11,050 – 11,199	150
VELCO	VE	11,200 – 11,399	200
Central Maine Power	ME	11,400 – 11,599	200
United Illuminating	UI	11,600 – 11,799	200
National Grid	NE	11,800 – 11,999	200
Eversource Boston	BE	12,000 – 12,199	200
Eversource Berlin	CX	12,200 – 12,599	400
Rhode Island Energy	RI	12,600 – 12,624	25
Spare	TBD	12,625 – 13,000	376

Each PDC and PMU in New England must have a unique IDCODE (configuration field #9).

If there are several PMUs at a substation, each must have a unique IDCODE.

Section B – Station Name STN*

Maximum 16 bytes in ASCII format, no spaces		
Field	***Description***	***Size (Byte)***
1	Company Abbreviation (See Section A)	2
2	Separator: underscore (_)	1
3	Station Name and ID if appropriate	13 (max)
3.1	(Optional) Separator: underscore (_)	1 (part of field 3)
3.2	(Optional) Individual device ID within a substation	part of field 3

****Each PMU in New England must have a unique STN (configuration field #8).***

If there are several PMUs at a substation, each must have a unique STN; field 3.2 can be used to distinguish them from one another.

Examples of STN:

PMU Name	***PMU Name Description***
BH_STATIONA	Station A from Versant Power, only has one PMU
CX_STATIONB123_A	Station B, with acronym # 123, from Eversource Berlin, multiple PMUs, device ID: A
VE_STATIONC_1	Station C from VELCO, multiple PMUs, device ID: 1

Section C – Channel Name CHNAM*

C.1 – Phasor Naming Convention

Maximum 16 bytes in ASCII format, no spaces			
#	***Field Description***	***Field Examples***	***Size (Byte)***
1	Asset Type	B – Bus L – Line T – Transformer or Phase Shifter G – GSU High Side or Low Side (Generator)	1
2	Nominal Voltage (kV)	765, 500, 345, 230, 138, 115, 46, 13 (13.8kV), etc.	3 (max)
3	Separator	Underscore (_)	1
4	Asset Description	BUS1, ABUS, TB123, 123-456, 789, GEN1, 1X, etc.	8 (max)
5	Separator	Underscore (_)	1
6	Measurement Type	V – Voltage I - Current	1
7	Positive Sequence or Individual Phase	P – Positive Sequence A, B, C – Individual Phase	1
****Each Channel within a substation must have a unique CHNAM (configuration field #14)***			

Examples of Phasor CHNAM:

Phasor Name	***Phasor Description***
B345_BUS1_VP	Positive sequence voltage signal from Bus 1 at 345 kV level.
T13_1X_IB	Phase B current for transformer 1X at 13.8 kV level.
L115_789_VA	Phase A voltage for line 789 at 115 kV level.
G345_GEN1_IP	Positive sequence current from high-side GSU for generator 1 at 345 kV level.

C.2 – Analog Signal Naming Convention

Maximum 16 bytes in ASCII format, no spaces			
#	***Field Description***	***Field Examples***	***Size (Byte)***
1	Measurement Type	A – Analog	1
2	(Optional) Nominal Voltage (kV)	765, 500, 345, 230, 138, 115, 46, 13 (13.8kV), etc.	3 (max)
3	Separator	Underscore (_)	1
4	Signal Description	Free Form Entry	8
5	Separator	Underscore (_)	1
6	Signal Type	F – Frequency R – ROCOF (Dfreq) P – Real Power Q – Reactive Power	1
7	ID	Free Form Identifier	1
****Each Channel within a substation must have a unique CHNAM (configuration field #14)***			

C.3 – Digital Signal Naming Convention

Maximum 16 bytes in ASCII format, no spaces			
#	***Field Description***	***Field Examples***	***Size (Byte)***
1	Asset Type	CB – Circuit Breaker CS – Circuit Switcher MD – Motor Operated Disconnect DS or MS – Disconnect Switch (without motor)	2
2	Nominal Voltage (kV)	765, 500, 345, 230, 138, 115, 46, 13 (13.8kV), etc.	3 (max)
3	Separator	Underscore (_)	1
4	Asset Description	Free Form Identifier	10 (max)
****Each Channel within a substation must have a unique CHNAM (configuration field #14)***			

Examples of Digital CHNAM:

Digital Signal Name	***Digital Signal Description***
CB345_123-4	Circuit breaker status of 123-4 at 345 kV level.

Section D – Configuration Frame for IEEE Standard C37.118-2005*

No.	*Field*	*Size (bytes)*	*Short Description*
1	SYNC	2	Sync byte followed by frame type and version number.
2	FRAMESIZE	2	Number of bytes in frame
3	IDCODE	2	PMU/DC ID number, 16-bit integer—See Appendix A
4	SOC	4	SOC time stamp
5	FRACSEC	4	Fraction of Second and Time Quality
6	TIME_BASE	4	Resolution of fraction-of-second time stamp.
7	NUM_PMU	2	The number of PMUs included in the data frame.
8	STN	16	Station Name—16 bytes in ASCII format. —See Appendix B
9	IDCODE	2	PMU ID number as above, identifies source of each data block.
10	FORMAT	2	Data format within the data frames, 16 bit flag. Bits 15-4: Unused
			Bit 3: 0 = FREQ/DFREQ 16-bit integer, 1 = floating point
			Bit 2: 0 = analogs 16 bit integer, 1 = floating point
			Bit 1: 0 = phasors 16 bit integer, 1 = floating point
			Bit 0: 0 = real & imag. (rectangular), 1 = mag. & angle (polar)
11	PHNMR	2	Number of phasors—2-byte integer (0 to 32 767).
12	ANNMR	2	Number of analog values—2-byte integer.
13	DGNMR	2	Number of digital status words—2-byte integer.
14	CHNAM	16 × (PHNMR + ANNMR + 16 ×	Phasor and channel names—16 bytes for each phasor, analog, and each digital channel (16 channels in each digital word) in ASCII format in the same order as they are transmitted. For digital channels, the channel name order will be from the least significant to the most significant. (The

No.	*Field*	*Size (bytes)*	*Short Description*
		DGNMR)	first name is for Bit 0 of the first 16-bit status word, the second is for Bit 1, etc., up to Bit 15. If there is more than 1 digital status, the next name will apply to Bit 0 of the 2nd word and so on). — See Appendix C
15	PHUNIT	4 × PHNMR	Conversion factor for phasor channels.(N/A for floating point)
16	ANUNIT	4 × ANNMR	Conversion factor for analog channels. (N/A for floating point)
17	DIGUNIT	4 × DGNMR	Mask words for digital status words.
18	FNOM	2	Nominal line frequency code and flags (must be set for 60 HZ)
19	CFGCNT	2	Configuration change count.

* IEEE C37.118-2005 - IEEE Standard for Synchrophasors for Power Systems

OP-22 Appendix C Revision History

Document History

Rev No.	Date	Reason
0	07/01/22	Initial version
0.1	08/30/23	Periodic review performed by procedure owner with no intent changes required; Replaced word “Appendix” with “Section” in Section B Field 1; Corrected formatting throughout.
0.2	03/05/24	Periodic review performed by procedure owner with no intent changes required; Provisioned 25 IDs for Rhode Island Energy from the spare IDs in Section A – Company Abbreviations & PMU/PDC IDCODE.