

IESO Conforming Meter Frameworks

EDA District No. 1
Metering and Service Entrance Committee
56th Annual Spring Conference – May 10, 2006

Dave Wilkinson



Meter Framework Project Goals

- q Improve meter programming consistency**
- q Ensure proper meter configuration to:**
 - Reduce meter registration difficulties
 - Support IESO meter data processing procedures
- q Improve reliability of daily MV-90 communication with each meter**
 - Include more detail on modems and configuration
- q Format documents as a “set” for all conforming meters for public distribution via IESO website**

PUBLIC IESO_STD_0064

STANDARD



Power to Ontario.
On Demand.

Conforming Meter Framework

Itron QUANTUM® Q1000

Issue 2.0

q Framework documents status:

- Itron QUANTUM® Q1000 – completed March 1, 2005
- Itron SENTINEL® - completed March 17, 2005
- GE kV2™ / kV2c™ - completed April 19, 2005
- PML ION® 8x00 – completed July 8, 2005
 - ü Revising document to incorporate feedback from MSPs using ION 8x00 meters
- Elster ALPHA® / ALPHA Plus® - in development
 - ü Target completion date – June , 2006

q Draft copies of each Framework circulated to Meter vendor’s technical support staff, MSPs and interested MMPs for comments as they are completed

q Feedback from MSPs and MMPs will be reviewed and included in Final versions of Framework documents for each conforming meter

q Final versions will be issued as a complete “set” via IESO baseline process once remaining Framework documents are finalized

Themes Common To All Conforming Meter Frameworks

- q **Enable consistent retrieval of all encoded energy register readings to enable automated validation of interval data vs. encoded energy register readings by MV-90**
 - kWh, kVARh, and I²h channels
 - ü Tolerance Type = “M-Multiplier method” and
 - ü Readings vs. Pulses Tol. = 100% (1 Meter Multiplier)
 - V²h channels
 - ü Tolerance Type = “**P-Percent method**” and
 - ü Readings vs. Pulses Tol. = **5%**
- q **Ensure all available encoded energy readings are properly archived as the start and stop meter readings within each MV-90 P-File/E-File**
 - Stores one set of encoded energy register readings at intervals of 30 days (max.)
 - Ongoing automated MV-90 data reconciliation benefits
 - Meter’s encoded register readings provide primary source of reference data to confirm meter’s accuracy in the event of a meter dispute
- q **Power Outage Status Definitions**
 - Where supported by the meter vendor’s software, each Framework provides instructions to define a minimum acceptable window (3 to 15 seconds) for momentary voltage interruption without flagging the interval with an MV-90 PO status flag
 - The duration of the acceptable window is now under review pending results of MTR Working Group’s recommended process for IESO manual review of all Power Outage MTRs

Q1000 Framework Highlights (1)

- q **MV-90 master file (MIRT) standard configuration changed to support reading Q1000 meter's encoded registers in kilo units (all channels)**
 - Meter Multipliers for V²h and I²h (Channels 5 to 10) changed from 1 to 1000
- q **Enables automated MV-90 validation of interval data vs. encoded register readings**
 - Validation Method set to 100% of Meter Multiplier for channels 1 to 4 and I²h channels
 - Currently Testing the “**Percent Method**” of Validation for V²h channels – using **5%** Tolerance
- q **IESO Recommended minimum Ke values for Q1000 meter:**
 - kWh / kVARh – 0.008 Watt hours or VAR hours per pulse
 - V²h – 0.050 Volts squared hours per pulse
 - I²h – 0.001 Amps squared hours per pulse
- q **Number of Dials used in MIRT file must be based on reading the Q1000's registers in kilo units and synchronized with the Register Rollover value programmed into each Q1000 meter**

- q Modem Configuration for multiple types of external modems and reference material provided**

- q All new Q1000 meters to be registered using IESO TIM 22**
 - MSPs must use the Current Version of the MIRT Software – Version 1.05.a**

Q1000 – 3 Element Main Meter Load Profile Configuration

Parameter		Value					
Firmware:		V3.03a or above					
Storage Capacity:		Minimum value set to 10,080 intervals (35 days of 5-minute intervals)					
Interval Length:		5 Minutes (12 intervals/hr)					
Load Profile Channel	Recorded Value	K _e Value	MV-90 Default Channel Parameters				
			UOM Code	Register Type	Encoder Type	Meter Multiplier	Pulse Multiplier
1	kWh delivered	0.008	01	E	01	PT*CT	(PT*CT*K _e)/1000
2	kVARh delivered	0.008	03	E	02	PT*CT	(PT*CT*K _e)/1000
3	kWh received	0.008	01	E	03	PT*CT	(PT*CT*K _e)/1000
4	kVARh received	0.008	03	E	04	PT*CT	(PT*CT*K _e)/1000
5	V ² h (Phase A)	0.050	07	E	05	1000	K _e
6	V ² h (Phase B)	0.050	07	E	06	1000	K _e
7	V ² h (Phase C)	0.050	07	E	07	1000	K _e
8	I ² h (Phase A)	0.001	10	E	08	1000	K _e
9	I ² h (Phase B)	0.001	10	E	09	1000	K _e
10	I ² h (Phase C)	0.001	10	E	10	1000	K _e
11	Unconnected / Unused		42				
12	Unconnected / Unused		42				
13	Unconnected / Unused		42				
14	Unconnected / Unused		42				
15	Unconnected / Unused		42				
16	Unconnected / Unused		42				
17	UNSUPPORTED						
18	UNSUPPORTED						
19	UNSUPPORTED						
20	UNSUPPORTED						
21	UNSUPPORTED						
22	UNSUPPORTED						
23	UNSUPPORTED						
24	UNSUPPORTED						

- q **MV-90 master file standard configuration by default supports reading the SENTINEL meter's encoded energy registers in kilo units (channels 1 to 4)**
- q **Enables automated MV-90 validation of interval data vs. encoded register readings**
 - **Validation Method set to 100% of Meter Multiplier for channels 1 to 4**
- q **IESO STANDARD Ke value for the SENTINEL meter:**
 - **kWh / kVARh – 0.025 Watt hours or VAR hours per pulse**
- q **Number of Dials used in MIRT file must be set to 9**
 - **The SENTINEL's internal encoded registers (kilo units) will not rollover in a normal six year seal period**
- q **All new SENTINEL meters to be registered using IESO TIM 30**
 - **MSPs must use the Current Version of the MIRT Software – Version 1.05.a**

SENTINEL – 2 or 3 Element Alternate Meter Load Profile Configuration

Parameter		Value					
Firmware:		V2.05 or above					
Storage Capacity:		Minimum value set to 2,880 intervals (10 days of 5-minute intervals)					
Interval Length:		5 Minutes (12 intervals/hr)					
Load Profile Channel	Recorded Value	K _e Value	MV-90 Default Channel Parameters				
			UOM Code	Register Type	Encoder Type	Meter Multiplier	Pulse Multiplier
1	kWh delivered	0.025	01	E	01	PT*CT	(PT*CT*K _e)/1000
2	kVARh delivered	0.025	03	E	02	PT*CT	(PT*CT*K _e)/1000
3	kWh received	0.025	01	E	03	PT*CT	(PT*CT*K _e)/1000
4	kVARh received	0.025	03	E	04	PT*CT	(PT*CT*K _e)/1000
5	Unconnected / Unused		42				
6	Unconnected / Unused		42				
7	Unconnected / Unused		42				
8	Unconnected / Unused		42				

kV2 / kV2c Framework Highlights

- q **kV2 / kV2c meters MUST be programmed using GE MeterMate software with an “Advanced Billing Measure” or “Summation Register” (S0 – “S zero”) that correlates directly with the energy registered in each of channels 1 to 4 of the Load Profile Recorder**
- q **MV-90 master file standard configuration by default supports reading the kV2 / kV2c meter’s “Advanced Billing Measure” (encoded energy registers) in kilo units (channels 1 to 4)**
- q **Enables automated MV-90 validation of interval data vs. encoded register readings**
 - **Validation Method set to 100% of Meter Multiplier for Channels 1 to 4**
- q **IESO STANDARD Ke value for the kV2 / kV2c meter:**
 - **kWh / kVARh – 0.05 Watt hours or VAR hours per pulse AND**
 - **Scale Factor** Programmed into the meter should be set to **1 (ONE)**
- q **Number of Dials programmed into the meter and used in MIRT file must be set to 6**
 - **The kV2 / kV2c’s internal encoded registers (kilo units) for this meter will not rollover in a normal six year seal period**
- q **All new kV2 / kV2c meters to be registered using IESO TIM 29**
 - **MSPs must use the Current Version of the MIRT Software – Version 1.05.a**

kV2 / kV2c – 2 or 3 Element Alternate Meter Load Profile Configuration

Parameter		Value					
Firmware:		V1.2 or above (kV2) or V1.3 or above (kV2c)					
Storage Capacity:		Minimum value set to 10 days or more					
Interval Length:		5 Minutes (12 intervals/hr)					
Load Profile Channel	Recorded Value	K _e Value	MV-90 Default Channel Parameters				Pulse Multiplier
			UOM Code	Register Type	Encoder Type	Meter Multiplier	
1	kWh delivered	0.05	01	E	S0	PT*CT	(PT*CT*K _e * Scale Factor)/1000
2	kVARh delivered	0.05	03	E	S0	PT*CT	(PT*CT*K _e * Scale Factor)/1000
3	kWh received	0.05	01	E	S0	PT*CT	(PT*CT*K _e * Scale Factor)/1000
4	kVARh received	0.05	03	E	S0	PT*CT	(PT*CT*K _e * Scale Factor)/1000
5	Unconnected / Unused		42				
6	Unconnected / Unused		42				
7	Unconnected / Unused		42				
8	Unconnected / Unused		42				
9	Unconnected / Unused		42				
10	Unconnected / Unused		42				
11	Unconnected / Unused		42				
12	Unconnected / Unused		42				
13	Unconnected / Unused		42				
14	Unconnected / Unused		42				
15	Unconnected / Unused		42				
16	Unconnected / Unused		42				
17	UNSUPPORTED BY MV-90						
18	UNSUPPORTED BY MV-90						
19	UNSUPPORTED BY MV-90						
20	UNSUPPORTED BY MV-90						

S 'zero'

The IESO requires the kV2 / kV2c meter to be programmed with a **Scale Factor of 1**

ION 8x00 Framework Highlights

- q **IESO worked with PML and Itron to develop an enhanced MV-90 TIM module for the ION 8x00 meters that supports reading the 8x00 meters' V²h and I²h encoded registers**
 - IESO has verified proper operation of this new functionality
 - IESO now has this new TIM in our MV-90 production system
 - We have recently worked with one MSP to verify proper functionality of a new MIRT file setup using this Framework for an ION 8500 meter change in our MV-90 production system

- q **Enables automated MV-90 validation of interval data vs. encoded register readings**
 - Validation Method set to 100% of Meter Multiplier for channels 1 to 4 and I²h channels
 - Currently Testing the **"Percent Method"** of Validation for V²h channels – using 5% Tolerance

- q **Number of Dials used in MIRT file must be based on reading the encoded registers in kilo units (channels 1 to 4) and unit hours (channels 5 to 10) and synchronized with the ION 8x00 meter's two programmed Register Rollover values**

- q **Modem Configuration described in detail for this meter – Modemgate etc.**

- q **All new ION 8x00 meters (Firmware V.218 and above) to be registered using IESO TIM 99**
 - MSPs must use the Current Version of the MIRT Software – Version 1.05.a

ION 8x00 – 3 Element Main Meter Revenue Log Configuration

Parameter		Value					
Firmware:		V2.32					
Storage Capacity:		Minimum value set to 10,080 intervals (35 days of 5-minute intervals)					
Interval Length:		5 Minutes (12 intervals/hr)					
Load Profile Channel	Recorded Value	UOM	MV-90 Default Channel Parameters				
			Direction of Power Flow	Register Type	Encoder Type	Meter Multiplier	Pulse Multiplier
1	kWh delivered int	01	Delivered	E	01	PT*CT	PT*CT
2	kVARh delivered int	03	Delivered	E	05	PT*CT	PT*CT
3	kWh received int	01	Received	E	02	PT*CT	PT*CT
4	kVARh received int	03	Received	E	06	PT*CT	PT*CT
5	V ² h (Phase A) int	07	Delivered	E	11	1	1
6	V ² h (Phase B) int	07	Delivered	E	12	1	1
7	V ² h (Phase C) int	07	Delivered	E	13	1	1
8	I ² h (Phase A) int	10	Delivered	E	14	1	1
9	I ² h (Phase B) int	10	Delivered	E	15	1	1
10	I ² h (Phase C) int	10	Delivered	E	16	1	1
11	Unconnected	42					
12	Unconnected	42					
13	Unconnected	42					
14	Unconnected	42					
15	Unconnected	42					
16	Unconnected	42					

ALPHA / ALPHA Plus Framework In Progress - Highlights to Date

- q **MV-90 master file standard configuration by default supports reading the ALPHA / ALPHA Plus meter's encoded energy registers in kilo units (channels 1 to 4)**
- q **Enables automated MV-90 validation of interval data vs. encoded register readings**
 - Validation Method set to 100% of Meter Multiplier for channels 1 to 4
- q **IESO STANDARD Ke value for the ALPHA and ALPHA Plus meters:**
 - kWh / kVARh – 0.05 Watt hours or VAR hours per pulse
 - **Scale Factor** Programmed into the meter should be set to **1 (ONE)**
- q **Testing to Date indicates ALPHA and ALPHA Plus meters will only supply MV-90 with an encoded energy reading for both kWh delivered and kWh received IF the meter has been programmed to specify the “Quantities Metered” as “kW-Del and kW-Rec”**
 - **MSP must program the meter to ensure it provides encoded energy register readings for BOTH kWh delivered and kWh received**
- q **All new ALPHA meters to be registered using IESO TIM 26**
- q **All new ALPHA Plus meters to be registered using IESO TIM 25**
- q **MSPs must use the Current Version of the MIRT Software – Version 1.05.a**

ALPHA / ALPHA Plus – 2 or 3 Element Alternate Meter Load Profile Configuration

Parameter		Value					
Firmware:		V2.3 or above					
Storage Capacity:		Minimum value set to 2,880 intervals (10 days of 5-minute intervals)					
Interval Length:		5 Minutes (12 intervals/hr)					
Load Profile Channel	Recorded Value	K _e Value	MV-90 Default Channel Parameters				
			UOM Code	Register Type	Encoder Type	Meter Multiplier	Pulse Multiplier
1	kWh delivered	0.05	01	E*	01	PT*CT	(PT*CT*K _e * Scale Factor)/1000
2	KVARh delivered	0.05	03	E	02	PT*CT	(PT*CT*K _e * Scale Factor)/1000
3	kWh received	0.05	01	E*	03	PT*CT	(PT*CT*K _e * Scale Factor)/1000
4	KVARh received	0.05	03	E	04	PT*CT	(PT*CT*K _e * Scale Factor)/1000

The IESO requires the ALPHA / ALPHA Plus meter to be programmed with a **Scale Factor of 1**

2006/02/16

A1R(P+) - Program Definition

Page 1

```
----- PROGRAM PROFILE ----- 1.30 -----  
Program ID: 001 Display Options: IESO01  
Description: IESO_SAMPLE_01 Special Dates List: IESO01  
Effective Date: / / Origination Date: 2006/02/16  
Program Function: TOU,L Origination Season: 0  
Register Multiplier: Automatic Demand Decimal Places: 2  
Energy Decimal Places: 0  
Constants: USE FACTORY DEFAULTS  
----- QUANTITIES METERED -----  
Display Function: TOU,L  
Quantities Metered (Energy and Demand): kw-Del kw-Rec  
Trigger Unit-of-Measure for  
Threshold based Load Control: kw-Del
```

Note: Testing to date indicates that the ALPHA / ALPHA Plus meters will only supply MV-90 with encoded energy register readings for both kWh delivered and kWh received IF these are the two user programmable “Quantities Metered” specified in the meter’s program.

- q Complete Framework Document for ALPHA/ALPHA Plus Meter**
 - Potential issue with enabling automated MV-90 validation of interval data vs. encoded register readings for kWh delivered (channel 1) and kWh received (channel 3)
 - IESO currently working with Itron to enhance existing ALPHA Plus TIM module to retrieve decimal values of encoded energy register readings regardless of number of decimal values specified for use on the meter's LCD display
- q Complete additional MV-90 testing for each conforming meter to summarize known error codes related to:**
 - Incorrect Device ID, Password(s), Unit ID (multi-drop) etc.
- q Include Framework Documents for all conforming meters as a package in IESO Baseline process**
 - Establish location on IESO website for Framework documents
 - Most likely via a link from the “Conforming Meter List” page

MV-90 Communication Error Return Codes - IESO Conforming Meters							
Error Number	Error Code	MV-90 Retry Status	Power Measurements ION	Itron (Schlumberger) Q1000	ABB Alpha Plus	Itron (Schlumberger) Sentinel	GE kV2/kV2c
01	TIM - OTHER ERROR			1. The MV90 Password #1 field is not the Read/Write or ReadOnly password of the meter. 2. Attempting to perform a WRITE DATE/TIME function with the ReadOnly password. 3. MV90 Masterfile configuration does not match the meter configuration. ie: # of channels, Int/hr, etc.			
		DISABLED	MV90 Masterfile configuration does not match the meter configuration. ie: # of channels.	4. The MV90 Reader Password does not match the Q1000 Meter Address. This field must contain the Q1000 Meter Address for the meters port that is used for communicating to the IMO's MV90 system.			
07	TIM - RECORDER CONFIGURATION DOES NOT MATCH TIM BLOCK CONFIGURATION	DISABLED		The MV90 UNIT ADDRESS field is incorrect. The UNIT ADDRESS field defines the Q1000 load profile configuration that MV90 will retrieve. In this particular case, the MV90 system was attempting to retrieve a load profile configuration that was not configured in the meter. As per the IMO Q1000 Framework, load profile configuration #1 is the revenue billing profile. The UNIT ADDRESS field must be blank or set to 1 to retrieve this load profile.		MV90 Masterfile configuration does not match the meter configuration. ie: # of channels, Int/hr, etc.	
08	TIM - INVALID TIM PARAMETER	DISABLED	Entry in Password 1 field > 8 characters.				
09	TIM - TIME DIFF. OUT OF BOUNDS	DISABLED					
10	TIM - ID MISMATCH	DISABLED	The MV90 Device ID field does not match the ION Factory_Module.TAG2.	The MV90 Device ID field does not match the Q1000 Unit ID.		The MV90 Device ID field does not match the Sentinel Unit ID.	The MV90 Device ID field does not match the kV2/kV2c Meter ID.
21	COMMUNICATIONS - OTHER ERROR	ENABLED					

- q All incoming MIRT files will be validated by IESO Hotline staff based on the content of all new / updated Meter Framework documents**
- q IESO staff will work with affected MSPs to resolve any inconsistent MV-90 Master Files settings identified for any existing compliant meters**

Questions?

