



RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Wholesale Electric Quadrant (WEQ) and Retail Electric Quadrant (REQ)
Requesters: NAESB Smart Grid Task Force (SGTF)
Request No.: 2010 WEQ Annual Plan Item 6(b) / 2010 Retail Annual Plan Item 9(b)
Request Title: Requirements Specifications for Common Scheduling Mechanism for Energy Transactions – for NIST PAP04

1. RECOMMENDED ACTION:

- Accept as requested
- Accept as modified below
- Decline

EFFECT OF EC VOTE TO ACCEPT RECOMMENDED ACTION:

- Change to Existing Practice
- Status Quo

2. TYPE OF DEVELOPMENT/MAINTENANCE

Per Request:

- Initiation
- Modification
- Interpretation
- Withdrawal

- Principle
- Definition
- Business Practice Standard Document
- Data Element
- Code Value
- X12 Implementation Guide
- Business Process Documentation

Per Recommendation:

- Initiation
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- Interpretation
- Withdrawal

- Principle
- Definition
- Business Practice Standard Document
- Data Element
- Code Value
- X12 Implementation Guide
- Business Process Documentation

3. RECOMMENDATION

SUMMARY:

The NAESB Smart Grid Task Force (SGTF) submits this Recommendation to define the range of information required to establish the breadth of the communication requirement. There is no need for the cases to be exhaustive, merely illustrative of the full scope.



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New WEQ-016 Abbreviations/Acronyms and Defined Terms to be added to WEQ-000

(NOTE: NAESB Retail numbering convention will replace WEQ numbering convention in NAESB Retail publication)

000-1 ABBREVIATIONS AND ACRONYMS

Abbreviation / Acronym	Meaning
<u>DDE</u>	<u>Designated Dispatch Entity</u>
<u>EA</u>	<u>Environmental Authority</u>
<u>ED</u>	<u>End Device</u>
<u>FR</u>	<u>Federal Regulator</u>
<u>LA</u>	<u>Local Authority</u>
<u>LSE</u>	<u>Load Serving Entity</u>
<u>MA</u>	<u>Metering Authority</u>
<u>MP</u>	<u>Market Participant</u>
<u>RA</u>	<u>Reliability Authority</u>
<u>RM</u>	<u>Response Method</u>
<u>RMA</u>	<u>Response Method Aggregation</u>
<u>SE</u>	<u>Scheduling Entity</u>
<u>SO</u>	<u>System Operator</u>
<u>SP</u>	<u>Service Provider</u>
<u>SR</u>	<u>State Regulator</u>
<u>TDSP</u>	<u>Transmission/Distribution Service Provider</u>
<u>UC</u>	<u>Utility Customer</u>
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000-2 DEFINITION OF TERMS

Term	Definition
<u>Business Entity</u>	<u>The wholesale or retail entity that interacts with other entities in its market.</u>
<u>Communication Method</u>	<u>The method by which an object communicates with another object to instruct, measure or control.</u>
<u>Control</u>	<u>The role associated with the control of an End Device.</u>
<u>Demand Response Objects</u>	<u>Physical and logical types of demand response resource objects.</u>
<u>Designated Dispatch Entity</u>	<u>A role which carries the responsibility of receiving and processing demand resource dispatch instructions or market information and (optionally) providing response information.</u>
<u>End Device</u>	<u>A physical end-use device that consumes or supplies electricity.</u>
<u>Environmental Authority</u>	<u>A regulatory authority responsible for the development, reporting and enforcement of environmental activities.</u>
<u>Facility</u>	<u>The location at which connection to the transmission or distribution system is made.</u>
<u>Federal Regulator</u>	<u>A Federal regulatory authority.</u>
<u>Load Serving Entity</u>	<u>A role which carries the responsibility of serving end-users and selling electric energy to end-users.</u>
<u>Local Authority</u>	<u>A regulatory authority responsible for the oversight and administration of utility service-related functions within its jurisdiction.</u>
<u>Market Enrollment</u>	<u>The collection of enrollment or tariff data for a Demand Resource Object to provide a specific market product or service.</u>
<u>Market Participant</u>	<u>An organization registered with the System Operator that may take on roles such as SP, LSE, TDSP, DDE, SE, and/or MA in accordance with the System Operator’s market rules.</u>



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Term	Definition
<u>Measurement</u>	<u>The role associated with the device or algorithm that measures the consumption or supply of an End Device.</u>
<u>Metering Authority</u>	<u>A role which carries the responsibility of providing data necessary to determine the performance of a Resource.</u>
<u>P-Node</u>	<u>The price location of the Facility in the transmission and/or distribution network.</u>
<u>Participant</u>	<u>The entity that represents resources to a market or distribution operator.</u>
<u>Regulator</u>	<u>A rule-making and enforcement entity.</u>
<u>Reliability Authority</u>	<u>A regulatory authority responsible for the development, reporting and enforcement of electric reliability-related activities.</u>
<u>Response Method</u>	<u>A measurable action taken in response to an instruction to change consumption.</u>
<u>Response Method Aggregation</u>	<u>A logical entity that has a reportable interval level consumption, e.g. a site may also be a physical entity that may have its own meter, a neighborhood of homes that has a net meter, or an estimate of consumption of an aggregation of retail customers.</u>
<u>Resource</u>	<u>A market-dependent group of Response Method Aggregations that represents a dispatchable entity.</u>
<u>Scheduling Entity</u>	<u>A role which carries the responsibility of submitting bids/offers and receives Schedules and Awards.</u>
<u>Service Provider</u>	<u>A role which carries the responsibility of coordinating resources to deliver electricity products and services to a market or distribution operator.</u>
<u>State Regulator</u>	<u>A regulatory authority responsible for the oversight and administration of electric utilities.</u>
<u>Supporting Objects</u>	<u>Objects that support the interaction of Business Entities and Demand Response Objects.</u>



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Term	Definition
<u>System Operator</u>	<u>An entity which carries the responsibility of administering the demand response process, from Resource enrollment to performance evaluation.</u>
<u>Transmission/Distribution Service Provider</u>	<u>A role which carries the responsibility of operating a local electricity transmission and/or distribution system.</u>
<u>Utility Customer</u>	<u>An end-use customer of the Utility Distribution Operator that takes on roles such as Facility or Resource.</u>
<u>Utility Distribution Operator</u>	<u>An entity which carries the responsibility of operating an electricity distribution system.</u>
<u>Zone</u>	<u>A physical or electrical region.</u>

New Business Practice Standards WEQ-016 – Smart Grid Activities

(NOTE: NAESB Retail numbering convention will replace WEQ numbering convention in NAESB Retail publication)

RECOMMENDED STANDARDS:

Executive Summary

Requirements Specification for Common Scheduling Mechanism for Energy Transactions

The following contains a set of requirements relating to the use of date and time based data elements that are used in transactions for Demand Response Programs. This information is being provided to NIST in order to aid in the development of a standard representation for date/time based data elements derived from an XML representation of iCalendar¹.

Although there are many other areas where date/time based data elements are used in energy industry transactions this recommendation is limited in scope to only those date/time based data elements that are utilized in Demand Response Programs.

Introduction

¹ <http://tools.ietf.org/html/rfc5545>



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Requirements Specification for Common Scheduling Mechanism for Energy Transactions

Smart grid interfaces must communicate between domains, that is between different business and consumer entities with different values and approaches (ontologies). Such interfaces must be simplified to bare essentials, and be understandable by parties with different backgrounds and expectations.

To achieve cross-domain understandability, and thereby enhance interoperation, smart grid transactions must use semantic models from different areas developed by different standards groups. Each of these vocabularies is most fully defined in one area. We have agreed, within the NIST process, to use the vocabularies from the appropriate domain experts to compose the message that flow between domains on the smart grid.

In the following, we defined transactions as grid events that occur between domains, or whose effects and outcomes must be communicated between domains. This activity makes no assertions about any other events.

Smart grid transactions communicate three classes of information. They describe events used within the power management and distribution of the grid. They invoke financial or business transactions concerning those transactions. They communicate schedules and interval information for the flows of energy. Per agreement, all semantics relating to Power Management will use the Common Information Model (CIM) from IEC TC57. All financial and market semantics will be based upon the definitions found in ISO 20022 (Financial Documents) and in their most common expression, FIX. All elements relating to schedule and interval will be expressed in the notation of the IETF iCalendar (RFC 5545) standard, as defined in the XML representation of iCalendar developed by CalConnect. The purpose of this approach is to increase interoperation and understanding between domains.

The group primarily associated with the development of interoperable enterprise date, time, and interval standards for the IETF is the Calendaring and Scheduling Consortium (CalConnect). CalConnect and OASIS will work together to define the common communication of date time and interval to meet the needs of smart grid transaction communications as well as for building systems integration, enterprise interaction, and financial transactions. This commonality is anticipated to reduce barriers to interoperation and thereby to expand participation in DR and DER.

The purpose of this action is to define the requirements for standard communication of date, time, schedule, and interval by smart grid actors, with particular attention to demand response (DR). These requirements will be submitted to the OASIS and CalConnect technical committee to define the applicable communication standards to support them.

Scope: The scope of the following is to define the range of information required to establish the breadth of the communication requirement. There is no need for the cases to be exhaustive, merely illustrative of the full scope.



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Assumptions: We assume as given that common semantics for communicating schedule, interval, and sequence will enhance interoperation between domains and between business entities.

Business Practice Standards

016-1 REQUIREMENTS SPECIFICATION FOR COMMON SCHEDULING MECHANISM FOR ENERGY TRANSACTIONS

016-1.1 USE CASE OVERVIEW

016-1.1.1 Requirements for Date and Time Usage

Demand Response Programs employ a combination of absolute dates/times, absolute periods (range) of dates/times, relative dates/times, recurring dates/times, absolute intervals and absolute durations in order to communicate temporal information pertaining to demand response transactions. Demand Response Programs must also accommodate time zone variations, leap years, leap seconds, and the use of daylight savings time. Any calendaring/scheduling standard that is applicable to Demand Response programs must be capable of supporting this range of requirements.

An incomplete, but representative, set of instances is provided below. The sample data included are non-normative representations; they are included to clarify the expectation of information that will be in the standard.

<u>Type of Representation</u>	<u>Representative Instance</u>	<u>Sample Data</u>
<u>Absolute date/time</u>	<u>Effective start date</u>	<u>2009-11-01</u>
	<u>Effective start date and time</u>	<u>2009-11-01T01:00:00-Z</u>
<u>Absolute Periods (range)</u>	<u>Deployment Period</u>	<u>2009-11-01T01:00:00-Z/ 2009-11-02T24:00:00-Z</u>
<u>Relative date/time (time-point)</u>	<u>Reduction Deadline</u>	<u>30 minutes from a specified point in time</u>
<u>Recurring date/time</u>	<u>Market Closing</u>	<u>Every day at 12:00 noon</u>



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<u>Type of Representation</u>	<u>Representative Instance</u>	<u>Sample Data</u>
<u>Absolute Interval</u>	<u>Meter Data Recording Interval</u>	<u>Every 5 minutes</u>
	<u>System Frequency</u>	<u>60 cycles per second</u>
<u>Absolute Duration</u>	<u>Outage Duration</u>	<u>2 days</u>
	<u>Minimum Run Time</u>	<u>4 hours</u>

It is an additional requirement that all schedule and interval communications be able to express the precision required in the response. For example, an actor may be required to perform within five minutes, or within five milliseconds of the agreed upon time.



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016-1.2 SPECIFIC USE CASES

016-1.2.1 Date and Time Based Data Elements Utilized in Demand Response Programs

The representative instances named in the table below are representative of those used in smart grid transactions. Although some instances may have been seen under other names in different markets, standardizing those names is beyond the scope of this activity, which is limited to standardizing communication of date, time, schedule, and interval. These instances are sufficiently diverse to define the range of communications that the standard must support.

<u>Representative Instances</u>	<u>Description</u>
<u>Adjustment Window</u>	<u>The period prior to a Demand Response Event used for calculating a Baseline Adjustment.</u>
<u>Advance Notification</u>	<u>One or more communications to Demand Resources of an impending Demand Response Event transmitted in advance of the actual event.</u>
<u>Baseline Window</u>	<u>The window of time preceding and optionally following, a Demand Response Event over which electricity consumption data is collected for the purpose of establishing a Baseline.</u>
<u>Demand Response Event</u>	<u>The periods, deadlines, and transitions during which Demand Resources perform. The Program Administrator should specify the duration and applicability of a Demand Response Event. Not all deadlines, periods, and transitions may be applicable to all Demand Response products or services.</u>
<u>Deployment</u>	<u>The time at which a Demand Resource begins reducing Demand on the system in response to an instruction.</u>



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<u>Representative Instances</u>	<u>Description</u>
<u>Deployment Period</u>	<u>The time in a Demand Response Event beginning with the Deployment and ending with the Release/Recall</u>
<u>Meter Data Recording Interval</u>	<u>The time between electricity meter consumption recordings</u>
<u>Meter Data Reporting Deadline</u>	<u>The maximum allowed time from the end of a Demand Response Event (Normal Operations) to the time when meter data submission is required for performance evaluation and settlement. The Meter Data Reporting Deadline may be either relative (a number of hours/days after Normal Operations) or fixed (a fixed calendar time, such as end-of-month).</u>
<u>Normal Operations</u>	<u>The time following Release/Recall at which a Program Administrator may require a Demand Resource to have returned its Load consumption to normal levels, and to be available again for Deployment</u>
<u>Performance Window</u>	<u>The period in a Demand Response Event analyzed by the Program Administrator to measure and verify the Demand Reduction Value for a Demand Resource.</u>
<u>Ramp Period</u>	<u>The time between Deployment and Reduction Deadline, representing the period of time over which a Demand Resource is expected to achieve its change in Demand</u>
<u>Recovery Period</u>	<u>The time between Release/Recall and Normal Operations, representing the window over which Demand Resources are required to return to their normal Load.</u>
<u>Reduction Deadline</u>	<u>The time at the end of the Ramp Period when a Demand Resource is required to have met its Demand Reduction Value obligation</u>
<u>Release/Recall</u>	<u>The time when a Program Administrator notifies a Demand Resource that the Deployment Period has ended or will end</u>



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<u>Representative Instances</u>	<u>Description</u>
<u>Sustained Response Period</u>	<u>The time between Reduction Deadline and Release/Recall, representing the window over which a Demand Resource is required to maintain its reduced net consumption of electricity</u>
<u>Telemetry Interval</u>	<u>The time unit between communications between a Demand Resource or Demand Response Provider and a Program Administrator</u>



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016-A Appendix A – Entity-Relationship Model

The following terms and definitions correspond to a set of actor/object classes and sub-classes as illustrated in the entity-relationship model in Figure 1 of Appendix A. Abbreviations/Acronyms correspond to the IDs shown in the figure.

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DEFINITION OF TERMS

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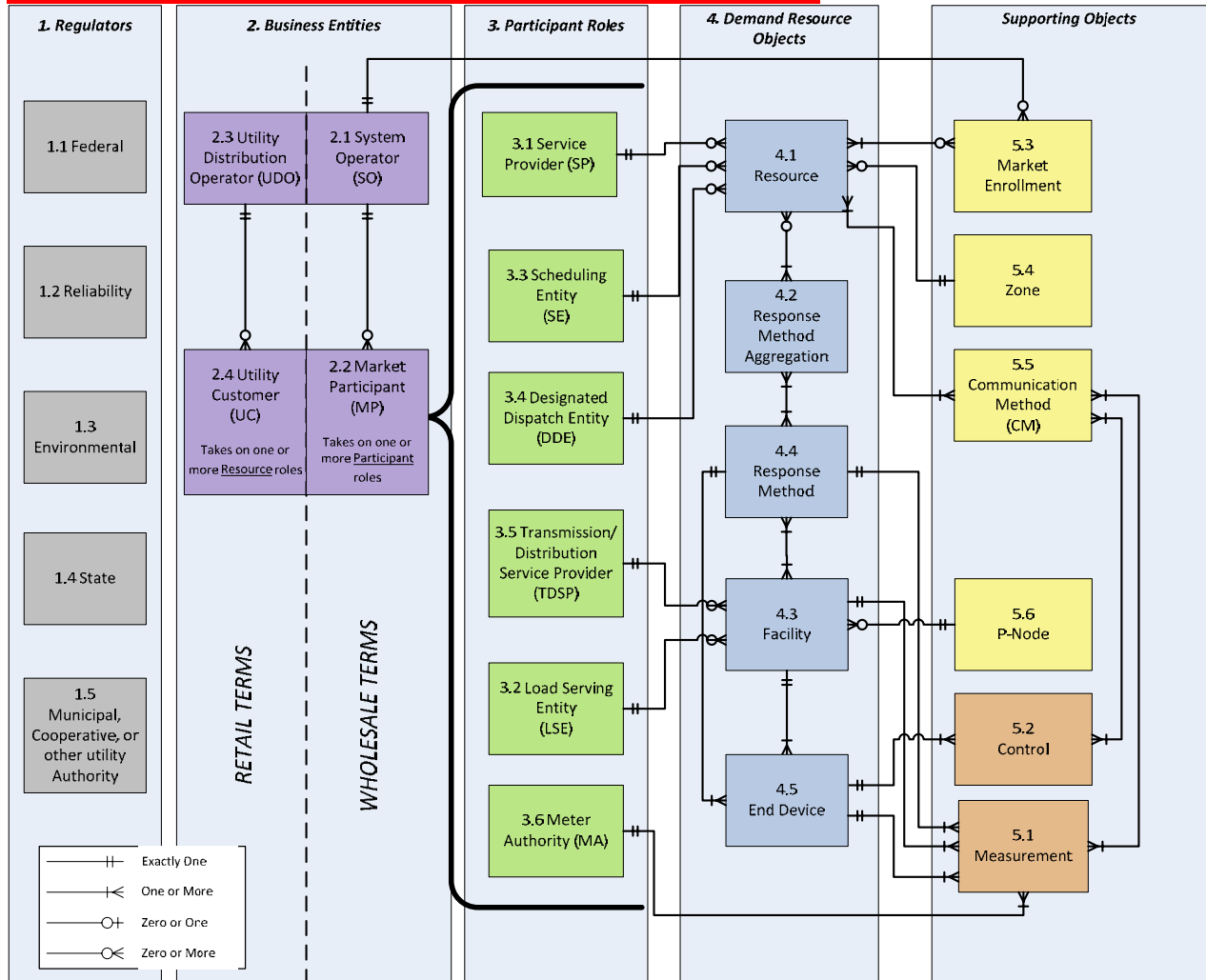
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Figure 1. Entity-Relationship Model for Smart Grid Use Cases





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4. SUPPORTING DOCUMENTATION

a. Description of Request:

On September 30, 2009, the National Institute of Standards and Technology officially assigned NAESB the responsibility to develop Requirements and Use Cases pertinent to Priority Action Plan items 3, 4 and 9. A complete description of each item is available on the NIST Web site located at <http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/WebHome> in the section titled Priority Action Plans (PAPs).

This recommendation specifically pertains to PAP 04², “A Common Scheduling Mechanism for Energy Transactions”.

b. Description of Recommendation:

The scope of this recommendation is to define the range of information required to establish the breadth of the communication requirement. There is no need for the cases to be exhaustive, merely illustrative of the full scope.

c. Business Purpose:

This recommendation has been developed in response to a request from NIST to provide use cases and requirements germane to the use of dates/times within a broad spectrum of energy transactions. The scope of this effort has been limited to Demand Response Programs in order to meet NIST’s deadline for this effort.

d. Commentary/Rationale of Subcommittee(s)/Task Force(s):

Assumptions - We assume as given that common semantics for communicating schedule, interval, and sequence will enhance interoperability between domains and between business entities.

Joint Smart Grid Standards Task Force and Fix Protocol Meeting Notes/Documents:

- September 17, 2009 Meeting Notes – To be posted
- October 1, 2009 Meeting Notes – To be posted
- October 15, 2009 Meeting Notes – To be posted

NAESB Smart Grid Standards Task Force Sub-Group Meeting Notes/Documents:

- October 13, 2009 Meeting Notes – To be posted
- October 20, 2009 Meeting Notes – To be posted
- October 27, 2009 Meeting Notes – To be posted
- November 3, 2009 Meeting Notes – To be posted
- November 4-6, 2009 Meeting Notes – To be posted

² <http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PAP04Schedules>



RECOMMENDATION TO NAESB EXECUTIVE COMMITTEE

For Quadrant: Wholesale Electric Quadrant (WEQ) and Retail Electric Quadrant (REQ)
Requesters: NAESB Smart Grid Task Force (SGTF)
Request No.: 2010 WEQ Annual Plan Item 6(b) / 2010 Retail Annual Plan Item 9(b)
Request Title: Requirements Specifications for Common Scheduling Mechanism for Energy Transactions – for NIST PAP04

- November 10, 2009 Meeting Notes – To be posted

NAESB Smart Grid Standards Task Force Meeting Notes/Documents:

- October 22, 2009 Meeting Notes – http://naesb.org/pdf4/smart_grid_ssd102209notes.doc
- October 29, 2009 Meeting Notes – To be posted
- November 5, 2009 Meeting Notes – To be posted
- November 13, 2009 Meeting Notes – To be posted
- December 3, 2009 Meeting Notes – To be posted
- December 10, 2009 Meeting Notes – http://naesb.org/pdf4/smart_grid_ssd121009notes.doc
- December 17, 2009 Meeting Notes – http://naesb.org/pdf4/smart_grid_ssd121709notes.doc
- January 7, 2010 Meeting Notes – To be posted
- January 14, 2010 Meeting Notes – To be posted
- January 21, 2010 Meeting Notes – To be posted
- January 28, 2010 Meeting Notes – To be posted