Power Quality Event Notifications

1   Descriptions of Function

All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work should be so noted.

1.1   Function Name

Power Quality Event Notifications

1.2   Function ID

IECSA identification number of the function

D-11,C-9.1,C-9

1.3   Brief Description

Describe briefly the scope, objectives, and rationale of the Function.

The purpose of the power quality event notifications enterprise activity is to enable a mechanism whereby stakeholders are alerted as soon as possible to the location, time and severity of power quality events that occur.

1.4   Narrative

A complete narrative of the Function from a Domain Expert's point of view, describing what occurs when, why, how, and under what conditions. This will be a separate document, but will act as the basis for identifying the Steps in Section 2.

Power quality event capture instruments can be installed anywhere on the electric power grid including transmission substations all the way down to end-use customer facilities. After an event capture there are generally two methods employed to notify stakeholders that an event has occurred. The first method is an "on-the-fly" approach, near real-time. When an event is captured, if it exceeds pre-set thresholds for notifications, then an email or page is immediately sent to a list of recipients. Generally, these emails or pages will list

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the time, magnitude and severity. In the case of some instrument manufacturers, a link is given to go back and view the event and in some cases, the event is embedded in the actual email message.

The other form of event notification is "after-the-fact" or post-processed. In this method, the data is collected and then processed by a central server or other type of application that is looking for events that exceeded thresholds. In this case, the central server application then sends out emails or pages to a list of recipients. This method has time lag built in because in some instances, data is downloaded only daily and messages are sent after the data is post-processed. Some instruments after and event is captured, will call back to the central server to let the server know, they should download data, reducing the time lag.

Key communication occurs between the instruments to pager vendor and ISPs and from the instruments to the central server and then similarly from the central server out to pager vendor and ISPs or internal mail servers.

1.5 Actor (Stakeholder) Roles

Describe all the people (their job), systems, databases, organizations, and devices involved in or affected by the Function (e.g. operators, system administrators, technicians, end users, service personnel, executives, SCADA system, real-time database, RTO, RTU, IED, power system). Typically, these actors are logically grouped by organization or functional boundaries or just for collaboration purpose of this use case. We need to identify these groupings and their relevant roles and understand the constituency. The same actor could play different roles in different Functions, but only one role in one Function. If the same actor (e.g. the same person) does play multiple roles in one Function, list these different actor-roles as separate rows.

Grouping (Community) '		Group Description
Hardware and Software Vendors		Provide instruments and software to capture events and provide notifications to stakeholders
Actor Name	*Actor Type (person, device, system etc.)*	*Actor Description*
PowerQuality Instrument	Device	Captures and records power quality events and sends event information to central server or stakeholders directly

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Grouping (Community) ,		Group Description
Hardware and Software Vendors		Provide instruments and software to capture events and provide notifications to stakeholders
Actor Name	Actor Type (person, device, system etc.)	Actor Description
Database and SoftwareProvider	Software	Provides download, archiving and notification software
Central Server	System	Downloads instruments located at variety of locations, accepts incoming calls from instruments, sends out notifications through pager vendors and/or ISPs or internal mail servers
Communication	Device and System	Mechanism for power quality instrument to contact or be contacted by the central server or to contact pager vendor and ISPs directly
Instrument		
Instrument manufacturer		

Grouping (Community) '		Group Description
Customers		Key stakeholders that need data
Actor Name	Actor Type (person, device, system etc.)	Actor Description
Customer	Person	Stakeholders that need PQ event data notifications as quickly as possible

Replicate this table for each logic group.

1.6 Information exchanged

Describe any information exchanged in this template.

Information Object Name	Information Object Description
Power quality event data	Events including magnitude and duration and other parameters captured by power quality instruments

1.7 Activities/Services

Describe or list the activities and services involved in this Function (in the context of this Function). An activity or service can be provided by a computer system, a set of applications, or manual procedures. These activities/services should be described at an appropriate level, with the understanding that sub-activities and services should be described if they are important for operational issues, automation needs, and implementation reasons. Other sub-activities/services could be left for later analysis.

Activity/Service Name	Activities/Services Provided
Event capture and notification	Instruments in the field must capture events when the occur and send out notifications via pager or email as soon as they occur
Data download	Periodically, the central server must download the data from the instruments in the field
Post Process notification	After downloading and processing data, central server sends out notifications via pager or email as soon as possible

1.8 Contracts/Regulations

Identify any overall (human-initiated) contracts, regulations, policies, financial considerations, engineering constraints, pollution constraints, and other environmental quality issues that affect the design and requirements of the Function.

Contract/Regulation	Impact of Contract/Regulation on Function
Speed of Notification	Terms dictate how quickly from an event capture that notifications are required to be sent

Policy	From Actor	May	Shall Not	Shall	Description (verb)	To Actor
Notification speed	Instrument manufacturer			X	Provide specifications on time between event capture and event notification to customer	Customer

Constraint	Type	Description	Applies to
Instrument	Data	Notifications are contingent on the accuracy and reliability of data captured by monitoring instruments	Overall program

2   Step by Step Analysis of Function

Describe steps that implement the function. If there is more than one set of steps that are relevant, make a copy of the following section grouping (Preconditions and Assumptions, Steps normal sequence, and Steps alternate or exceptional sequence, Post conditions)

2.1   Steps to implement function

Name of this sequence.

2.1.1 Preconditions and Assumptions

Describe conditions that must exist prior to the initiation of the Function, such as prior state of the actors and activities

Identify any assumptions, such as what systems already exist, what contractual relations exist, and what configurations of systems are probably in place

Identify any initial states of information exchanged in the steps in the next section. For example, if a purchase order is exchanged in an activity, its precondition to the activity might be 'filled in but unapproved'.

Actor/System/Information/Contract	Preconditions or Assumptions
PQ Instruments	Instruments are monitoring system, are ready to capture data if thresholds are exceeded and all communication systems are working so that notifications can be made if an event is captured

2.1.2 Steps – Normal Sequence

Describe the normal sequence of events, focusing on steps that identify new types of information or new information exchanges or new interface issues to address. Should the sequence require detailed steps that are also used by other functions, consider creating a new "sub" function, then referring to that "subroutine" in this function. Remember that the focus should be less on the algorithms of the applications and more on the interactions and information flows between "entities", e.g. people, systems, applications, data bases, etc. There should be a direct link between the narrative and these steps.

The numbering of the sequence steps conveys the order and concurrency and iteration of the steps occur. Using a Dewey Decimal scheme, each level of nested procedure call is separated by a dot '.'. Within a level, the sequence number comprises an optional letter and an integer number. The letter specifies a concurrent sequence within the next higher level; all letter sequences are concurrent with other letter sequences. The number specifies the sequencing of messages in a given letter sequence. The absence of a letter is treated as a default 'main sequence' in parallel with the lettered sequences.

Sequence 1:

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1.1 - Do step 1
1.2A.1 - In parallel to activity 2 B do step 1
1.2A.2 - In parallel to activity 2 B do step 2
1.2B.1 - In parallel to activity 2 A do step 1
1.2B.2 - In parallel to activity 2 A do step 2
1.3 - Do step 3
1.3.1 - nested step 3.1
1.3.2 - nested step 3.2
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Sequence 2:

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2.1 - Do step 1
2.2 – Do step 2
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#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
#	*Triggering event? Identify the name of the event.[1]*	*What other actors are primarily responsible for the Process/Activity? Actors are defined in section1.5.*	*Label that would appear in a process diagram. Use action verbs when naming activity.*	*Describe the actions that take place in active and present tense. The step should be a descriptive noun/verb phrase that portrays an outline summary of the step. "If …Then…Else" scenarios can be captured as multiple Actions or as separate steps.*	*What other actors are primarily responsible for Producing the information? Actors are defined in section1.5.*	*What other actors are primarily responsible for Receiving the information? Actors are defined in section1.5.* (Note – May leave blank if same as Primary Actor)*	*Name of the information object. Information objects are defined in section 1.6*	*Elaborate architectural issues using attached spreadsheet. Use this column to elaborate details that aren't captured in the spreadsheet.*	*Reference the applicable IECSA Environment containing this data exchange. Only one environment per step.*
1.1	Event Capture	Instrument	Event Capture	If voltage and/or current thresholds are exceeded, the power quality instrument records and event	PowerQuality Instrument	Instrument	Voltage and current waveforms and other power quality data		Inter-Field Equipment

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[1] Note – A triggering event is not necessary if the completion of the prior step – leads to the transition of the following step.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
1.2 A.1	Instrument Event Notification	Instrument	Instrument Event Notification	If an event is triggered, the instrument sends out pages and/or emails to stakeholder recipients	PowerQuality Instrument	Customer	PQ Event data and/or summary data including date, time, magnitude, duration, etc.	Basic telecommunication constraints such as modem and dial up telephone connection, but could also include internet TCP/IP connectivity or even cellular	Intra-Customer Site

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
1.2 B.1	Event Transmittal	Instrument	Event Transmittal	After an event is triggered, the instrument calls back to the central server and the server downloads the data	PowerQuality Instrument	Central Server	Voltage and current waveforms and data	Basic telecommunication constraints such as modem and dial up telephone connection, but could also include internet TCP/IP connectivity or even cellular	Customer / ESP

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
1.2. B.2	Server Event Notification	Central Server	Server Event Notification	After the central server software processes the event data, pages and/or emails are sent out to stakeholders	Central Server	Customer	PQ Event data and/or summary data including date, time, magnitude, duration, etc.	Basic telecommunication constraints such as modem and dial up telephone connection, but could also include internet TCP/IP connectivity or even cellular	Customer / ESP

2.1.3 Steps – Alternative / Exception Sequences

Describe any alternative or exception sequences that may be required that deviate from the normal course of activities.   Note instructions are found in previous table.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments

2.1.4 Post-conditions and Significant Results

Describe conditions that must exist at the conclusion of the Function. Identify significant items similar to that in the preconditions section.

Describe any significant results from the Function

| *Actor/Activity*	*Post-conditions Description and Results*
PQ Instruments	Instruments are monitoring system, are ready to capture data if thresholds are exceeded and all communication systems are working so that notifications can be made if an event is captured

2.2 Architectural Issues in Interactions

Elaborate on all architectural issues in each of the steps outlined in each of the sequences above. Reference the Step by number

Microsoft Excel
Worksheet

2.3   Diagram

For clarification, draw (by hand, by Power Point, by UML diagram) the interactions, identifying the Steps where possible.
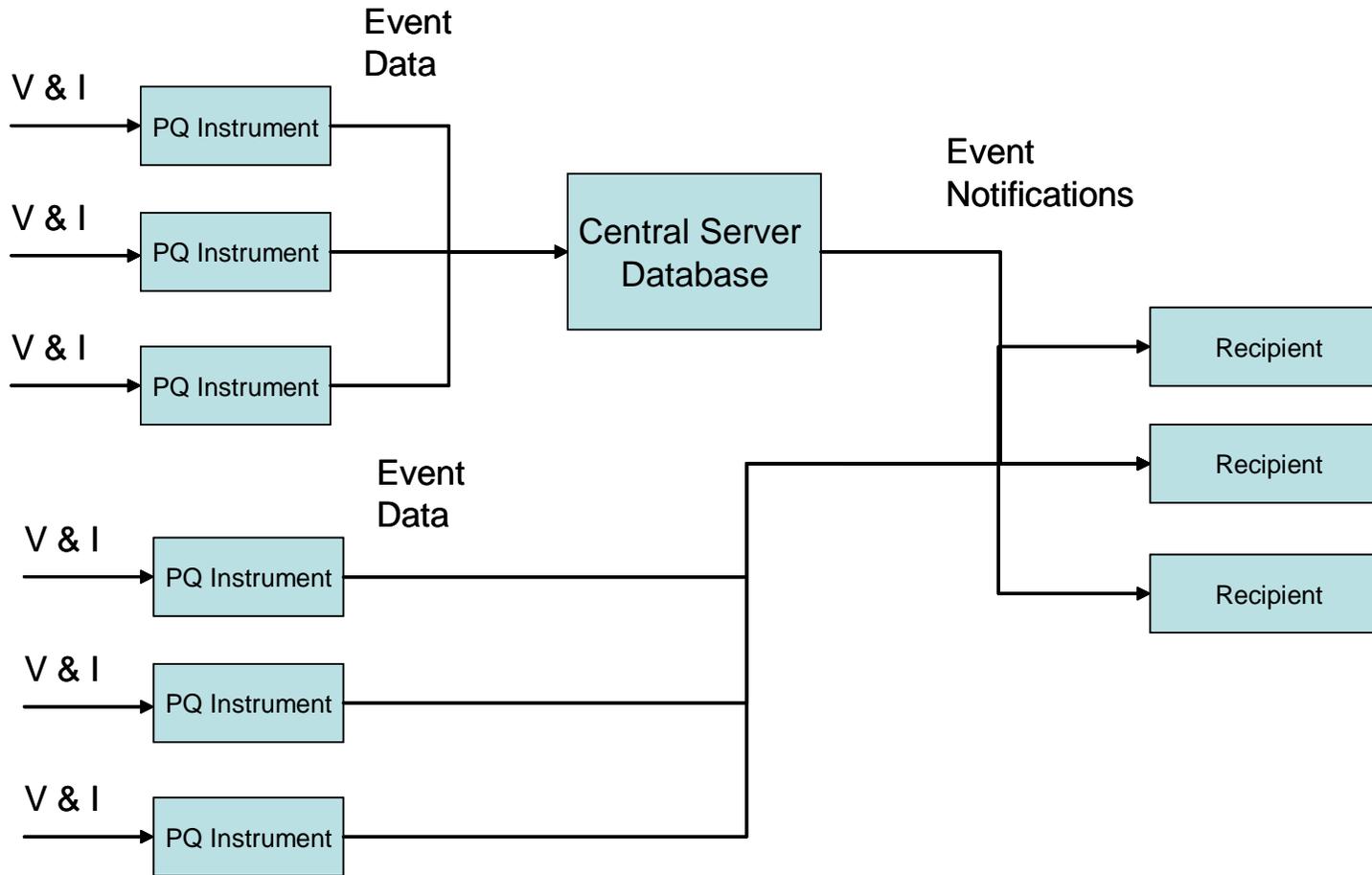
3 Auxiliary Issues

3.1 References and contacts

Documents and individuals or organizations used as background to the function described; other functions referenced by this function, or acting as "sub" functions; or other documentation that clarifies the requirements or activities described. All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work must be so noted.

ID	Title or contact	Reference or contact information
[1]		
[2]		

3.2 Action Item List

As the function is developed, identify issues that still need clarification, resolution, or other notice taken of them. This can act as an Action Item list.

ID	Description	Status
[1]		
[2]		

3.3 Revision History

For reference and tracking purposes, indicate who worked on describing this function, and what aspect they undertook.

No	Date	Author	Description
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