

RTP- DERDevice Management

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

DERDevice Management

1.2 Function ID

IECSA identification number of the function

C-4, C-6.4

1.3 Brief Description

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

1.4 Narrative

The DERDevice management system controls the DERDevice(s) according to the DERDevice schedule. The customer's CustomerBuildingAutomationSystem receives the RTP signals from the EnergyServiceProvider and performs optimizations on the best mix of load reductions and DERDevice function based on the customer's criteria. At the beginning of each interval, the CustomerBuildingAutomationSystem sends the appropriate commands to the DERDeviceManager to initiate the DERDevice functions for that interval. The DERDeviceManger processes those commands, initiates the DERDevice utilization and monitors the DERDevice(s) for compliance with commands. Any failure to produce the scheduled DERDevice results in an alarm broadcasted to the CustomerBuildingAutomationSystem where the customer can take appropriate action. The monitored DERDevice activity is made available in real-time to the CustomerBuildingAutomationSystem where the data can be made available to the customer and EnergyServiceProvider.

In addition to RTP responses, the CustomerBuildingAutomationSystem may bid into the energy and ancillary services markets if all business constraints are first met. If these bids are accepted, additional commands may be set to the DERDevice management system to implement those bids. The CustomerBuildingAutomationSystem will monitor the response to insure the bid services are supplied.

The EnergyServiceProvider is responsible for monitoring DERDevice facilities while operating to ensure power quality constraints are met, and to help manage emergency situations (detailed in the Advanced Distribution Automation Use Cases).

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.

<i>Grouping (Community)</i>		<i>Group Description</i>
RTP Subscribing Customer		End use customers who subscribe to RTP rates and have load control capability, either automatic or manual
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Customer	Person	Verifies activities of the DERDevice Manager and takes action in case of failure
CustomerBuildingAutomationSystem	System	Provides optimized load reductions and DERDevice schedules, notifies DERDevice manager of those schedules and monitors DERDevice systems for compliance with schedule. Interacts with the EnergyServiceProvider to provide real-time information on load and ancillary services performance of customer.
DERDevice	System	Monitors operations schedules, status and controls operation of DERDevice

<i>Grouping (Community)'</i>		<i>Group Description</i>
RTP Subscribing Customer		End use customers who subscribe to RTP rates and have load control capability, either automatic or manual
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Manager		equipment under the control of the customer and/or the customer's CustomerBuildingAutomationSystem.
DERDevice Equipment	Device	Equipment controlled by DERDevice Manager. Could include generation and load devices.

<i>Grouping (Community)'</i>		<i>Group Description</i>
Energy Service Provider (EnergyServiceProvider)		Sells energy and energy services to the customer
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
DERDevice and Ancillary Services Monitoring	System	Monitors RTP customer's system for actual status of ancillary services bid for DERDevice. See Advanced Distribution Automation.
Interval meters/AMR	System	Records energy usage and generation during the settlement periods and sends that information to market operations for financial settlement.
EnergyServiceP rovider		

Replicate this table for each logic group.

1.6 Information exchanged

Describe any information exchanged in this template.

<i>Information Object Name</i>	<i>Information Object Description</i>
DERDevice Schedule	A table of operating levels for DERDevice for each interval in the settlement period. This may be sent one interval at a time or as an entire settlement period's schedule.
DERDevice Device Start/Stop/Set Commands	
DERDevice Status Information	Real-time status of operating DERDevice units
Interval Meter Data	A table of energy consumed by the customer for each interval (maybe sub-interval) in the settlement period. The settlement interval maybe one hour but the energy data may be available on a 5 or 15 minute interval. Full granularity shall be maintained.
Ancillary Services Monitoring Data	Data indicating the ancillary services that are delivered to the system by the customer. This could include VAR support, spinning reserve or load regulation among others.

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.

<i>Activity/Service Name</i>	<i>Activities/Services Provided</i>

<i>Activity/Service Name</i>	<i>Activities/Services Provided</i>

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.

<i>Contract/Regulation</i>	<i>Impact of Contract/Regulation on Function</i>
Environmental	Maximum run times of DG units may be affected by emissions limits.

<i>Policy</i>	<i>From Actor</i>	<i>May</i>	<i>Shall Not</i>	<i>Shall</i>	<i>Description (verb)</i>	<i>To Actor</i>
Provide DERDevice	Customer			X	Provide power as bid to and excepted by EnergyServiceProvider/marker operations	EnergyServiceProvider
Provide Ancillary Services	Customer			X	Provide Ancillary services as bid to and excepted by EnergyServiceProvider/market operations	EnergyServiceProvider
Meter Energy	EnergyServiceProvider			X	Meter energy delivered to customer	Customer

<i>Constraint</i>	<i>Type</i>	<i>Description</i>	<i>Applies to</i>

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'.

<i>Actor/System/Information/Contract</i>	<i>Preconditions or Assumptions</i>
CustomerBuildingAutomationSystem Optimization	Customer CustomerBuildingAutomationSystem has optimized load and DERDevice based upon RTP schedules as well as DERDevice and ancillary services bids. Secondary optimization may have taken place based on acceptance or decline of DERDevice and ancillary services bids.
DERDevice bid	Bids to provide additional energy into the markets have been accepted.
Ancillary Services bid	Bids to provide ancillary services into the markets have been accepted.

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:

*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*

Sequence 2:

*2.1 - Do step 1
2.2 - Do step 2*

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
#	<i>Triggering event? Identify the name of the event.¹</i>	<i>What other actors are primarily responsible for the Process/Activity? Actors are defined in section 0.</i>	<i>Label that would appear in a process diagram. Use action verbs when naming activity.</i>	<i>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.</i>	<i>What other actors are primarily responsible for Producing the information? Actors are defined in section 0.</i>	<i>What other actors are primarily responsible for Receiving the information? Actors are defined in section 0. (Note – May leave blank if same as Primary Actor)</i>	<i>Name of the information object. Information objects are defined in section 1.6</i>	<i>Elaborate architectural issues using attached spreadsheet. Use this column to elaborate details that aren't captured in the spreadsheet.</i>	<i>Reference the applicable IECSA Environment containing this data exchange. Only one environment per step.</i>
1.1	Timer for beginning of interval	CustomerBuildingAutomationSystem		CustomerBuildingAutomationSystem sends signals to DERDevice manager for the upcoming interval. These commands would include generation and ancillary services support.	CustomerBuildingAutomationSystem	DERDevice manager	DERDevice schedule		DER Monitoring and Control
1.2	DERDevice receives schedule for interval	DERDevice Manager		DERDevice implements schedule starting or stopping generation and switching loads.		DERDevice devices	DERDevice Device Start/Stop/Set Commands		DER Monitoring and Control
1..3	DERDevice implements generation	DERDevice Manager		Monitors DERDevice performance and reports status to CustomerBuildingAutomationSystem	DERDevice manager	CustomerBuildingAutomationSystem	DERDevice Status		DER Monitoring and Control

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
1.4	DERDevice performance data published	CustomerBuildingAutomationSystem		Makes DERDevice performance data available to EnergyServiceProvider	CustomerBuildingAutomationSystem	EnergyServiceProvider DERDevice and Ancillary Services Monitoring	DERDevice Status		Customer / ESP
1.5	Failure to meet DERDevice goals	CustomerBuildingAutomationSystem		If DERDevice goals are not met, the CustomerBuildingAutomationSystem will signal the customer with an alarm so that action can be taken.	CustomerBuildingAutomationSystem	Customer	DERDevice Status		Intra-Customer Site

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

<i>Actor/Activity</i>	<i>Post-conditions Description and Results</i>
DERDevice Manager	DERDevice is controlled based on the DERDevice schedule provided by the CustomerBuildingAutomationSystem

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
0.			

This page intentionally left blank.