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| CHANGE REQUEST |
| Meeting ID:\* | REQ#32 |
| Source:\* | Yang, CAICT, yangguang1@caict.ac.cn |
| Date:\* | 2017-11-14 |
| Reason for Change/s:\* | Adding definition of smart meter reading  |
| CR against: Release\* | 3 |
| CR against: WI\* | [x]  Active <WI-0015> [ ]  MNT maintenance / < Work Item number(optional)>Is this a mirror CR? Yes [ ]  No [ ] mirror CR number: (Note to Rapporteur - use latest agreed revision)[ ]  STE Small Technical Enhancements / < Work Item number (optional)>Only ONE of the above shall be ticked |
| CR against: TS/TR\* | TR-0001-Use\_Cases\_Collection-V3\_0\_1 |
| Clauses \* | 5.3 |
| Type of change: \* | [ ]  Editorial change[ ]  Bug Fix or Correction[ ]  Change to existing feature or functionality[x]  New feature or functionalityOnly ONE of the above shall be ticked |
| Impacted other TS/TR(s) |  |
| Post Freeze checking:\* | This CR contains only essential changes and corrections? YES [x]  NO [ ] This CR may break backwards compatibility with the last approved version of the TS? YES [ ]  NO [x]   |
| Template Version: January 2017 (Do not modify) |

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GUIDELINES for Change Requests:

Provide an informative introduction containing the problem(s) being solved, and a summary list of proposals.

Each CR should contain changes related to only one particular issue/problem.

In case of a correction, and the change apply to previous releases, a separate “mirror CR” should be posted at the same time of this CR

Mirror CR: applies only when the text, including clause numbering are exactly the same.

Companion CR: applies when the change means the same but the baselines differ in some way (e.g. clause number).

Follow the principle of completeness, where all changes related to the issue or problem within a deliverable are simultaneously proposed to be made E.g. A change impacting 5 tables should not only include a proposal to change only 3 tables. Includes any changes to references, definitions, and acronyms in the same deliverable.

Follow the drafting rules.

All pictures must be editable.

Check spelling and grammar to the extent practicable.

Use Change bars for modifications.

The change should include the current and surrounding clauses to clearly show where a change is located and to provide technical context of the proposed change. Additions of complete clauses need not show surrounding clauses as long as the proposed clause number clearly shows where the new clause is proposed to be located.

Multiple changes in a single CR shall be clearly separated by horizontal lines with embedded text such as, start of change 1, end of change 1, start of new clause, end of new clause.

When subsequent changes are made to content of a CR, then the accepted version should not show changes over changes. The accepted version of the CR should only show changes relative to the baseline approved text.

## Introduction

<Provide an introduction containing the problem(s) being solved, and a summary list of proposals. Discuss any risk of breaking backwards compatibility with last published version of the impacted TS.>

### -----------------------Start of change 1-------------------------------------------

## 5.3 Smart Meter Reading

### 5.3.1 Description

This clause provides selected Smart Meter Reading use cases

### 5.3.2 Source

oneM2M-REQ-2013-0217R02 Smart Meter Reading Use Case

***Note:*** use case information extracted from SGIP/OpenSG

REQ-2015-0563 pCR on smart meter reading

### 5.3.3 Actors

* Smart Meters (SM), Data Aggregation Points (DAPs),
* Advanced Metering Infrastructure (AMI) Head-end,
* Meter Data Management System (MDMS),
* Customer Information System (CIS)
* Customers(e.g., personal user, company, water supplier, city administrator)

### 5.3.4 Pre-conditions

Availability of meter data.

Smart Meters which are deployed in a block (e.g. same house, building, community, etc.) with the same behaviour based on default configuration or charging policy could be assigned as a group.

### 5.3.5 Triggers

Smart meter on-demand or bulk interval meter read request events

### 5.3.6 Normal Flow

Smart Grid Interoperability Panel (SGIP) (http://www.sgip.org) and OpenSG users group (http://osgug.ucaiug.org/default.aspx) have been leading this effort in North America. An informative document has been submitted to OneM2M based on the SGIP activity. In general, a number of external organizations such as the SGIP or the SGCG (Smart Grid Coordination Group) in Europe have been working to define use cases for Smart Grid (SG). Portals such as the Smart Grid Information Clearing House (http://www.sgiclearinghouse.org) to assist with distributing information about smart grid initiatives in the US. The use-cases presented are derived in part from the above publicly available information.

Figure 5-6 shows the conceptual actors/data flow diagram based on a more detailed diagram developed by SG-Net. The more detailed diagram developed by SG-Net can be seen in the associated submission related to SGIP-based Smart Grid Use Cases.

In Figure 5-7 each element is an “actor” that is communicating with another actor using the shown data flows. As an example, consider “Smart Meter” in the “Customer” quadrant (lower right). Smart Meter (SM) communicates with a number of other actors, such as a Data Aggregation Point (DAP) located in the AMI Network. The DAP can then transmit the aggregated data to the Utility Service Provider using the Wide Area Network. The meter reading information can reach the data center for the Utility Service Provider via the AMI Headend which can forward the information to the MDMS which can coordinate with the CIS to store/retrieve meter data and to determine customer billing information. In certain variations such as cellular-based smart metering systems, a DAP entity may be bypassed, or merely serve as a pass-through for the information flow between the utility data center and the smart meter.

**Figure 5‑6 Conceptual Actors/Data Flow Diagram**

**Figure 5‑7 Typical Smart Meter Reading Flows A (on left) and B (on right)**

Typically, a utility data center processing application communicates end-to-end via the AMI Headend with a smart meter data application at the edge. Figure 5.3.6‑2 shows two possible flows A and B depending on whether there is a DAP entity along the path from the Utility Data Center / AMI Headend and the Smart Meter.

In flow A, the Utility Data Center / AMI Headend can make a request to the Smart Meter directly. Typically there may be 3 to 6 such requests per day (typically < 10 times per day). The request could indicate that the current meter reading is desired. Alternatively, multiple meter readings over a period of time such as for a few hours (e.g. from 2 p.m. to 8 p.m.) for a given day or across days could be requested. The Smart Meter completes the request and communicates it back to the Utility Data Center / AMI HeadEnd. Typical in such on-demand or bulk-interval read requests, a reasonably immediate response is desired of the order of a few seconds, so that there is not necessarily any significant delay tolerance allowed for the response. However, it is possible that, in current systems or in future systems, such requests could optionally carry a delay tolerance associated with the request depending on the urgency of the request. The size of the meter reading response can be of the order of a few tens to hundreds of bytes, and is also implementation dependent.

In flow B, the Utility Data Center / AMI Headend can make a request to the Smart Meter that can be received via the DAP. Typically there may be 3 to 6 such requests per day (typically < 10 times per day). The request could indicate that the current meter reading is desired or that multiple meter readings over a period of time are desired. The Smart Meter completes the request and sends its response to the DAP. This response from the Smart Meter to the DAP is typically desired in the order of 15 to 30 seconds, as suggested in the submitted informative document related to SGIP-based Smart Grid Use Cases. However the actual delay in processing can be implementation dependent across smart metering systems across the world. The size of the meter reading response can be of the order of a few tens to hundreds of bytes, and is also implementation dependent.

In case that the Smart Meters belong to a group, there are two ways to distribute the request from the Utility Data Center / AMI Headend to Smart Meters: the Utility Data Center / AMI Headend sends a request to DAP then DAP distributes it to all Smart Meters, or the Utility Data Center / AMI Headend sends same requests to all Smart Meters via DAP which acts as a router. There are several ways to submit the data from Smart Meters to the Utility Data Center / AMI Headend: The DAP entity can buffer the data for some time, receive data from many meters, and then submit the aggregated data across meters to the Utility Data Center / AMI Head End. The duration for which the DAP may buffer data can be implementation dependent, and could last for several seconds or minutes. In some variants, the DAP may serve merely as a router, so that it directly forwards the smart meter response to the Utility Data Center / AMI HeadEnd without performing any aggregation tasks. In further variants, the DAP entity could be merely a virtual processing entity and not a physical one, where such a virtual entity could even potentially reside on the other side (not shown) of the wide area network associated with the Utility Data Center / AMI Head End. For instance, the Utility Data Center / AMI Headend could send a request to DAP for distributing it to all Smart Meters in a group, and if the DAP belongs to the third party, the DAP shall serve as a router to directly forward the smart meter response to the Utility Data Center / AMI HeadEnd without performing any aggregation tasks.

Summary

To summarize, meter reading requests could request a single meter reading or a set of meter readings. Such requests may occur a few times (typically < 10) per day and can be of the order of a few tens of bytes. Meter reading responses can be of the order of a few 10s to 100s of bytes typically. Meter reading responses are typically expected in the order of a few seconds after reception of the request at the meter. Any delay tolerance associated with such requests can be optional or implementation dependent. In some system variants, a DAP entity may not exist at all so that the Utility Data Center / AMI Head End communicates directly with the smart meter. In other end-to-end system variants, a DAP entity may serve as an intermediate processing or forwarding entity between the Smart Meter and the Utility Data Center / AMI Head End. In such cases, the DAP entity may be either a physical or virtual processing entity in the end-to-end system and can assist with buffering and aggregating meter reading responses. The duration of buffering or aggregation at the DAP entity can be implementation dependent and could be of the order of a few seconds or minutes typically.

### 5.3.7 Alternative Flow

None

### 5.3.8 Post-conditions

For normal flow, the customers can fully master meter reading in time.

### 5.3.9 High Level Illustration



### 5.3.10 Potential Requirements

1. The M2M System shall be able to provide identity verification between the M2M device and the M2M server.
2. The M2M System shall be able to protect confidentiality of data (i.e. Smart Meter Response), even when DAP is deployed by the third party.

### -----------------------End of change 1---------------------------------------------