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| CHANGE REQUEST | |
| Meeting ID:\* | SDS#39 |
| Source:\* | Convida Wireless Catalina Mladin, Convida Wireless, [Mladin.Catalina@convidawireless.com](mailto:Mladin.Catalina@convidawireless.com)  Convida Wireless Dale Seed, Convida Wireless,  [Seed.Dale@convidawireless.com](mailto:Seed.Dale@convidawireless.com) |
| Date:\* | 2019-02-10 |
| Contact:\* | Catalina Mladin, Convida, [Mladin.Catalina@convidawireles.com](mailto:Mladin.Catalina@InterDigital.com) |
| Reason for Change/s:\* | Provides updates on solution to Key Issue for time synchronization |
| CR against: Release\* | Release 4 |
| CR against: WI\* | Active <WI-0046>  MNT / < Work Item number(optional)>  Is this a companion CR? Yes  No  Companion CR number: (Note to Rapporteur - use latest agreed revision)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-0026 |
| Clauses/Sub Clauses \* | Clause 10.8 |
| Type of change: \* | Editorial change  Bug Fix or Correction  Change to existing feature or functionality  New feature or functionality  Only ONE of the above shall be ticked |
| Impacted other TS/TR(s) | <TS/TR number>, <Version Number>, and <Description on which aspect should be reflected in this TS/TR> |
| Post Freeze checking:\* | This CR contains only essential changes and corrections? YES  NO  This CR may break backwards compatibility with the last approved version of the TS? YES  NO |
| 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

This solution addresses aspects of the Key Issue on Time Synchronization in TR-0026. This contribution is updating the existing time synchronization beacon solution that has been accepted into TR-0026 to add missing details and corrections.

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



## Solution H: Time Synchronization using beacons

### Solution Description

This solution addresses Key Issue 7 which highlights that services requiring time-sensitive operations rely on the various Service Layer entities being time-synchronized.

CSEs can be configured by one or more entities to send SL time synchronization beacon notifications. The beacons can be customized to be sent at specific frequencies (e.g. every 5 minutes) or in response to customized conditions or events (e.g. certain synchronization offset has been exceeded), and the settings can be specified by one or more entities. The beacons can be useful for keeping an entity synchronized with the current local time of a CSE especially when the entity is communicating with the CSE on an intermittent basis where clock drift and synchronization issues can arise.

Time synchronization beacon notifications contain information such as the local time of the originator of the beacon and other coordination scheduling information e.g. information used by receivers to program their sleep and low power schedules.

The solution relies upon the following elements:

1. <*timeSynchBeacon*> resources are created by entities requesting time synchronization services from the Hosting CSE. The Hosting CSE provides time synchronization services in the form of beacon notifications that are sent to the entities.
2. The Hosting CSE provides notifications with the time-synchronization information (beacon message) based on the configured parameters. The notification includes: originator CSE-ID, target, CSE current local time, and other beacon notification event information.

### The beacon receiver can extract a *CSE current local time* component, compare it against its own local time and an offset is computed. The offset can then be used to synchronize the local time of the beacon receiver to the local time of the beacon originator.Solution Applicability

This solution applies to Key Issue 7

### Solution Details

To implement this solution, the new <*timeSynchBeacon*> resource type is introduced, as described in Table 10.8.3‑1. Existing resource types <*CSEBase*>, <*remoteCSE*> and <*AE*> are modified to include <*timeSynchBeacon*> as optional child resources.

Table 10.8.3‑1: <timeSynchBeacon> Resource Attributes

| New Attributes | Multiplicity | RW/  RO/  WO | Description |
| --- | --- | --- | --- |
| *timeSynchBeaconInterval* | 0..1 | RW | Frequency of beacons expressed as the minimum time between two beacon notifications sent by the Hosting CSE to the beacon target. This attribute is used for the periodic *timeSynchBeaconCriteria*.  If this attribute is not configured and *timeSynchBeaconCriteria* is set to “Periodic” then the Hosting CSE will use a default value based on local policies. |
| *timeSynchBeaconThreshold* | 0..1 | RW | Synchronization time offset threshold. Used for the “Loss of Synchronization” *timeSynchBeaconCriteria*. When the delta between the current local time of the Hosting CSE and the local time of the beacon target specified in the *timeSynchBeaconTarget* exceeds this defined threshold, then the Hosting CSE sends a beacon to the target.  The local time of the beacon target can be extracted by the Hosting CSE using time synchronization parameters present in the request and response messages that the beacon target sends to the Hosting CSE.  If this attribute is not configured and *timeSynchBeaconCriteria* is set to “Loss of Synchronization” then the Hosting CSE will use a default value based on local policies. |
| *timeSynchBeaconTargets* | 1 (L) | RW | This attribute is configured with the list of targets that the Hosting CSE sends beacon notifications to. A target is formatted as a oneM2M compliant Resource-ID or as an identifier compliant with a oneM2M supported protocol binding (e.g. http, coap, mqtt).  If a target is formatted as a oneM2M compliant Resource-ID, then the target is formatted as a structured or unstructured CSE-Relative-Resource-ID, SP-Relative-Resource-ID, and/or Absolute-Resource-ID of an <*AE*> or <*remoteCSE*> resource. A Hosting CSE uses this information to determine proper *pointOfAccess*, *requestReqchability* and/or *pollingChannel* information needed to send a beacon notification to the target. The following is an example.   * /CSE0001/AE0001   For a target that is formatted as an identifier compliant with a oneM2M supported protocol binding, the details of this format are defined by the respective oneM2M protocol specification. The following is an example of an HTTP URI compliant with oneM2M HTTP protocol binding.   * <https://172.25.30.25:7000/notification/handler>   A notification serialization type may be appended to a notification target. The Hosting CSE serializes notifications and sends them to the target based on this serialization type indicator (e.g. XML, JSON or CBOR). If a notification serialization type is not appended to a notification target, a default is applied based on the Hosting CSE local policy. The syntax for appending a serialization type to a notification target uses the “?” delimiter character as shown in the below examples.   * <http://mydomain/notificationHandler?ct=json> * CSE02/base/ae2?ct=xml |
| *timeSynchBeaconCriteria* | 1 | RW | Criteria for the beacon generation.   * Periodic – Beacon is sent periodically based on the period defined in *timeSynchBeaconInterval* * Loss of Synchronization – Beacon is sent as a result of a detection in a loss of synchronization exceeding the defined *timeSynchBeaconThreshold* |

To support sending time synchronization information to beacon targets within the payload of a oneM2M notification, a new data type is defined within the existing oneM2M notification data object as described in Table 10.8.3‑2.

Table 10.8.3-2: Data Types for notification data objects

|  |  |  |  |
| --- | --- | --- | --- |
| Root Element Name | **Request Optionality** | Data Type | Default Value and Constraints |
| **N** |
| timeSynchBeacon | O | m2m:timeSynchBeaconInfo |  |

Table 10.8.3‑2 defines a proposed definition for the m2m:timeSynchBeacon data type.

Table 10.8.3-3: Type Definition of m2m:timeSynchBeacon

|  |  |  |  |
| --- | --- | --- | --- |
| Element Path | **Element Data Type** | Multiplicity | Note |
| currentLocalTime | m2m:timestamp | 1 | This element is configured with the local time of the Hosting CSE. |
| currentTimeOffset | xs:duration | 0..1 | This element is included only if *timeSynchBeaconCriteria* is set to “Loss of Synchronization”. This element is configured with the amount of time offset calculated by the Hosting CSE and that triggered the beacon. The beacon target should adjust its local time by this specified offset. |

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

CHECK LIST

* Does this Change Request include an informative introduction containing the problem(s) being solved, and a summary list of proposals.?
* Does this CR contain changes related to only one particular issue/problem?
* Have any mirror CRs been posted?
* Does this Change Request make **all** the changes necessary to address the issue or problem? E.g. A change impacting 5 tables should not include a proposal to change only 3 tables?Does this Change Request follow the drafting rules?
* Are all pictures editable?
* Have you checked the spelling and grammar?
* Have you used change bars for all modifications?
* Does the change 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.)
* Are multiple changes in this CR 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.?