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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 a 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.XX |
| 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 introducing a new proposed time synchronization solution involving a CSE performing time offset compensation on behalf of one of its Registrees.

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



## 10.XX Solution XX: Time Compensation

### 10.XX.1 Solution Description

This solution addresses the time synchronization Key Issue 7 by proposing time offset compensation functionality within a Registrar CSE.

In this proposal a new time synchronization solution involving a CSE performing time offset compensation on behalf of one of its Registrees is defined. This time offset compensation can be performed by a CSE when it detects a lack of synchronization between itself and one of its Registrees that exceeds a specified threshold. A CSE can use timing information that a Registree includes within the ***Current Local Time*** oneM2M message parameter to calculate the amount of offset between its local time and the local time of the Registree. Based on this offset, a CSE can then compensate for the offset by making adjustments to oneM2M timing related metadata contained within the oneM2M requests it receives from the Registree. In doing so, a Registree’s messages can be synchronized to the local time of the CSE without burdening the Registree with having to maintain synchronization with the CSE.

Some examples of timing related metadata in a oneM2M request that is expressed in absolute format (e.g. 20141003T112032) and that a Registrar CSE can perform time offset compensation includes the following.

* originatingTimestamp
* requestExpirationTimestamp
* resultExpirationTimestamp
* operationExecutionTime
* resultPersistence
* createdBefore
* createdAfter
* modifiedSince
* unmodifiedSince
* expireBefore
* expireAfter
* creationTime
* lastModifiedTime
* expirationTime
* createdBefore
* createdAfter
* modifiedSince
* unmodifiedSince
* startTime
* completeTime
* eventStart
* eventEnd
* dynamicAuthorizationLifetime

In this proposal, new resource attributes are proposed to the <AE> and <remoteCSE> resources to allow a Registree to enable its Registrar CSE to perform time offset compensation on its behalf.

### 10.XX.2 Solution Applicability

This solution applies to Key Issue 7.

### 10.XX.3 Solution Details

A Registree can enable its Registrar CSE to perform time offset compensation on its behalf by configuring the *enableTimeCompensation* and *synchronizationPrecision* attributes of the <AE> and <remoteCSE> resources defined in Table 10.XX.3-1.

Table 10.XX.3-1: Time Compensation Attributes of <AE> and <remoteCSE>

| Attributes | Multiplicity | RW/  RO/  WO | Description | *Announced* Attributes |
| --- | --- | --- | --- | --- |
| *enableTimeCompensation* | 0..1 | RW | Enables time offset compensation functionality. When set to TRUE, the Registrar CSE peforms time offset compensation and when FALSE it does not. Default is FALSE. | NA |
| *synchronizationPrecision* | 0..1 | RW | Defines the level of precision required for time synchronization. Value is expressed in terms of a time offset threshold (e.g. 10msec). If *enableTimeCompensation* is TRUE, the Registrar CSE monitors the time offset between its local time and the local time of the Registree to detect if and when this threshold has been exceeded. When exceeded, the Registrar CSE will perform time offset compensation by adjusting incoming message parameters expressed in absolute time format (e.g. 20141003T112032) by the detected time offset. | NA |



**Step 1:** Registree AE/CSE registers to Registrar CSE by issuing a CREATE request for an <AE> or <remoteCSE> resource. Within this request, the Registree includes time offset compensation related attributes to configure the Registrar CSE to enable time offset compensation processing. The types of time synchronization parameters include *enableTimeSyncrhonization* and *synchronizationPrecision*.

**Step 2:** The Registrar CSE creates the <AE> or <remoteCSE> resource and enables time offset compensation functionality.

**Step 3:** The Registrar CSE generates a response.

**Step 4:** The Registree sends a subsequent request to the Registrar sometime later. In this request, the Registree can include its ***Current Local Time***.

**Step 5:** The Registrar CSE then computes the time offset between its current local time and the local time of the Registree.

**Step 6:** If the compted time offset exceeds the *synchronizationPrecision*, the Registrar CSE performs time offset compensation to the incoming request by adjusting any time stamp related metadata that is expressed in absolute time format. The adjustment is performed using the computed time offset.

**Step 7:** The Registrar CSE returns a response.

-----------------------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.?