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| CHANGE REQUEST |
| Meeting ID:\* | SDS#39 |
| Source:\* | Convida Wireless Catalina Mladin, Convida Wireless, Mladin.Catalina@convidawireless.comConvida Wireless Dale Seed, Convida Wireless, Seed.Dale@convidawireless.com |
| Date:\* | 2019-02-10 |
| Contact:\* | Catalina Mladin, Convida, Mladin.Catalina@convidawireles.com |
| Reason for Change/s:\* | Provides a solution to Key Issue for time synchronization  |
| CR against: Release\* | Release 4 |
| CR against: WI\* | [x]  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[x]  New feature or functionalityOnly 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 [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

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.

R01:

* Consider adjusting/compensating times for incoming requests and outgoing responses
* Do we need Synchronization Precision (is this overkill)

R02:

* Consider re-using existing OET parameter instead of defining a new parameter

R03:

* Fix editorial issue

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

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 ***Originating Timestamp*** oneM2M message parameter to calculate the amount of offset between its current time and the current 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 current 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.

Note, this solution is applicable to the 0-hop deployment scenario involving an ADN-AE or ASN-CSE which does not support synchronizing its time reference to its Registrar MN-CSE. This is not targeting a multi-hop deployment scenario.

### 10.XX.3 Solution Details

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

Table 10.XX.3-1: Time Compensation Attribute 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 |
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**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 enables time offset compensation processing by setting the *enableTimeSyncrhonization* to a value of TRUE.

**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 includes its ***Originating Timestamp*** request parameter.

**Step 5:** The Registrar CSE then computes the time offset between its time and the time of the Registree specified in the ***Originating Timestamp*** request parameter.

**Step 6:** 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 to adjust time stamp related metadata within the request to compensate for any offset.

**Step 7:** The Registrar CSE performs time offset compensation to the outgoing response by adjusting any time stamp related metadata that is expressed in absolute time format. The adjustment is performed using the computed time offset to align time stamp related metadata within the response to account for any time offset between the Originator and Receiver.

**Step 8:** The Registrar CSE returns a response. Within the response, any time stamp related metadata is compensated to account for any time offset between the Originator and Receiver.

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