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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 updates on 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 10.9 |
| 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 expanding further on the proposed time synchronization solution involving the definition of new request and response parameters that has been accepted into TR-0026.

R01

* Investigate if it makes sense to merge Ping and Current Time parameters
* Investigate whether a new oneM2M primitive, Response Type, and/or Result Content value should be defined to optimize Ping request/response handling and improve the accuracy of transit time calculations.
* Remove "local"

R02

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

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

1.

## Solution I: Time Synchronization using request and response parameters

### Solution Description

This solution addresses the time synchronization Key Issue 7.

In this proposal, the ***Originating Timestamp*** message parameter is used to advertise as well as compare the current times of a CSE and the entities that communicate with it. The ***Originating Timestamp*** parameter can be used to share current times, compute time offsets, and adjust/correct times such that they remain synchronized with one another. The ***Originating Timestamp*** message parameter can be included in requests as well as in response messages originated by the CSE or the entities that communicate with it.

In this solution a Service Layer Ping message is also proposed, enabling the calculation of network latency for time compensation.

### Solution Applicability

This solution applies to Key Issue 7.

### Solution Details

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When an entity creates a <*timeSynchBeacon*> resource on a Hosting CSE and configures the *timeSynchBeaconCriteria* attribute with a value of “Loss of Synchronization”, the entity is requesting that the Hosting CSE monitor the offset between the current time of the entity and the current time of the Hosting CSE to detect if/when there is a delta that exceeds a certain threshold. To perform this monitoring, the entity must provide its current time on a regular basis to the <*timeSynchBeacon*> resource Hosting CSE. To facilitate this exchange, the ***Originating Timestamp*** request and response parameters can be used.

Note based on deployment and implementation use case requirements, the ***Originating Timestamp*** message parameter can be included in all request and response messages originated by an entity targeted towards a <*timeSynchBeacon*> resource Hosting CSE, or only in select messages (e.g. one every n seconds or one in every n messages). This allows providing adequate information for maintaining proper synchronization without introducing unnecessary overhead.

Note, when an entity creates a <*timeSynchBeacon*> resource and configures the *timeSynchBeaconCriteria* attribute with a value of “Periodic”, the exchange of current timing information and the use of ***Originating Timestamp*** is not required.

When an entity configures a <*timeSynchBeacon*> resource with the *timeSynchBeaconCriteria* attribute set to a value of “Loss of Synchronization”, the Hosting CSE can optionally compute the transit time (i.e. network latency) of messages that flow between itself and the entity. The Hosting CSE can take this time into account when calculating the offset between the current time of the entity and the current time of the Hosting CSE. This enables the Hosting CSE to calculate the offset with added precision. When receiving messages from the entity with the ***Originating Timestamp*** parameter configured, the Hosting CSE can first adjust this value by the transit time before comparing the value against its own current time and computing an offset.

To compute the transit time between the entity and the <*timeSynchBeacon*> resource Hosting CSE, a new Ping (P)operation can be defined in addition to the existing Create (C), Retrieve (R), Update (U), Delete (D), Notify (N) operations. The <*timeSynchBeacon*> resource Hosting CSE can use the Ping operation along with a ***Originating Timestamp*** parameter within requests that it targets towards the *pointOfAccess* of an entity that created the <*timeSynchBeacon*> resource. When the entity receives the Ping request and returns a Ping response, the entity can echo back the value of the ***Originating Timestamp*** parameter of the Ping request in a ***Originating Timestamp*** parameter within the Ping response. Upon receiving the Ping response, the <*timeSynchBeacon*> resource Hosting CSE can compute the round-trip transit time by substracting the value contained in the ***Originating Timestamp*** parameter of the Ping response from the time when it received the Ping response message.

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Editor’s Note: It is FFS whether targeting a Ping request towards the pointOfAccess of an entity is optimal or whether defining a new pingURI is required.

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

-----------------------Start of change 2 -------------------------------------------

The following clauses are duplicates of 10.8 and 10.9 and need to be removed from TR-0026.

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-----------------------End of change 2-------------------------------------------

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.?