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| CHANGE REQUEST |
| Meeting ID:\* | SDS 42 |
| Source:\* | Bob Flynn, Convida Wireless , Bob.Flynn@convidawireless.com |
| Date:\* | 2019-09-13 |
| Reason for Change/s:\* | Core oneM2M for Device Connection Efficiency (DCE) |
| CR against: Release\* | Rel-4 |
| CR against: WI\* | [x]  Active <Work Item number> [ ]  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-0024v4\_2\_0 |
| Clauses \* |  |
| Type of change: \* | [ ]  Editorial change[ ]  Bug Fix or Correction[x]  Change to existing feature or functionality[ ]  New feature or functionalityOnly ONE of the above shall be ticked |
| Other TS/TR(s) impacted | None |
| 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 [ ]  |
| Template Version: January 2019 (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

-------------------------------------------------- Start of Change 1--------------------------------------------------

## x.3 Solutions

*Editor's Note: This clause will contain the solutions that address the key issues in this area.*

### x.3.n Solution #y.1: TS.34\_4.1\_002

*Editor's Note: Solutions within the area are not in any particular order but they are added incrementally (n = 1, 2, 3…) when new solution is identified. 'y' refers to the area.*

#### x.3.n.1 Introduction

*Editor's Note: Each solution should list the key issues that it addresses. There may be references to the key issues outside the area.*

TS.34:

|  |  |
| --- | --- |
| TS.34\_4.1\_REQ\_002 | The IoT Device Application should always be prepared to handle situations when communication requests fail, when such failure is reported by the IoT Embedded Service Layer. |

This is partly the Application responsibility, however we should identify the types of errors that can occur and define when the CSE should report the errors.

Application logic errors: these types of errors occur as a result of operations initiated by the application, such as sending sensor measurements or sending payloads that exceed policy limits, sending messages too frequently (as defined by policies).

As these devices may be in remote locations, there should also be a mechanism to report these errors to the MNO and/or SP such that the need for remote management or maintence of the device can be indicated.

ASN-CSE logic errors occur when the ASN-CSE performs operations that fall within the parameters of specified policies, but have a failure result, e.g. based on a CMDH policy to buffer messages until a specified buffer size occurs when the ASN-CSE sends the payload yet the transmission fails. This is an example of an error not caused by the application, rather something in the communication channel (ASN-CSE-comm module-core network-IN-CSE…). To be prepared to meet this requirement, the ASN-CSE should report this type of error to the application(s) on the device (store in a errorlog resource container such that a subscription/notification can be created), but they may not know how to handle it. Given that this is reported to the applications, we must assume that some applications could modify their behaviour based on this error report, therefore there should be an indication when the error condition is resolved (if possible). As these devices may be in remote locations, there should also be a mechanism to report these errors to the MNO and/or SP such that the need for remote management or maintence of the device can be indicated.

To ensure error reporting does not create a large signalling /communication load on the CN, error reporting should be managed by a CMDH policy and adhere to applicable message transmission policies.

Solution should include the following:

- listing of the different types of errors that the application can cause

- Listing of error types that are caused by CN conditions, i.e. failure to connect.

- location to store error conditions (not

- procedure to report errors to MNO/SP when they occur or later based on communication schedule and policies

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#### x.3.n.2 Solution details

*Editor's Note: This clause will describe the solution.*

#### x.3.n.3 Evaluation

*Editor's Note: This clause will contain a variety of evaluations of this solution.*

EDITORS NOTE: Each evaluation will include the requirement ID(s) from GSMA TS.34 that is solved with the proposed solution

-------------------------------------------------- End of Change 1---------------------------------------------------

-------------------------------------------------- Start of Change 2--------------------------------------------------

### x.3.n Solution #y.1: TS.34\_4.1\_003

*Editor's Note: Solutions within the area are not in any particular order but they are added incrementally (n = 1, 2, 3…) when new solution is identified. 'y' refers to the area.*

#### x.3.n.1 Introduction

*Editor's Note: Each solution should list the key issues that it addresses. There may be references to the key issues outside the area.*

TS.34:

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| TS.34\_4.1\_REQ\_003 | Each time there is a need to send data over the mobile network the IoT Device Application should classify the priority of each communication. For example, the IoT Device Application should distinguish between data that requires instantaneous transmission and delay tolerant data that could be aggregated and/or sent during non-peak hours. Such information about the priority of the communication should be communicated to the IoT Embedded Service Layer. |

This requirement is met with the use of the optional ***Event Criteria*** request parameter and ***Delivery Aggregation***.

The proposed solution is to define the ASN-CSE to either

1. Make these two request parameters MANDATORY or
2. Define default behavior when these parameters are not provided, such that Ec is **bestEffort** and DelAggr is TRUE.

Implications of these two options:

If option 1 is used an application hosted on another host platform may not work on this platform because the messages would be rejected. This is VERY BAD.

If option 2 is used an application hosted on another host platform may see a different behaviour on a UE host platform. This may be a problem for the application, but aligns with the goal of this requirement.

Option 2 is proposed. This can be implemented by defining a default CMDH policy.

This will need to be captured in an appropriate section in TS-0026 that lists defaults for a variety of policies.

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-------------------------------------------------- End of Change 2---------------------------------------------------

-------------------------------------------------- Start of Change 3--------------------------------------------------

### x.3.n Solution #y.1: TS.34\_4.2\_001

*Editor's Note: Solutions within the area are not in any particular order but they are added incrementally (n = 1, 2, 3…) when new solution is identified. 'y' refers to the area.*

#### x.3.n.1 Introduction

*Editor's Note: Each solution should list the key issues that it addresses. There may be references to the key issues outside the area.*

TS.34:

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| TS.34\_4.2\_REQ\_001 | When supporting IoT Device Applications which need to send data very frequently the IoT Embedded Service Layer should use an “always-on” connectivity mechanism instead of activating and deactivating network connections (a ‘network connection’ being the establishment of a radio connection between the Communications Module and the network) very frequently. |

Based on the <schedule>/<ape> the ASN-CSE needs to decide what communication mode to be in: PSM, etc.

The ASN-CSE has a <schedule> resource at CSEBase and/or <node>.

There needs to be a CMDH (or perhaps a DM) policy that describes evaluating the <schedule>/*ape* resource of the ASN-CSE and then placing the UE device into appropriate power savings mode. For example, if the <schedule>/*ape* shows that the device is not expected to communicate for the next 2 hours the device can switch to PSM.

Define a policy that specifies the conditions needed for the ASN-CSE to switch to a supported power saving mode.

Define a procedure that defines when and how this is to be evaluated.

For example, upon power on, the ASN considers the *ape* attribute of all registered AE’s or RemoteCSE’s to determine the next expected communication time (ECT). Based on that result, the CSE selects the appropriate mode to put the device into. CSE would need to find the policy that applies to the ECT and then execute the device specific command to put the device into the specified mode.

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-------------------------------------------------- End of Change 3---------------------------------------------------

-------------------------------------------------- Start of Change 4--------------------------------------------------

### x.3.n Solution #y.1: TS.34\_4.2\_002

*Editor's Note: Solutions within the area are not in any particular order but they are added incrementally (n = 1, 2, 3…) when new solution is identified. 'y' refers to the area.*

#### x.3.n.1 Introduction

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TS.34:

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| TS.34\_4.2\_REQ\_002 | The IoT Embedded Service Layer should minimize the number of network connections between the IoT Device and the network. |
| Data should be aggregated by the IoT Embedded Service Layer into as big a chunk as possible before being compressed and sent over the communications network. |
| The IoT Embedded Service Layer should coordinate each of the IoT Services network communication to make efficient use of the network. |

There are three separate parts of this requirement.

1. Since the ASN-CSE only communicates with the Registrar CSE, there only needs to be a single connection at a time, even if multiple connections are possible. This does not apply to NOTIFY messages as they can be sent to any endpoint.
	1. We may want to restrict that in a manner that notifications are sent to the Registrar (IN-)CSE and then sent to the final destination from the registrar CSE. In this case notifications would not be allowed on the Mcc. This would impact how CREATE/UPDATE subscription is processed as we would only allow notificationUri to be registered entities. All other data would be accessed from the SP host CSE. This will help make sure that the UE hosted ASN-CSE does not get into a bad state because of communication with an UNKNOWN entity, i.e. waiting for a response that does not come.
	2. In what case(s) do we need a direct connection to the UE hosted ASN-CSE? (that does not go through the IN-CSE)
2. The “aggregate” messages is handled by a CMDH policy and related functionality that needs to be defined clearly. Note that compression of the message is directed as well.
3. “should coordinate each of the IoT Services network communication”.
	1. In one interpretation of this requirement, Coordinating the Network SL communication is handled by the <schedule> and *activityPattern* attributes. Default/mandatory values will fully address this requirement.
	2. In a second interpretation of this requirement, more in context with the other two parts of this requirement, it addresses multiple communication channels, e.g. cellular, ethernet, other and when those communication channels would be used. This would be addressed by a CMDH policy
	3. In a third interpretation of this requirement, reflecting on the first requirement, if there are multiple connections to the IN-CSE, e.g. NIDD, COAP, and Websockets, the ASN-CSE should coordinate the usage among them. For example, if policies for communication are set such that NIDD is used for high priority messages and COAP is used for low priority messages where we buffer for a specified threshold. If a new high priority message would put the size of the buffered messages over the limit of the threshold, then the COAP communication channel should be used for the high priority message plus the low priority messages.
	4. I think that the third interpretation should be addressed in this requirement and perhaps we should get clarification of what is intended. The other two interpretations are covered in other requirements and will be in the final solution as well.

Solution:

Define how CMDH buffers are managed and perhaps improve some of the

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-------------------------------------------------- End of Change 4---------------------------------------------------

-------------------------------------------------- Start of Change 1--------------------------------------------------

### x.3.n Solution #y.1: TS.34\_4.2\_003

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#### x.3.n.1 Introduction

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TS.34:

|  |  |
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| TS.34\_4.2\_REQ\_003 | If permissible for the IoT Service, the IoT Embedded Service Layer should avoid synchronized behaviour with other IoT Devices and employ a randomized pattern (e.g. over a period of time of a few seconds to several hours or days) for network connection requests. |

The oneM2M <cmdhNwAccessRule> resource allows specification of a number spreadingWaitTime (SWT), such that before accessing the underlying network, the CSE will wait for an additional amount of time randomly chosen between 0 and SWT.

Related procedures that need to be defined:

This <cmdhNwAccessRule> resource shall be specified in the IN-CSE. When an ASN-CSE registers, this resource is announced to the ASN-CSE in a manner that the ASN-CSE will use this information.

Whenever the ASN-CSE needs to communicate, this parameter needs to be taken into consideration. There could be multiple instances of this resource such that SWT values can be tailored to the priority of the communication, e.g. smaller value of SWT for Ec=immediate compared to a larger value of SWT for Ec=best effort.

These solutions need to consider but the basic functionality AND the deployment that ensures consistent implementation of the functionality.

For multiple devices in the same area the IN-CSE can ensure that CMDH parameters are appropriately defined to avoid synchronization.

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