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| Work Item |
| Work Item Title: | IPE-based Device Management with FlexContainers |
| Document Number | WI-xxxx |
| Supporting Members or Partner type 2 | Orange, Hansung University, Exacta GSS, Deutsche Telekom, Nokia |
| Date: | 2021-11-15 |
| Abstract: | Propose a work item for Device Management (DMG) with IPE-based approach with FlexContainers |
| 'Template Version: January 2019 (do not modify) |

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1 Title (abbreviation)

IPE-based Device Management with FlexContainers (IPE-DM)

2 Justification

In Release 4, SDT (Smart Device Template) (WI-0081) was extended to include device management functions in addition to the existing services. This justified extension creates a new way to perfom device management compared to the existing Device Management (DMG) Common Service Function (CSF) model using <mgmtObj>.

In order not to live with 2 solutions for the same purpose, in Release 4, a work item (WI-0099) was created to study a possible transition phase allowing implementation using DMG <mgmtObj> to migrate towards SDT model. The study done in TR-0067 concluded that such a migration was not desirable and thus, DMG <mgmtObj> should stay as is.

The WI-0099 study raised a new vision on the way the Device Management could be designed, especially for IoT network technologies, with more abstract APIs and independently from any external DM technology, relying on IPE guidelines. This new vision is driven by the extension of the Edge architectural paradigm, from Edge in network equipments to Extreme Edge Computing in IoT devices, able to host more and more powerful processing. This leads to potentially highly distributed deployment which need to reconsider some initial architectural thoughts.

Device Magangement using flexContainers (IPE-based) with SDT provides a unique and extensible solution to manage IoT devices for services and device management. This unicity will help to develop solutions using AI within architectures that may be extended when a solution is upgraded for new needs but also to include new kinds of devices which do not exist today.

Benefits of the IPE-based Device Management with FlexContainers (IPE-DM) are:

* Simplified architecture: one IPE per interworked technology, not a global CSF for the CSE to handle all external technologies.
* Simplified data model: no need to describe in each managed entity the full information on its origin.
* Simplified design: only <flexContainers>, not <mgmtObj> + <mgmtCmd>. FCs are more flexible than MOs (FCs can have FC children), and it is easier to design new FCs, if needed, than new MOs.
* Simplified usage: unified Service & Device Management.
* Historization of DM events through flexContainerInstances.

Limitations of the current DMG CSF are:

* Designed before the creation of the <flexContainer> resource (release 2).
* Well suited for centralized DM solutions, with a Management Adapter explicitly hosted on a IN-CSE, connected with a cloud-based DM server managing big fleets of devices (e.g. ACS for the TR-069 protocol); this model is less adapted for edge-based DM, with various scopes and scales, from Smart Cities to Smart Buildings or Home networks.
* It is the CSE that manages MOs, hence it has to ‘know’ the underlying DM protocols: not suited for the explosion of IoT protocols (in the proposed IPE-based DM, the ‘intelligence’ is in the IPEs, not in the CSE).
* Designed for ‘real’ DM protocols (BBF TR-069, OMA DM & LwM2M), not for interworking with IoT networks that have few ‘pure DM’ features.

This Release 5 Work Item proposes to define an IPE-based Device Management with FlexContainers that will be more future-proof and applicable to any kind of existing or future IoT networks.

3 Intended Output

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| Tick all the appropriate cases  |  |
| X | Change request(s) to existing Technical Specification(s) |
| X | Change request(s) to existing Technical Reports(s) |
| X | New Normative Technical Specifications(s) |
|  | New Permanent Technical Reports(s) |
|  | New Temporary Technical Reports(s) |

4 Impact

4.1 oneM2M Work Items

None

5 Scope

The scope of the Work Item is to specify the IPE-based Device Management with FlexContainers (IPE-DM)

6 Schedule and impacted specifications

Provide the schedule of tasks to be performed;

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| New Specifications (if any) |
| DocumentType | DocumentNumber\* | Title | Schedule (TP No.) | Lead WG | Impacted WGs | Comments |
| Start  | Change Control  | Freeze | Approval |
| TR |  |  |  |  |  |  |  |  |  |
| TS/TR | TBC | IPE-based Device Management with FlexContainers | TP 52 | TP 56 | TP 57 | TP 58 | RDM | SDS |  |

\* The first versions will be assigned by the secretariat (WPM Secretary)

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| CRs to existing specifications (if any) |
| ImpactedTS/TR |  | Subject of the CR | Approved at plenary# | Impacted WGs | Comments |
| TS-0001, TS-0004 |  | Allow [flexNode] child to <node> |  | SDS |  |
| TS-0023 |  | Move DM to TS-xxxx |  | RDM |  |
| TS-0033 |  | Extend guidelines with TS-xxxx DM |  | RDM |  |
| TR-0039 or new TR |  | Developer guide for IPE-based DM |  | TDE |  |
| TS-0021, TS-0024, TS-0030, TS-0035, TS-0040, TR-0042, TR-0064, TR-0065 |  | Extend with reference to TS-xxxx DM |  | RDM, SDS |  |
| TBC |  |  |  |  |  |

7 Work Item Rapporteur(s)

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8 History

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| Document history |
| V0.0.1 | 2021-11-16 | Initial proposal |
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