3GPP TSG-WG SA2 Meeting #146E e-meeting *S2-2106067*

Elbonia, August 16 – 27, 2021 (revision of S2-210xxxx)

**Source: Huawei, HiSilicon**

**Title: New SID: Study on enhancement of 5G CAPability EXPosure for Industrial Applications**

**Document for: Approval**

**Agenda Item: 9.1.3**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

# Title: Study on enhancement of 5G CAPability EXPosure for Industrial Applications

## Acronym: FS\_5G\_CAPEXP\_enh

## Unique identifier: ?

Potential target Release: Rel-18

## 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Affects:** | UICC apps | ME | AN | CN | Others (specify) |
| **Yes** |  |  |  | X |  |
| **No** | X | X | X |  |  |
| **Don't know** |  |  |  |  | X |

## 2 Classification of the Work Item and linked work items

### 2.1 Primary classification

This work item is a

|  |  |
| --- | --- |
|  | Feature |
|  | Building Block |
|  | *Work Task* |
| X | Study Item |

### 2.2 Parent Work Item

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| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
|  |  |  |  |

### 2.3 Other related Work Items and dependencies

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| Other related Work Items (if any) |
| Unique ID | Title | Nature of relationship |
| 720005 | Service requirements for the 5G system (TS 22.261) | SA1 TS with requirement on 5G capabilities exposure for factories of the future |
| 840050  | Service requirements for cyber-physical control applications in vertical domains (TS 22.104) | SA1 TS with requirement on 5G capabilities exposure for factories of the future |
| 750004 | Study on Communication for Automation in Vertical Domains (TR 22.804) | SA1 TR with requirement on 5G capabilities exposure for factories of the future |

## 3 Justification

Recently, the 5G Alliance for Connected Industries and Automation (5G-ACIA) has provided to 3GPP a whitepaper (S2-2102128) including a set of functional requirements that the 5GS has to satisfy in terms of supporting certain information exchange between 5GC and industrial application domain, and exposure of 5G capabilities. The main goal is to enable the management, operation, monitoring and use of such networks and network services from an enterprise perspective at ease without having to rely on sophisticated, heavy-weight tools and in-depth knowledge on the underlying 5G technology. This is because the main focus of such enterprises should be on an application business and not the maintenance of a communication infrastructure. These requirements as identified in a recent whitepaper entitled *Exposure of 5G capabilities for connected industries and automation applications* have been documented in SA1 specifications TS 22.104 and TS 22.261.

5G supports highly reliable communication with very low latency as well as massive connectivity. These new capabilities enable new use cases in many vertical domains, including the automotive industry, healthcare, agriculture, energy, and other manufacturing sectors.

Via capabilities exposure, industrial applications can access 5GS for factory and process automation, production IT and logistics and warehousing. Industrial applications also have access to communication service monitoring and network management capabilities. It is also possible to support other use cases that share the requirements of Industrial applications. Examples include control applications for rail transportation, electrical power distributions and central power generation.

The primary role of capabilities exposure is to manage the user plane (e. g. connections established, monitored, changed, terminated, etc.) within the 5GS by industries and automation applications. The user plane supports the transmission of application data for diverse devices: sensors, actuators and controllers.

General requirements for 5G exposure comprise identity management, connectivity management, connectivity monitoring, group management and location management. NPN-specific requirements for 5G exposure comprise device provisioning and onboarding. Somerequirements has been already included in SA2 specification (e.g. Rel-15 5GS\_Ph1, Rel-16 Vertical\_LAN, Rel-17 IIOT and Rel-17 eNPN) while some requirements have not yet been included:

- For connectivity management, it requires provisioning of traffic profile (including transfer interval and the data volume per cycle time, average and peak date rates, and silence time interval) applicable to a single UP connection, to all UP connections of a device, or to all UP connections of a group of devices. However, some of the traffic profile is not supported. Besides that requirement for modification of the PDU Session Type is also not supported.

- For connectivity monitoring, it requires to monitor the connection parameters per QoS flow or Set of QoS flows (including communication service availability, communication service reliability, end-to-end latency, service bit rate and packet error rate). However, this is not supported.

- For group management it requires provisioning of the service area for a group and subscribing to notifications of group status events. However, this is not supported.

- For device provisioning and onboarding it requires (de-)provisioning the relevant UE information (e.g. UE IDs, network access authentication keys, subscriptions) to the 5G core network via capabilities exposure for an individual UE or a group of UEs. However, this is not supported.

## 4 Objective

Enhancement of 5G capabilities exposure for industrial and automation applications to support at least the following:

- Connectivity management, i.e. information (including transfer interval and the data volume per cycle time, average and peak date rates, silence time interval, and PDU Session Type) provisioned to manage a UP connecivity of a UE/device via exposure interface.

- Connectivity monitoring, i.e. performance indicators including communication service availability, communication service reliability, end-to-end latency, service bit rate and packet error rate to be monotered for a UP connecivity of a UE/device via exposure interface.

- Group management, i.e. set/modify the group attributes (including srevice area) and subscribe to group status events for a group via exposure interface.

For enhancement on capabilities exposure via non-public network, it also supports device provisioning and onboarding for an individual UE or a group of UEs, i.e., (de-)provisioning the relevant UE information (e.g. UE IDs, network access authentication keys, subscriptions) to the 5G core network.

## 5 Expected Output and Time scale

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| **New specifications**  |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
| Internal TR | 23.abc | Study on enhancement of 5G CAPability EXPosure for Industrial Applications | SA#96 June 2022(TBD) | SA#97 Sep 2022(TBD) | Qianghua, Zhu, Huawei, (zhuqianghua @ huawei.com) |

|  |
| --- |
| **Impacted existing TS/TR** |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |

## 6 Work item Rapporteur(s)

Qianghua, Zhu, Huawei, (zhuqianghua @ huawei . com)

## 7 Work item leadership

SA2

## 8 Aspects that involve other WGs

Potential security impact to be covered by SA3.

Potential charging and OAM impact to be covered by SA5.

Potential service related impact to be covered by SA6.

## 9 Supporting Individual Members

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| Supporting IM name |
| Huawei |
| HiSilicon |
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