**3GPP TSG WG-2 Meeting #167 S2-2502631**

**17 - 21 Feb 2025, Athens, Greece rev of S2-2501796**

**TSG SA Meeting #SP-102 SP-231754**

**11 - 15 December 2023, Edinburgh, Scotland**

**Source: Xiaomi (Moderator of ISAC)**

**Title: New SID on Study on Architecture Enhancement to support Integrated Sensing and Communication**

**Document for: Approval**

**Agenda Item: 30.8**

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 Architecture Enhancement to support Integrated Sensing and Communication

Acronym: FS\_ISAC\_ARC

Unique identifier:

{A number to be provided by MCC at the plenary}

Potential target Release: Rel-20

# 1 Impacts

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

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
| X | Study  |
|  | Normative – Stage 1 |
|  | Normative – Stage 2 |
|  | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

For a brand-new topic, use “N/A” in the table below. Otherwise indicate the parent Work Item.

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

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 950003 | Study on Integrated Sensing and Communication | Use cases scenarios and service requirements of Integrated Sensing and Communication services |
| 1000026 | Integrated Sensing and Communication | Service requirements of Integrated Sensing and Communication services |
|  |  |  |

# 3 Justification

The rapid growth of wireless communication technologies and the increasing demand for high-quality data transmission have led to the development of advanced communication systems. One such promising technology is the integration of sensing and communication, which has the potential to revolutionize various industries, including automotive, healthcare, UAV, and smart cities, etc.

Integrated sensing and communication involves the simultaneous use of radio frequency (RF) signals for both sensing and communication purposes. This integration can lead to improved spectrum efficiency, reduced latency, and enhanced reliability in various applications. Integrated Sensing and Communication is particularly relevant in the context of mobile operators, User Equipment (UE) vendors, automobile vendors, and subscribers, as it can significantly enhance the overall user experience, improve network efficiency, and enable new business opportunities.

Integrated sensing and communication enables 3GPP network to evolve from communication network to communication sensing integrated network. By replicating the physical world through sensing and exchanging information through communication, it also connects the cyber world and the physical world and provides the key technical foundation for the integration of virtual world and reality, which expands 3GPP technical scope.

Functional requirements and performance requirements of integrated sensing and communication services that have architectural impacts have been studied in SA1. Within this study, sensing applications such as intruder detection applications (highway, railway, restricted area for UAV, yard and home), monitoring applications (rainfall, tourist, flood, respiration and sport), navigation assistance applications, real-time map generation applications, collision avoidance application, etc., can be achieved via 5G system to fulfil the required sensing accuracy. It can be supported for a target object (and its environment) without UE on board over licensed or unlicensed spectrum for commercial, V2X, public safety and emergency services use cases. The SA1 study also identified the service requirements on sensing configuration, 5G wireless sensing service, exposure, security and charging, and SA2 is assumed to address the above requirement.

This study item aims to study the various aspects of integrated sensing and communication and provide insights for the future development of technical specifications.

# 4 Objective

The study item aims at investigating the function enhancement, end to end service operations and procedures to support Integrated Sensing and Communication with the considerations of a sub-set of use cases (e.g. commercial, automotive, public safety and emergency services) based on the SA1 requirements.

The following aspects will be studied:

* WT-1: Architecture and function enhancements to support sensing.
* WT-2: Service authorization and revocation. This includes investigating mechanisms for authorization and revocation sensing service requests from the service consumer~~.~~
* WT-3: Discovery and selection of sensing entities based on service requirements triggered by the service request and capability of the sensing entities.
* WT-4: Sensing data and the associated information collection and transport mechanisms for result calculation.
* WT-5: Mechanisms for providing sensing associated information and result (including sensing result and contextual information) exposure, for one time, periodic or event based reporting.
* WT-6: Configuration parameters/policy provisioning for the support of ISAC services.

NOTE 1: The scope of the sensing study (incl. TUs) will be further aligned in plenary TSG#108 together with RAN TSG.

NOTE 2: Any study work on sensing before TSG#108 will be limited to common aspects for the study.

NOTE 3: Potential privacy requirements if identified from the WTs will be considered for the study of the sensing architecture in SA2~~.~~ Privacy protection and other security aspects will be coordinated with SA3, and the related impact to architecture enhancement will be based on SA3 conclusion.

NOTE 4: Charging and OAM aspects will be tasked to SA5, and the related impact to architecture enhancement will be based on SA5 conclusion.

NOTE 5: Implications to RAN or RAN dependent aspects will be coordinated with RAN WGs.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Work Task ID** | **TU Estimate****(Study)** | **TU Estimate****(Normative)**  | **RAN Dependency****(Yes/No/Maybe)**  | **Inter Work Tasks Dependency** Editor’s Note: This column should highlight if WT#x is self-contained, or is depended on completion of other WTs |
|  |  |  |  |  |
| WT-1 |  |  | Yes3 |   |
| WT-2 |  |  | Maybe |  WT-1 |
| WT-3 |  |  | Yes  |  WT-1 |
| WT-4 |  |  | Yes |  WT-1 |
| WT-5 |  |  | Maybe | WT-1 |
| WT-6 |  |  | Yes |  WT-1 |
|  |  |  |  |  |

**Total TU estimates for the study phase: TBD**

**Total TU estimates for the normative phase: TBD**

**Total TU estimates: TBD**

NOTE 6: SA2 couldn’t make consensus on TU estimation. However, the TU could be considered as range from 10 to 20 TUs for study work. Further alignment with RAN is needed after TSG#108.

# 5 Expected Output and Time scale

***{If this WID covers both stage 2 and stage 3, clearly indicate the different completion dates.}***

|  |
| --- |
| New specifications {One line per specification. Create/delete lines as needed} |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
| Internal TR | 23.700-xyz | Study on Architecture Enhancement to support Integrated Sensing and Communication | TBD | TBD | {<FamilyName>, <GivenName>, <Company>, <email address>. See Note 2} |
|  |  |  |  |  |  |

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |
|  |  |  |  |

# 6 Work item Rapporteur(s)

# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

SA3 for the Security aspects, SA5 for the Charging and OAM aspects, RAN for the RAN related issues.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| CATT? |
| China Mobile? |
| China Telecom? |
| China Unicom? |
| ETRI? |
| FirstNet? |
| FutureWei? |
| Huawei? |
| HiSilicon? |
| HONOR? |
| KDDI |
| Lenovo? |
| MATRIXX Software? |
| MediaTek? |
| OPPO? |
| Philips International B.V? |
| Sharp? |
| Sony |
| Telus? |
| Tencent? |
| Toyota? |
| Uangel? |
| Vivo? |
| Xiaomi? |
| ZTE? |
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