3GPP TSG|SA WG2 Meeting #169 S2-2505921

19 - 23 May, 2025, Fukuoka, Japan (revision of S2-2505647r02)

**Source: ZTE (Moderator)**

**Title: New Study on Architecture for 6G System**

**Document for: Approval**

**Agenda Item: 30.7**

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 for 6G System

{Free text. It has to be the same as in the "Title:" section above. Studies have to start by "Study on"}

Acronym: FS\_6G\_ARCH

Unique identifier: TBC

Potential target Release: Rel-20

# 1 Impacts

{For Normative work, identify the anticipated impacts. For a Study, identify the scope of the study}

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

# 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

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| FS\_6G\_REQ | SA WG1 | 1050110 | Study on 6G Use Cases and Service Requirements; Stage 1 |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 1060079 | Study on 6G Scenarios and Requirements | The architecture related requirements from RAN may need to be taken into account. |
|  | RAN WG studies (TBD) |  |

# 3 Justification

The 5G network architecture marked a significant leap forward compared with previous generations, with its adoption of a Service-Based Architecture (SBA) enabling a cloud-native deployment, and the 5G starts the business opportunities towards providing services to verticals. These innovations enhanced flexibility and scalability, enabling more dynamic and adaptable network orchestration.

While 5G is continuously introducing remarkable advancements, there is the need from operators for further CAPEX/OPEX reduction by further improvement of overall 3GPP system performance. However considering the ARPU/DOU has clearly reached to flat and the population in some countries have even been decrease, simply performance enhancement may not justify the introduction of 6G.

6G offers a great opportunity to leverage the latest cutting-edge technologies in the 3GPP system. Looking ahead to the expected society development in 2030 to 2040, it is expected that the 6G network should not only support the enhancement on the connectivity service with new technologies, but also support the beyond connectivity services. The 6G should also integrate the satellite access to achieve seamless coverage.

3GPP SA1 has started the FS\_6G\_REQ study item to identify use cases and service/operational requirements for 6G system. TSG RAN has also initiated the FS\_6G\_RAN\_Scen\_Req study item to develop requirements for 6G Radio and expects to see initial input from and interaction with SA2.

The 6G architecture is to be grounded in established design principles, aligns with the IMT-2030 vision, and responds directly to the 6G requirements outlined in 3GPP TR 22.870 and TR 38.914. Therefore, this study will address critical challenges identified in 5G deployments and study the architecture aspects to support both connectivity service and beyond connectivity services in 6G era in a more efficient, sustainable, and innovative ways.

# 4 Objective

This study aims to define a system architecture for 6G mobile networks for improvement of existing services and support of new services, to meet the 6G system requirements as defined by 3GPP SA1 and TSG RAN.

The study will work towards goals endorsed at TSG#107(Mar 2025) to "create lean and streamlined standards for 6G, e.g. by dimensioning an appropriate set of functionalities, minimizing the adoption of multiple options for the same functionality, avoiding excessive configurations, etc. Any exception to the above shall be well justified."

The study shall investigate the requirements, assumptions and high level principles for 6G architecture.

The study should consider at least the following aspects: cloud native, sustainability and energy efficiency, robustness and resiliency, architecture simplification, etc.

The study contains multiple work tasks. The scope of these work tasks and potential key issues derived from these work tasks will be refined during SA2#170-#172 before solutions for a given key issue can be studied. Some work task(s) might not result in key issue(s). WT numbering doesn't imply any priority order.

The study includes the following high level work tasks, and the conclusion will consolidate the 6G architecture among all work tasks:

**WT#1**: Define the overall 6G architecture as collection of capabilities and high level functionalities considering the following sub work tasks and other work tasks to support 6G access network:

1.1. Void

NOTE  n: The duplication of functionality in RAN and CN will be avoided, while maintaining the existing RAN and CN functionality split.

1.2. Study the support for control signalling for 6G for connectivity services and beyond connectivity services, including at least the following:

a. Whether and how to enable the introduction of a new non-access stratum functionality without impacting other non-access stratum functionalities.

b. Whether and how to identify a minimal set of non-access stratum functionalities that does not get impacted by additional non-access stratum functionalities.

1.2x Study the support for UE to network interaction for 6G for connectivity service and/or beyond connectivity services, including at least the following:

a. Whether and how to support generic mechanisms for UE-Core Network interaction (e.g. discovery, authentication, authorisation, etc.) that are reusable for different operator services.

1.3. Study whether and how to support and/or enhance the following in 6G: the SBA framework, network slicing, network sharing, user plane architecture, QoS framework, policy framework, network exposure framework.

1.4. Void .

1.5. Void.

1.6. Void.

1.7. Void.

1.7a. Void.

1.8. Study whether and how to support and/or enhance different non-3GPP access (e.g. Wi-Fi, wireline) in 6G and support multi-access data connections between 3GPP access and non-3GPP access.

1.9. Study whether and how to support and/or enhance the essential/regulatory services (i.e. voice, Messaging, location services, Emergency services, MPS, Mission Critical services, PWS) in 6G.

1.10. Void

1.11 Study whether and how to support and/or enhance the system architecture for fixed wireless access scenarios (e.g. paging and UP optimization)

1.12 Study whether and how to support and/or enhance the system architecture for localized service access scenario.

In addition to the work tasks above, this study will identify other 5G features that will be supported and/or adapted in 6G.

**WT#2**: Study migration and interworking, including

- How to support migration to 6GS

- How to support interworking with 5GS

- Whether and how to support interworking with EPS

NOTE  n: Interworking with 2G/3G are not considered in this study, but scenarios where the UE in 6G may reselect to 2G/3G and return to 6G will be analysed only if there is a need.

NOTE n: The detailed migration study scope will be coordinated and aligned with RAN

**WT#3:** Study the support of AI in 6GS (e.g. E2E AI based framework, AI Agent, etc.)

**WT#4:** Study the integration of Sensing and Communication over 3GPP access, considering the sensing modes to be supported and other sources of sensing data.

NOTE n: The detailed scope of WT#4 will be determined considering the scope and work of R20 FS\_Sensing\_ARC.

**WT#5:** Study data framework for all aspects related to efficient and scalable data handling including, for example, data collection, distribution, processing, storage, data access and data exposure, with consideration of access control/user consent and privacy where relevant. The example of data may include data for AI and Sensing. This WT can also study any potential enhancements on system and procedure needed for user consent framework.

NOTE n: The work split with SA3, SA5 and RAN WGs will require TSG coordination

**WT#6:** Study aspects on support of computing for UE, core network and application server in 6G (e.g. coordination between UE, core network and application server, exposure of computing service in the core network, etc.).

NOTE n: Application layer mechanism and exposure framework may require coordination with SA6.

**WT#7:** Study whether and how to enhance the IMS architecture (e.g. simplify the IMS architecture, enhance the support of existing services, etc.)

NOTE n: This study assumes that the UNI signaling and NNI signaling are not modified and IMS architecture remains access agnostic.

NOTE n: Whether WT#7 is part of this study will be determined at TSG SA#108(Jun).

**WT#8:** Study how to support 6G RAT for NTN and TN-NTN Service Continuity. Study how to support interworking between 4G/5G satellite access and 6G system.

NOTE n: The detailed scope for WT#8 will be coordinated and aligned with RAN

**WT#9:** Study whether and how to support cellular IoT enablers in 6G, based on RAN decision for 6G IoT..

NOTE n: The detailed scope for WT#9 will be coordinated and aligned with RAN. Ambient IoT is not in the scope of the study.

The conclusion for each work task should:

a. Identify functionalities, NFs etc. that use 5GC NFs as basis and any enhancements.

b. Identify functionalities, NFs etc. that need further study and that may be redesigned

c. Identify new functionalities, e.g. NFs to be added for supporting new features

The conclusions of this study will form the basis for the normative work and/or for any further study.

During the study, the progress and results of 3GPP TR 22.870(SA1 study) and TR 38.914(RAN study) shall be taken into account.

A single TR is expected to capture the output of this study.

# 5 Expected Output and Time scale

|  |
| --- |
| 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 |
|  |  |  |  |  |  |
| TR | 23.xxx | Study on Architecture for 6G System | TSG#xx(TBD) | TSG#xx(TBD) | {<FamilyName>, <GivenName>, <Company>, <email address>. See Note 2} |

NOTE n: The timeline for the study will be decided at SA#110 (Dec 2025)

# 6 Work item Rapporteur(s)

# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

Potential RAN impact to be covered by RAN WGs.

Potential security impact to be covered by SA3.

Potential multimedia and codecs aspects to be covered by SA4.

Potential charging and OAM impact to be covered by SA5.

Potential specific exposure related aspects to be covered by SA6

# 9 Supporting Individual Members

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| Supporting IM name |
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|  |
| Tejas Networks Limited |
| IIT Bombay |
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