

SA2 Rel-19 23Q3 moderated discussion - Integrated Sensing and Communication
Variation of SA2 Rel-19 23Q3 moderated discussion - Integrated Sensing and Communication
Version 0.0.2

SA2

<https://nwm-trial.etsi.org/#/documents/8581>

1 Introduction

This moderated discussion is intended to reach consensus on objectives for Rel-19 study item on Integrated Sensing and Communication.

Based on SA#100 guidance to SA2 on Rel-19 work planning, the below list of work task under “Brief Description and Key Objectives” in SP-230759 serves as a starting point for the moderated discussion.

- **WT-1:** Overall architecture and function enhancement to support new sensing service.
- **WT-2:** Sensing service authorization and control
- **WT-3:** Sensing measurement collection/result calculation
- **WT-4:** Sensing result exposure
- **WT-5:** Policy/Charging for Sensing
- **WT-6:** Security
- **WT-7:** Support for non-3GPP RAT sensing

Work tasks similar to or covering what are listed in SP-230759 are proposed in some company inputs to the SA#100 workshop, which are captured below for information:

WT-1: Overall architecture and function enhancement to support new sensing service.

- the potential system enhancements to support and monetize the Integrated Sensing and Communication for SA1 use cases, in parallel to initial RAN studies. (SWS-230013, TIM)
- Defining new 5G logic functionality for the management of sensing services (e.g. Sensing Function). (SWS-230033, China Unicom)
- Overall architecture enhancements to support sensing services: Whether introducing new NF and new interface or reusing the existing architecture(SWS-230055, China Telecom)
- Overall architecture and function enhancement to support new sensing service. (SWS-230068, China Mobile)
- Overall architecture and function enhancement to support new sensing service. (SWS-230014, Intel)
- Define the system architecture supporting sensing services. Reuse/extend Location Service/Positioning architecture. Defining procedures and management functions for sensing services (e.g. a Sensing Management Func.)(SWS-230012, QC)

- ISAC system architecture: Enhance existing architecture to support new ISAC service.(SWS-230015, Futurewei)
- Study what and how to extend the 5GS architecture to support UE involved sensing (i.e., user plane sensing can be used) for large amounts of sensing data. (SWS-230020, OPPO)
- Identify the system architecture to support integrated communication and sensing (SWS-230032, TCL)
- Overall architecture and function enhancement to support new sensing service. (SWS-230034, ZTE)
- Study overall architecture to support new sensing service and Study basic functionalities to support new sensing service (SWS-230041, NEC)
- Architecture enhancements to support ISAC; .NF function enhancements and sensing procedures, e.g. sensing trigger, capabilities exchange, measurements and result delivery via UP and/or CP (SWS-230042, CATT)
- Overall architecture and function enhancement to support new sensing service. (SWS-230045, Huawei)(SWS-230050, vivo)(SWS-230059, Philips)
- Define network architecture framework and Procedures to support Sensing(SWS-230058, Lenovo)
- Study overall architectural enhancements, required functionalities and procedures to support sensing service.(SWS-230073, Apple)

WT-2: Sensing service authorization and control

- Sensing authorization for specific areas / objectives. (SWS-230033, China Unicom)
- Basic functionalities and procedures to support sensing service: Sensing service authorization, Sensing entities registration/discovery, Sensing control parameter generation and provisioning, 3GPP sensing data and/or non 3GPP sensing data usage, sensing result exposure (SWS-230055, China Telecom)
- Basic functionality for Sensing service exposure, Discovery and selection of the sensing entities, Sensing control parameter generation and provisioning, related QoS/Policy enhancement, Handling of sensing data.(SWS-230068, China Mobile)
- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related QoS/Policy enhancement.(SWS-230014, Intel)
- Sensing service management: New procedure for ISAC Service creation, activation, authorization, configuration, modification, so on.(SWS-230015, Futurewei)
- Study UE configuration according to above quality management, authorization, charging, service type aspects.(SWS-230020, OPPO)
- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related (SWS-230034, ZTE)
- Service authorization and policy/parameter provisioning for a UE or a gNB (SWS-230038, Xiaomi)
- Sensing service authorization and control (SWS-230045, Huawei)
- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related(SWS-230050, vivo)

- E2E procedures for sensing service exposure, discovery, selection and coordination of the sensing entities, authorization, sensing control parameter generation and provisioning, handling and processing of sensing data, service continuity, additional privacy control.(SWS-230059, Philips)

WT-3: Sensing measurement collection/result calculation

- How to handle and manage the Sensing Data (SWS-230019, Rakuten)
- Defining end-to-end procedures for supporting sensing data collection / calculation / exposure.(SWS-230033, China Unicom)
- Basic functionalities and procedures to support sensing service: Sensing service authorization, Sensing entities registration/discovery, Sensing control parameter generation and provisioning, 3GPP sensing data and/or non 3GPP sensing data usage, sensing result exposure (SWS-230055, China Telecom)
- Basic functionality for Sensing service exposure, Discovery and selection of the sensing entities, Sensing control parameter generation and provisioning, related QoS/Policy enhancement, Handling of sensing data.(SWS-230068, China Mobile)
- Study sensing data/result handling within 5GS and data/result transfer between 5GS and application.(SWS-230020, OPPO)
- Discuss the necessary architecture enhancements to handle and manage the Sensing Data (SWS-230032, TCL)
- Sensing service operation, including Sensing Transmitter/Sensing Receiver discovery and selection, Coordination between Sensing transmitter(s) and Sensing receiver(s), Data (3GPP sensing data and/or non 3GPP sensing data) collection and transmission by the gNB or the UE or both, Data (3GPP sensing data and/or non 3GPP sensing data) processing(SWS-230038, Xiaomi)
- Sensing measurement collection/result calculation (SWS-230045, Huawei)
- Sensing architecture, including data collection and exposure.(SWS-230066, InterDigital)
- SA enh. for data collection (SWS-230069, Google)
- E2E procedures for sensing service exposure, discovery, selection and coordination of the sensing entities, authorization, sensing control parameter generation and provisioning, handling and processing of sensing data, service continuity, additional privacy control.(SWS-230059, Philips)

WT-4: Sensing result exposure

- Basic functionalities and procedures to support sensing service: Sensing service authorization, Sensing entities registration/discovery, Sensing control parameter generation and provisioning, 3GPP sensing data and/or non 3GPP sensing data usage, sensing result exposure (SWS-230055, China Telecom)
- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related QoS/Policy enhancement.(SWS-230014, Intel)
- Defining end-to-end procedures for supporting sensing data collection / calculation / exposure.(SWS-230033, China Unicom)

- Basic functionality for Sensing service exposure, Discovery and selection of the sensing entities, Sensing control parameter generation and provisioning, related QoS/Policy enhancement, Handling of sensing data.(SWS-230068, China Mobile)
- Defining signaling and service exposure functions for collaborative sensing, for both NR-sensing and non-3GPP sensing.(SWS-230012, QC)
- NEF extension for interaction with AF for ISAC: How sensing result and/or sensing analytics data are requested and/or provided to 3rd party applications? (SWS-230015, Futurewei)
- Study 5GC sensing service exposure to UE and to the AF and service provisioning(SWS-230020, OPPO)
- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related (SWS-230034, ZTE)
- Sensing service invocation and exposure to the 3rd party application and to the UE (SWS-230038, Xiaomi)
- Sensing service exposure, e.g. to third party, NF, UE(SWS-230042, CATT)
- Sensing result exposure (SWS-230045, Huawei)
- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related(SWS-230050, vivo)
- Sensing architecture, including data collection and exposure.(SWS-230066, InterDigital)
- Study sensing service authorization and exposure mechanisms of sensing results to trusted third parties(SWS-230073, Apple)
- E2E procedures for sensing service exposure, discovery, selection and coordination of the sensing entities, authorization, sensing control parameter generation and provisioning, handling and processing of sensing data, service continuity, additional privacy control.(SWS-230059, Philips)

WT-5: Policy/Charging for Sensing

- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related QoS/Policy enhancement.(SWS-230014, Intel)
- QoS handling and policy enhancements to support diverse sensing services. (SWS-230055, China Telecom)
- Basic functionality for Sensing service exposure, Discovery and selection of the sensing entities, Sensing control parameter generation and provisioning, related QoS/Policy enhancement, Handling of sensing data.(SWS-230068, China Mobile)
- Aspects involving security and privacy mechanism, charging and non-3GPP sensing.(SWS-230068, China Mobile)
- ISAC QoS and its related resource management: New ISAC Policy and enhancement of network resource management to support ISAC.(SWS-230015, Futurewei)

- Study sensing quality/QoS control & management for sensing services to support high volume and resource consumption for sensing data transfer.(SWS-230020, OPPO)
- Study the charging method for different sensing target.(SWS-230020, OPPO)
- QoS/Policy enhancement.(SWS-230034, ZTE)(SWS-230050, vivo)
- QoS mechanism and QoS handling(SWS-230038, Xiaomi)
- Policy/Charging for Sensing(SWS-230045, Huawei)
- Charging for sensing (coordinated with SA5)(SWS-230050, vivo)
- Study QoS model and Policy enhancements to support diverse sensing services(SWS-230073, Apple)

WT-6: Security

- Privacy protection of sensing areas / objects, security aspects of Sensing services.(SWS-230033, China Unicom)
- Charging and security (SWS-230055, China Telecom)
- Aspects involving security and privacy mechanism, charging and non-3GPP sensing.(SWS-230068, China Mobile)
- Sensing security and privacy consideration (SWS-230015, Futurewei)
- Study authorization and privacy requirements for different sensing targets.(SWS-230020, OPPO)
- Sensing measurements/results privacy assurance(SWS-230042, CATT)
- Security (SWS-230045, Huawei)
- Security/privacy for sensing e.g. data privacy, user consent (coordinated with SA3)(SWS-230050, vivo)
- Security and privacy protection(SWS-230069, Google)
- E2E procedures for sensing service exposure, discovery, selection and coordination of the sensing entities, authorization, sensing control parameter generation and provisioning, handling and processing of sensing data, service continuity, additional privacy control.(SWS-230059, Philips)

WT-7: Support for non-3GPP RAT sensing

- Enhancements for Non 3GPP sensing (SWS-230014, Intel)
- Aspects involving security and privacy mechanism, charging and non-3GPP sensing.(SWS-230068, China Mobile)
- Defining signaling and service exposure functions for collaborative sensing, for both NR-sensing and non-3GPP sensing.(SWS-230012, QC)
- Sensing service operation, including Sensing Transmitter/Sensing Receiver discovery and selection, Coordination between Sensing transmitter(s) and Sensing receiver(s), Data (3GPP sensing data and/or non 3GPP sensing data) collection and transmission by the gNB or the UE or both, Data (3GPP sensing data and/or non 3GPP sensing data) processing(SWS-230038, Xiaomi)

- Study whether and how to use the non-3GPP sensing data in the 5GS architecture.(SWS-230020, OPPO)
- Non 3GPP sensing (SWS-230058, Lenovo)
- Study architectural enhancements and procedures required to support non-3GPP sensing data and related functionality(SWS-230073, Apple)

Additionally, the following work tasks are also identified based on inputs to SA#100 workshop. The original proposed wording is used to avoid mis-interpretation:

WT-8: How to combine with OAM or other NW Data

- How to combine with OAM or other NW Data (SWS-230019, Rakuten)

WT-9: Sensing service continuity

- Sensing service continuity (SWS-230055, China Telecom)(SWS-230038, Xiaomi)(SWS-230042, CATT)
- E2E signaling interactions to support sensing service including the sensing service initiation, sensing authorization, sensing control, and sensing data report, sensing service continuity. (SWS-230068, China Mobile)
- Seamless Sensing service and mobility: How to support seamless sensing when tracked target moving between networks. (SWS-230015, Futurewei)
- E2E procedures for sensing service exposure, discovery, selection and coordination of the sensing entities, authorization, sensing control parameter generation and provisioning, handling and processing of sensing data, service continuity, additional privacy control.(SWS-230059, Philips)

WT-10: Discovery and selection of the sensing entities (e.g., UE, gNB, etc.)

- Study discovery and selection of the sensing entities (e.g., UE, gNB, etc.)(SWS-230020, OPPO)
- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related (SWS-230034, ZTE)
- Sensing service operation, including Sensing Transmitter/Sensing Receiver discovery and selection, Coordination between Sensing transmitter(s) and Sensing receiver(s), Data (3GPP sensing data and/or non 3GPP sensing data) collection and transmission by the gNB or the UE or both, Data (3GPP sensing data and/or non 3GPP sensing data) processing(SWS-230038, Xiaomi)
- Basic functionality and E2E procedure for Sensing service exposure, Discovery and selection of the sensing entities, Authorization, Sensing control parameter generation and provisioning, related(SWS-230050, vivo)
- E2E procedures for sensing service exposure, discovery, selection and coordination of the sensing entities, authorization, sensing control parameter generation and provisioning, handling and processing of sensing data, service continuity, additional privacy control.(SWS-230059, Philips)

WT-11: Sensing deployment considerations

- Study different sensing deployment considerations (possible different types of sensing functions to support multiple service types and data types; possible multiple sensing function instances to address the high processing complexity.)(SWS-230020, OPPO)

WT-12: Power saving

- Power saving (SWS-230038, Xiaomi)

WT-13: Integration with location services for combined and more accurate position estimation.

- Integration with location services for combined and more accurate position estimation.(SWS-230059, Philips)

WT-14: ISAC for different scenarios, e.g., in network coverage, out of network coverage, partial coverage.

- Study of ISAC approach for different scenarios, e.g., in network coverage, out of network coverage, partial coverage. (SWS-230080, 5GAA)

Other related SA#100 workshop inputs are listed below in which Integrated Sensing and Communication is mentioned, but with no work task proposals:

- SWS-230018, DISH Network
- SWS-230033, NTT DOCOMO
- SWS-230030, LGE
- SWS-230036, Nokia
- SWS-230060, Ericsson
- SWS-230061, Cisco
- SWS-230017, SyncTechno
- SWS-230039, FirstNet
- SWS-230048, NICT

2 Scoping

2.1 Work Tasks based on input to and outcome of the Workshop

The initial set of Work Tasks for discussion, based on the input to the workshop and SP-230759 are as follows (source of the below Work Tasks can be checked in Section 1 Introduction. The original wording is used for each Work Task to avoid mis-interpretation) :

WT-1: Overall architecture and function enhancement to support new sensing service.

WT-2: Sensing service authorization and control

WT-3: Sensing measurement collection/result calculation

WT-4: Sensing result exposure

WT-5: Policy/Charging for Sensing

WT-6: Security

WT-7: Support for non-3GPP RAT sensing

WT-8: How to combine with OAM or other NW Data

WT-9: Sensing service continuity

WT-10: Discovery and selection of the sensing entities (e.g., UE, gNB, etc.)

WT-11: Sensing deployment considerations

WT-12: Power saving

WT-13: Integration with location services for combined and more accurate position estimation.

WT-14: ISAC for different scenarios, e.g., in network coverage, out of network coverage, partial coverage.

Feedback Form 1: Which of the above Work Tasks should be in scope of Rel-19?

1 – Qualcomm Incorporated

WT-1, 2, 3, 4, 7, 9, 10 can be potentially in scope for Rel-19 study. (see Form 2 and 3 for more comments on their relationships)

WT-11, 12 and 14 are not work tasks by themselves. They are part of the architecture design considerations and therefore should be made a sub-task for WT-1 (and applicable to all the other work tasks).

WT-5 belongs to SA5.

WT-6 belongs to SA3.

WT-8 belong to SA5.

WT-13 is not needed before RAN WGs work out the baseline sensing design.

2 – INSPUR

WT-1 □ In the scope of Rel-19 study.

WT-2 □ In the scope of Rel-19 study. It should be related to the privacy protection of sensing service.

WT-3 □ In the scope of Rel-19 study. But the data collection and calculation should be a common feature for LCS, Ranging, NWDAF and Sensing. It had better to think of them holistically.

WT-4 □ In the scope of Rel-19 study.

WT-5 □ Potentially, policy for Sensing is in the scope of Rel-19 study. The same as V2X policy/ProSe Policy, UE based sensing is out of the control of 3GPP. Policy for sensing is needed to constrain the sensing's scope, frequency and so on.

WT-6 □ Decided by SA3.

WT-7 □ Potentially, in the scope of Rel-19 study. The support for non-3GPP type sensor is in the scope of SA1's requirement in Rel-19. But the supporting non-3GPP type sensor is kinds of application-related implementation in 3GPP system. First of all, we should take 3GPP type sensor as priority in Rel-19 and deprioritize non-3GPP type sensor.

WT-8 □ Decided by SA5.

WT-9 □ Potentially, in the scope of Rel-19 study. Sensing continuity should be an essential feature of sensing. But considering the limited TAs, I prefer to deprioritize the WT in Rel-19.

WT-10 □ In the scope of Rel-19 study.

WT-11 □ Not an explicit WT. But it should be taken into account during the overall system architecture design and other WTs.

WT-12 □ Not an explicit WT. But it should be taken into account during the overall system architecture design and other WTs (such as the selection of sensing mode and sensing parameters based on sensing' QoS).

WT-13 □ Potentially, in the scope of Rel-19 study. But it should be deprioritized because it is unclear that the target UE of LCS is equal to the target for sensing. In my understanding, the target for sensing covers more cases rather than only a target UE (such as target with 3GPP ID (e.g. target UE), without 3GPP ID and with non-3GPP ID).

WT-14 □ Potentially, in the scope of Rel-19 study. But given the limited TAs in Rel-19, the scenarios in network coverage should be prioritized.

3 – HuaWei Technologies Co.

WT #1, #2, #3, #4, #5, #6, #10 should be in the scope of Rel-19 work. WT#6 would be led by SA3. Residual WTs in Rel-19 are considered as low priority.

WT#7: We don't think it would be the best practice to take N3GPP sensing in the initial release of SA2, it can be postponed to the next release.

WT#8 is for SA5, which is a "nice-to-have" feature and can be postponed to future releases.

WT#9 is built on top of basic sensing procedures and can be investigated after we determine those procedures if time allows in Rel-19.

WT#11 can be a solution of WT#1 and don't need a dedicated WT.

Power saving is a more general topic, and we don't even need to address in this study, and therefore WT#12 is not needed.

WT#13 is not the utmost essential task in Rel-19.

WT#14 can be a part of solution of WT#1.

4 – Ericsson LM

Overall each WT is written in very vague form, if we consider scoping part of the details then we don't see scope for more than WT#1, parts of WT#2 and some of WT#6 that are in SA2 scope. Depending on RAN/SA1 requirements work further discussion needed. But significant reduction/rephrasing/scoping is needed from current description.

5 – MediaTek Inc.

There is very strong dependency on all WTs to RAN plan and also eventual consolidated Stage 1 requirements. It is not possible to do proper scoping at this stage without at least some RAN Guidance.

6 – MediaTek Inc.

There is very strong dependency on all WTs to RAN plan and also eventual consolidated Stage 1 requirements. It is not possible to do proper scoping at this stage without at least some RAN Guidance.

7 – Nokia

Generic comments:

- 1. We think there is one fundamental question missing and i.e. whether Rel-19 should we only do a study (i.e. do normative work in a later release) or should Rel-19 scope include both study and normative work? The scope of the SID will vary based on the answer. For example: If we only do study (i.e. no normative work), we may include more objectives and broadened the scope to study various aspects (that fits into max 14 TU budget). But if we want to do both study + normative specification work, then the SID scope needs to be adjusted accordingly. All the comments (from Nokia) hereafter are with the assumption that we are only doing a study in Rel-19.
- 2. The WT description in its current form are very vague, open ended and left to interpretation. A lot of clarification is needed and rephrasing would be required for most of the WT descriptions to clearly scope the study. The WTs cannot be agreed in their current form.

Now some comments specific to the question:

- WT-1, 2, 3, 4, 5, 10, 11 can be potentially in scope for Rel-19 study.
- WT-2: More clarity is needed on the scope. What is meant by "control" here? Also "Authorization" may fall in the boundary between SA2 and SA3.
- WT-3: The WT description needs more clarity regarding what aspects of measurement collection/result calculation shall be studied.
- WT-4: Is it Sensing "result" exposure. I think we need to study the enhancements needed in the exposure framework for exposing "sensing service". It is not just result exposure.

- WT-5: Charging is in SA5 scope and hence shall be removed from the WT. In the SID we can have a NOTE that charging aspects will be studied at SA5. The WT-5 needs rephrasing to clearly describe the scope. For example: "Study whether and what enhancements are in in UE/AM/SM policies for supporting sensing services". This is also a bit overlapping with WT-2, e.g. based on the authorization and control policies may be provided?
- **WT-6: Shall be removed.** Security, Integrity protection and privacy shall be studied at SA3. In the SID we can have a NOTE that security, privacy aspects will be studied at SA3.
- **WT-7: Shall be removed.** Considering the limited TU available in Rel-19, our view is that in Rel-19 we should focus on the fundamental architecture enhancements needed to support NR based sensing. Support for Non-3GPP based sensing can be integrated as a next step in later releases.
- **WT-8: Shall be removed.** The WT description is not clear. This is probably not in scope of SA2 either? Not a priority for Rel-19
- **WT-9: Shall be removed.** We agree that mobility is an important topic to be studied, however, this is probably not a priority for Rel-19. This can be studied as a next step in a later release once we have specified the fundamental architecture to support sensing in Rel-19
- WT-12: Need more clarity on the scope of the WT. What will be studied as part of "Power saving"? Should this rather be an objective for "Energy Efficiency" related SID?
- **WT-13: Shall be removed.** It is not a good idea to include objectives for "positioning enhancements" in the sensing study. For sensing operation the network may need to use "location services" so we may have to re-use the existing LCS capability in sensing architecture. How we can have enhanced positioning using some sensing measurements should be studied as a next phase of LCS study. Rather, in Rel-19 study we should focus of architectural enhancements needed to support sensing.
-

8 – Samsung R&D Institute UK

WT-1 implies all the other remaining WTs. So, WT-1 can be an umbrella WT, and WT-2, WT-3, WT-4, WT-6, WT-7, and WT-10 can be studied under the umbrella WT-1.

9 – CICT

[From CATT]

WT-1, WT-2, WT-3, WT-4, WT-9, WT-10 are essential to be in the scope of Rel-19.

WT-5: Charging is in SA5 scope.

WT-6: Security is in SA3 scope.

WT-7: It is unclear and seems application specific. It can be deprioritized.

WT-8: It is in SA5 scope.

WT-12 and WT-13 are not essential tasks and can be deprioritized.

WT-11 and WT-14 are related and import topics, but they can be merged into WT-1.

10 – Lenovo Information Technology

WT-1, WT-2, WT-3, WT-4, WT-5, WT-6, WT-7, WT-10 are essential to be in the scope of Rel-19. WT-9 can be considered if time allows in Rel-19.

WT-2: sensing authorization is part of E2E procedure for sensing.

WT-3: this can also include the sensing task configuration and node selection as per WT-10.

WT-4: sensing result exposure is the main requirement from SA1.

WT-5: policy/charging are main requirements for any service.

WT-6: security is always required.

WT-7: it should be reword to "non-3GPP sensing" instead of "non-3GPP RAT sensing". Besides, more clarification is needed. E.g., non-3GPP sensing is not related to the used AN to register with the 5GS, e.g. UE may be registered via NR/5GC, but configured to perform non-3GPP sensing and report to the 5GC via UP/CP.

WT-9: service continuity is an essential feature of sensing. It can be considered in Rel-19 due to the limited TAs.

WT-10: it belongs to the main procedures for sensing task configuration. No need to have an explicit WT.

WT-12: it is more related with UE based sensing. it can be considered as enhancement (i.e., Rel-20).

WT-14: it is more related with UE based sensing. it can be considered as enhancement (i.e., Rel-20)

11 – Nubia Technology Co.

•WT#1,2,3,4,5,6,9,10 should be in the scope of R19 as the first priority. (#6 is led by SA3)

•WT#7, we should focus on the 3gpp access first, then extend to non-3gpp case. It proposes to treat this as low priority, or postpone to next release if time does not permit

•WT#8, let's SA5 to decide.

•WT#11, does not need a WT task for this. Can be the informative part of WT#1. In some SID/WID, there are informative deployment alternatives in the Annex.

•WT#12, does not need a separate WT task for this. Can be a solution for the WT#1 or postpone to next release.

•WT#13, not in R19. In the next release, we may consider whether sensing can be used for position enhancement.

•WT#14, can be sub-part of WT#1.

12 – Nubia Technology Co.

[From ZTE]

•WT#1,2,3,4,5,6,9,10 should be in the scope of R19 as the first priority. (#6 is led by SA3)

•WT#7, we should focus on the 3gpp access first, then extend to non-3gpp case. It proposes to treat this as low priority, or postpone to next release if time does not permit

•WT#8, let's SA5 to decide.

•WT#11, does not need a WT task for this. Can be the informative part of WT#1. In some SID/WID, there are informative deployment alternatives in the Annex.

- WT#12, does not need a separate WT task for this. Can be a solution for the WT#1 or postpone to next release.**
- WT#13, not in R19. In the next release, we may consider whether sensing can be used for position enhancement.**
- WT#14, can be sub-part of WT#1.**

13 – China Mobile Com. Corporation

WT #1, #2, #3, #4, #5(policy part), #10 should be in scope of Rel-19 work.

WT#5(charging part): charging should be led by SA5.

WT#6: security should be led by SA3.

WT#7: for ISAC Ph1, Non-3GPP sensing should be lower priority.

WT#8: OAM should be decided by SA5.

WT#9: Sensing service continuity is an important feature, but due to the limited TUs, it could be de-prioritized.

WT#11: sensing deployment could be lower priority, which depends on the overall architecture design.

WT#12: power saving may be reflected by the other features, e.g., the sensing mode, sensing QoS.

WT#13: Integration with location services is solution specific regarding the architecture design, which could be discussed in WT#1.

WT#14: for ISAC Ph1, we could focus on the scenarios in network coverage.

14 – China Telecommunications

Basic Sensing architecture, functionalities and important features should be studied in Rel-19, therefore, **WT #1, #2, #3, #4, #5, #9, #10 should be in the Rel-19 scope. WT#6 should be led by SA3.**

•**WT#7** needs further clarification. “non-3GPP sensing data” is defined in SA1 TR 22.837, it may be used together with “3GPP sensing data” to improve sensing results. However, “non-3GPP RAT” is not expected in Rel-19.

•**WT#8** belongs to SA5’s scope, needs further clarification.

•**WT#11** can be reflected in basic architecture design, while deploying site resources and sensing function instances could not be a separate WT.

•**WT#12** belongs to additional features to improve Sensing Service, could be studied in Rel-20 and beyond.

•**WT#13** could not be a separate WT. Sensing results are not limited to location information.

•**WT#14**, can be reflected in WT#1. In Rel-19, focus on Sensing Services in network coverage.

15 – CEWiT

WT-1, WT-2, WT-3, WT-4, WT-5 (only policy part), WT-7, and WT-10 are important to be studied as to start with. WT-6 is important but should be led by SA-3. WT-8 should be led by SA-5. Other WTs can be merged in one of the above.

16 – VIVO TECH GmbH

Ø WT #1, #2, #3, #4, #5 (policy part), #6, #10 could be potentially in the scope of Rel-19 work and WT#5 Charging part belongs to SA5 and WT#6 should be led by SA3.

Ø WT#7: So far no clarification regarding non-3GPP RAT sensing and it is not clear what's the meaning of non-3GPP RAT sensing and so it looks that this can be postponed to the next release and at the moment we prefer to focus on 3GPP sensing in R19.

Ø WT#8: not very clear what's the potential relationship between SA5 data and propose to first clarify the motivation

Ø WT#9, #13, #14: due to limited time in R19, prefer to study basic sensing procedures and better to postpone it next release. Also, better to clarify use case(s).

17 – Apple (UK) Limited

WT #1, #2, #3, #4, #6, #10 should be in the scope of SA2's Rel-19 work. WT#6 is high priority for us and it needs to be coordinated with SA3.

WT#7, #8, #12, #13 are not in scope and we prefer not to include these WTs in SA2's work.

WT#9, #14 should not be in scope of SA2's Rel-19 work but these may be considered in future releases.

WT#5, #11 we are neutral on these WTs.

18 – China Unicom

WT-1, WT-2, WT-3, WT-4, WT-5 (policy part), WT-10 should be in scope of Rel-19.

- For WT-5, suggest to de-couple policy and charging as separated issues, the policy part can be in scope of Rel-19 SA2 and the charging part should be left to SA5.
- For WT-6, should be led by SA3.
- For WT-7, not clear what "N3GPP RAT Sensing" means, further clarifications are needed.
- For WT-8, should be led by SA5.
- For WT-9, very valuable issue but highly dependent on the fundamental architecture / procedure of sensing, can be accepted to de-prioritize it from Rel-19 due to limited TUs.
- For WT-11 and WT-14, not necessary to mention deployment / scenario consideration as separated WTs, the corresponding aspects can be considered together with other essential WTs (e.g. WT-1).
- For WT-12 and WT-13, useful but not essential, can be de-prioritized from Rel-19 due to limited TUs.

19 – OPPO

WT #1, #2, #3, #4, #5, #6, #7, #10, #11 and #14 should be in the scope of Rel-19 work. While charging part of WT#5 could be led by SA5 and WT #6 could be led by SA3. WT#11 and WT#14 could be sub-WT of WT#1. WT #2, #3, #4, #10 can be merged as a new WT for E2E procedure. WT#7 is an enhanced feature based on WT#1, it can be a sub-WT of WT#1 or a standalone WT. The reformed WT list from OPPO side can be referred to the answer in Feedback form 2.

20 – Beijing Xiaomi Software Tech

Xiaomi thinks WT-1, 2, 3, 4, 5, 7, 9, 10, 11 and 14 are considered in the scope of the R19 study, with the following comments:

- WT-5: the charging aspects are essential; however, the work should be led by SA5. Policy control and QoS mechanism are considered in the SA2 scope.
- WT-11 and 14 can be merged into WT-1.

The descriptions of all the above WTs are too general requiring more details; therefore, rewordings are required. Furthermore, the above WTs should be reorganized, see answers to Feedback Form 2.

Some additional comments to other WTs:

- WT-6: security aspects are essential; however, the work should be led by SA3.
- WT-8: more clarification is needed. If it means that assistant data is required to facilitate generating sensing result, it can be merged into WT-3.
- WT-12: should be considered by any WT while developing the solution, so no standalone WT is needed.
- WT-13: If it means that location information can be used as the assistant data to facilitate generating sensing result, it can be merged into WT-3. For sensing assisted location, it can be considered in later releases.

21 – InterDigital Communications

Interdigital thinks WT-1, 2, 3, 4, 5, 6, 7, 9 and 10 should be considered for R19 study.

WT-2/WT-3/WT-10 should be merged into WT-1 as those are basic functionality.

WT-7 should be included in Rel-19 study as integrated sensing shall support service by integrating 3GPP sensing data and non3GPP sensing data.

WT-5 may be led by SA5 and WT-6 led by SA3.

WT-10 is relating to the mobility support. Therefore, it should be changed to broad scope that how to support mobility for integrated sensing (including roaming).

22 – ROBERT BOSCH GmbH

- WT-1, 2, 3, 4, 7, 9, 10, 11, 12, 13, 14 should be in the scope of Rel-19 study in SA2
- WT-5 and WT-6 are important, and should be considered by SA5 and SA3 respectively

Feedback Form 2: Can any of the Work Tasks above be combined/merged?

1 – OPPO

1. WT-2 can be reworded as "*End to End Sensing service procedure*", merging WT-3, WT-4, WT-10 as sub section as WT-2.x. Another sub section as "*sensing control parameter generation and provisioning*" can also be added as WT-2.x after rewording of WT-2.
 2. WT-11 and WT-14 can be merged to WT-1 as sub section as WT-1.x.
 3. WT-13 can be merged with WT-8 and finally merged into WT-3 as WT-2.x.x.
 4. Authorization part of WT-2 can be combined with WT-6 with the wording "*Security and Authorization*".
- The updated WT list with some rewording is as follows:

WT-1: Overall architecture and function enhancement to support new sensing service.

WT-1.1(WT-11): Sensing deployment considerations

WT-1.2(WT-14): ISAC for different scenarios, e.g., in network coverage, out of network coverage, partial coverage.

WT-1.3(new sub WT from rewording of WT-1): *Support for different kinds of sensing modes (i.e. UE monostatic, UE bistatic, UE-gNB bistatic (UL uu and DL uu), gNB bistatic, gNB monostatic)*

WT-1.4 (new sub WT from rewording of WT-1): *Support for Sensing data transmission in control plane and user plane*

WT-2: *End to End Sensing service procedure (Rewording of WT-2):*

WT-2.1(WT-10): Discovery and selection of the sensing entities (e.g., UE, gNB, etc.)

WT-2.2 (WT-3): Sensing measurement collection/result calculation

WT-2.2.1 (WT-8): How to combine with OAM or other NW Data

WT-2.2.2 (WT-13): Integration with location services for combined and more accurate position estimation.

WT-2.3 (WT-4): Sensing result exposure

WT-2.4 (new sub WT from rewording of WT-2): *sensing control parameter generation and provisioning*

WT-5: Policy/Charging for Sensing

WT-6 (Merged authorization part of WT-2): *Security and Authorization*

WT-7: Support for non-3GPP sensing

WT-9: Sensing service continuity

WT-12: Power saving

2 – Qualcomm Incorporated

WT-2, 3, 4, 9, 10, should be made as the sub work tasks for a combined WT for sensing operation and procedure definition.

WT-7, 11, 12, 14 should be made as part of for WT-1.

3 – INSPUR

WT-13 should be a part of WT-1. But It is preferred to be deprioritized.

4 – HuaWei Technologies Co.

WT#11 and WT#14 can be checked during studying WT#1, but should not be mentioned as a separated WT.

WT#2: OK to merge the “Sensing service operation”-related WTs into one, e.g., merge WT#3, WT#4, WT#5, WT#10 with WT#2.

5 – Nokia

- WT-10: This could be probably merged to or can become a sub-task under WT-1 or 2.
- WT-11: I think this needs to be merged to WT-1. The architecture shall be defined considering all the deployment options.
- WT-14: shall be merged to WT-1. In Rel-19 we should focus only on the ”in network coverage” case. It may be difficult (from TU budget point of view) to cover all the cases and hence prefer to study out of network coverage and partial coverage cases in a later release.

6 – Lenovo Information Technology

WT-2, WT-3, WT-4, WT-5, WT-10 can be combined as one WT for E2E sensing procedure, which includes the following subtasks:

- a) Sensing task provisioning and configuration (may include the authorization of the sensing request)
- b) Discovery, selection and configuration of the sensing entities (e.g., UE, gNB, etc.)
- c) QoS/Policy enhancement for sensing
- d) Sensing data collection/result calculation, CP or UP reporting
- e) sensing result exposure

7 – Nubia Technology Co.

[From ZTE]

•WT#11, 12, 14 can be part of WT#1.

•WT#2, #3, #4, #5, #9, #10 can be merged into one WT like “sensing operation”

8 – China Telecommunications

WT#11 and WT#14 can be reflected in WT#1.

WT#2, #3, #4, #5, #9, #10 can become sub-tasks under “Basic functionalities to support new sensing service”

9 – VIVO TECH GmbH

Ø WT#11 should be reflected in WT#1 focusing on architecture enhancement

Ø WT#3, #4, #5, #10, #12 should be made as part of WT#2 focusing on the operation and procedures.

10 – Beijing Xiaomi Software Tech

Yes.

WT-11 and 14 can be merged into WT-1.

WT-2, 3, 4, 5, 7, 9, 10 can either stay stand alone or be merged into a single WT named as e.g. “end to end sensing service operation”

11 – InterDigital Communications

Yes,

WT-2, WT-3 and WT-10 may be merged into WT-1.

12 – ROBERT BOSCH GmbH

- Yes, several of the listed WTs require further discussions and elaborations before merging.

Feedback Form 3: Should any of the Work Tasks above be reworded? If so, propose the required rewording.

1 – OPPO

1. “WT-7: Support for non-3GPP RAT sensing” should be reworded as “WT-7: Support for non-3GPP RAT sensing” .

2. WT-1’s sub section should include “Support for different kinds of sensing modes (i.e. UE monostatic, UE bistatic, UE-gNB bistatic (UL uu and DL uu), gNB bistatic, gNB monostatic)” and “Support for Sensing data transmission in control plane and user plane”.

2 – China Mobile Com. Corporation

Regarding the UE-gNB bistatic (UL uu and DL uu), if i understand correctly, it may refer to the 2 different sensing modes, involving 1) UE as transmitter and base station as receiver, and, 2) base station as transmitter and UE as receiver. For the two cases, the collecting of the sensing data, the handling of the sensing data, the service control could be different, so we prefer to differentiate the 2 sensing modes.

3 – vivo Communication Technology

Regarding WT-7: Support for non-3GPP RAT sensing, either non-3GPP RAT sensing or non-3GPP sensing (as proposed by OPPO) looks a little ambiguous and could the supporting company kindly provide some clarification for better understanding?

4 – Qualcomm Incorporated

Yes. Suggest the following restructuring and rewording:

(new) WT-1 [original WT-1]: Study and define the architecture and function enhancement to support the integrated sensing and communication (ISAC) service, including:

WT-1.1 determining ISAC service deployment cases for Rel-19 normative work; [original WT-11]

WT-1.2 support of sensing based on non-3GPP sensing data (as defined by SA1); [original WT-7]

WT-1.3 support of all the coverage scenarios: in-coverage, out-of-coverage, and partial coverage, including support of existing UE power saving mechanisms. [original WT-14, WT-12]

NOTE: existing eLCS (TS 23.273) and Ranging_SL (TS 23.586) architecture should be reused as the baseline.

(new) WT-2: Study and define the operation and procedures for the ISAC service, including:

WT-2.1: ISAC service authorization and control; [original WT-2]

WT-2.2: Discovery and selection of sensing devices (e.g. UE, gNB); [original WT-10]

WT-2.3: Sensing measurement data collection; [original WT-3. Sensing result calculation is not in SA2 or 3GPP scope.]

WT-2.4: Sensing result exposure; [original WT-4]

WT-2.5: support of ISAC service continuity for periodic, deferred, and event triggered sensing; [original WT-9. sensing service continuity is only required for these sensing cases.]

5 – HuaWei Technologies Co.

Yes.

We prefer to reword WT#1 and add a NOTE with addressing the existing work (and may not limit to the above-mentioned topics).

WT#1 (original WT#1):

Study the overall architecture and function enhancement to support integrated sensing and communication service.

NOTE: Reusing the existing architecture and minimal system impact is preferred.

We can accept if majorities would like to have WT#2 defined in a E2E perspective, e.g.:

WT#2 (combining WT#3, WT#4, WT#5, WT#10, WT#2):

Study the Sensing service operation procedures, i.e.:

1. **(original WT#2)** Sensing service authorization and control;
2. **(original WT#3)** Sensing measurement collection/result calculation;
3. **(original WT#4)** Sensing result exposure;
4. **(original WT#5)** Policy/Charging for Sensing

6 – Ericsson LM

Current phrasing of the WTs are too high level and vague to be able to determine what is in or what is out, that leads to wrong budgeting etc. depending on whether this study is in Rel-19 or not and in what scope, included WTs need to be properly described and scoped.

7 – MediaTek Inc.

Please see form 1 feedback. Rewording requires more time for proper scoping first.

8 – China Mobile Com. Corporation

Regarding the WT about supporting for non-3GPP sensing, the current statements (e.g., Support for non-3GPP RAT sensing, or support of sensing based on non-3GPP sensing data.) are a little bit high level. More details may be need for better understanding, for example, whether and how the non-3GPP data is collected or handled by UE, RAN or 5GC? Which type of RAT could be selected, e.g., Trusted or Untrusted access? How the 5GC controls the non-3GPP sensing? So there are some questions which need be clarified and discussed before determining whether the non-3GPP sensing should be scoped or not.

9 – Nokia

All WTs need re-phrasing. The WT description in its current form are very vague, open ended and left to interpretation. A lot of clarification is needed, and rephrasing would be required for most of the WT descriptions to clearly scope the study.

10 – Samsung R&D Institute UK

Overall, current WT descriptions are abstract and need to be more specific. For now, we propose WT-2 and WT-7 rewording as follows:

WT-2: Sensing service authorization and control accounting for user privacy.

NOTE: Privacy aspects require coordination with SA3

WT-7: Support for non-3GPP sensing data.

11 – Lenovo Information Technology

WT-7 should be reworded as "WT-7: Support for non-3GPP sensing"

12 – Nubia Technology Co.

[From ZTE]

- WT#1 as the main WT for the overall architecture and functionality consideration.**
- WT#2 can be the Sensing session management**
- #2.1** Sensing service authorization and control (original WT#2)
- #2.2** Sensing measurement collection/result calculation (original WT#3)
- #2.3** Sensing exposure framework (original WT#4)
- #2.4** Sensing policy framework (original WT#5)
- #2.5** Service continuity (original WT#9)
- #2.6** NF discovery and selection (original WT#10)

13 – China Mobile Com. Corporation

In general, the scope should be determined first, and then the rewording is taken into account.

Furthermore, WT#5 could be replaced with “WT-5: Policy for Sensing”, the charge part should be led by SA5.

14 – China Telecommunications

Based on Huawei’s rewording, under WT#2, the following sub-tasks should be added:

2.5 (original WT#9) Sensing service continuity

15 – VIVO TECH GmbH

Ø □ New □ WT#1 (combining the original WT#1 and #11):

Study the overall architecture, function enhancement and deployment considering to support integrated sensing and communication service.

NOTE: Minimal impact to the existing system is preferred but considering backward compatibility and sensing modes extendibility.

Ø □ New □ WT#2 (combining and rewording the original WT#2 □ #3, WT#4, WT#5, WT#10):

Study E2E Sensing service procedures and operations, i.e.:

1. (original WT#2) Sensing service authorization and control;
2. (original WT#3) Sensing measurement collection/result calculation;
3. (original WT#4) Sensing result exposure;
4. (reworded WT#5) Policy/~~Charging~~ for Sensing;
5. (original WT#10) Discovery and selection of the sensing entities (e.g., UE, gNB, etc.).

16 – Beijing Xiaomi Software Tech

Yes. Here are the proposals for the rewording:

WT-1: Overall architecture and function enhancement to support integrated sensing and communication service with the following considerations:

- The support of commercial, V2X, public safety and emergency services use cases.
- The support of in-network coverage, out-of-network coverage, and partial coverage
- The support of different service deployment scenarios

Note: Existing architecture, e.g. architecture of eLCS and Ranging_SL, shall be reused as much as possible.

WT-2: Service authorization and policy/parameter provisioning

WT-3: Sensing Transmitter/Sensing Receiver discovery and selection

WT-4: Sensing data collection and processing based on 3GPP sensing data or non-3GPP sensing data or both.

Note: Existing solutions, e.g. solutions developed for eLCS and Ranging_SL, shall be reused as much as possible.

WT-5: Sensing service invocation and exposure to the 3rd party application and to the UE.

WT-6: QoS mechanism and QoS handling.

WT-7: Service continuity for periodic and triggered sensing service.

NOTE 1: Privacy protection and other security aspects will be tasked to SA3, and the related impact to architecture enhancement will be based on SA3 conclusion.

NOTE 2: Charging aspects will be tasked to SA5, and the related impact to architecture enhancement will be based on SA5 conclusion.

Alternatively, WT-2 to WT-7 can also be listed under a single WT as the sub-WTs.

17 – InterDigital Communications

WT-7 shall be reworded into "Support sensing service with non3GPP sensing data.

(here non3GPP sensing data may be further clarified as sensing data collected from non3GPP entity)

WT-9 shall be reworded into "Mobility and Roaming support of integrated sensing service".

18 – Intel Corporation (UK) Ltd

WT-7 should be reworded as "WT-7: Support for non-3GPP radio access based sensing" and in the scope of Rel-19 study in order to make progress for normative work independent of RAN WGs work.

19 – ROBERT BOSCH GmbH

- WT-7 could be reworded as "support for non-3GPP sensing"

2.2 Additional Work Tasks

As well as the initial set of Work Tasks in section 2.1 companies can request to add additional Work Tasks. The naming of these additional Work Tasks should follow the format: WT-company name-# (eg WT-Samsung-1) so that other participants can reference them.

Feedback Form 4: Are there any additional Work Tasks that should be part of Rel-19?

1 – Qualcomm Incorporated

No additional WT for Rel-19.

2 – INSPUR

A generic WT should be studied to cover the general topics and high level requirements.

For example, it can be:

WT-0: The general topics and high level requirements

WT-0.1: Target for sensing.

WT-0.2: Sensing mode.

WT-0.3: Sensing events.

<p>WT-0.4: Sensing request type. WT-0.5: Sensing privacy and others.</p>
<p>3 – HuaWei Technologies Co. We think there is no WTs to be added.</p>
<p>4 – Nokia No additional WT for Rel-19</p>
<p>5 – Lenovo Information Technology No additional WT for Rel-19</p>
<p>6 – Nubia Technology Co. [ZTE] •No additional WT for R19 is needed</p>
<p>7 – China Mobile Com. Corporation No additional WT for Rel-19.</p>
<p>8 – China Telecommunications No additional WT for Rel-19.</p>
<p>9 – VIVO TECH GmbH No additional WT for Rel-19.</p>
<p>10 – OPPO No additional WT for Rel-19.</p>
<p>11 – Beijing Xiaomi Software Tech No additional WT is needed</p>

Feedback Form 5: If there are any additional Work Tasks required, describe them

--

3 Dependencies

These feedback forms will help define the dependencies between Work Tasks, dependencies of Work Tasks on other Working Groups (SA, RAN or CT), and dependencies on other potential SA2 Rel-19 SIDs and WIDs. The Work Tasks can be from the list in section 2.1, or any additional Work Tasks identified in the feedback in section 2.2.

Feedback Form 6: Describe the dependencies that any of the Work Tasks have on other 3GPP Working Groups

<p>1 – Qualcomm Incorporated</p> <p>Some comments based on new WT structure proposed in Form 3:</p> <p>(new) WT-1, WT-2.2, WT-2.3 has dependency on RAN WGs.</p> <p>(new) WT-2.1, WT-2.2 may have dependency on SA3 for security.</p>
<p>2 – HuaWei Technologies Co.</p> <p>Depending on the supported sensing modes, relationship with RAN could be different. gNB monostatic sensing can be supported by RAN implementation and is only related to RAN3. Other sensing modes with different Tx/Rx may have RAN1 dependencies.</p> <p>“Sensing service operation”-related procedures may need the coordination with SA3 as well.</p>
<p>3 – Ericsson LM</p> <p>Depending on the scope and defined WTs, potential for dependencies exist. WT#1 would be the first phase of study before anything else can be handled, RAN scope, if included in Rel-19 is also important input in SA2 WT description.</p>
<p>4 – Ericsson LM</p> <p>Depending on scope: SA3, SA5, in addition to RAN WGs</p>
<p>5 – MediaTek Inc.</p> <p>Strong Dependency to RAN WGs. Some potential dependency to SA3, SA5.</p>
<p>6 – Nokia</p> <p>There is strong dependency on RAN work. For example: depending on what sensing methods are supported by RAN, the SA2 SID have to be scoped accordingly. Our view is that SA2 work should follow normative work done at RAN1/2. So, we may only do a study in Rel-19 and do a normative work in a later release. This will also to scope the normative specification work in SA2 based on what is supported at the RAN side.</p>

Additionally, there is dependency on SA5 for charging and SA3 for security:

- WT-5: Charging is in SA5 scope and hence shall be removed from the WT. In the SID we can have a NOTE that charging aspects will be studied at SA5.
- WT-6: Shall be removed. Security, Integrity protection and privacy shall be studied at SA3. In the SID we can have a NOTE that security, privacy aspects will be studied at SA3.

7 – Samsung R&D Institute UK

This item has dependencies on RAN WGs. So, RAN dependency issues should be identified/considered during the study. Also, privacy aspects should be coordinated with SA3.

8 – LG Electronics France

Our understanding is that ISAC has heavy dependency on RAN and channel modeling for ISAC needs to be studied and discussed in RAN first before setting-up a study item for ISAC in SA2. Therefore, seems scoping, starting and progressing study for ISAC in SA2 difficult or not appropriate in Rel-19.

9 – Lenovo Information Technology

Some WTs have dependency on SA3 and SA5, e.g., WT-6 and WT-5. RAN dependency should be identified after the sensing scope is determined, e.g., RAN 3 will be involved for RAN node reporting sensing measurement data. If UE based sensing is supported, enhancement for air interface may be needed.

10 – Nubia Technology Co.

[from ZTE]

•**Mainly depends on RAN and SA3.**

•**But different mode may have different RAN dependency. It should be case by case.**

11 – China Mobile Com. Corporation

In general, the sensing data reporting has RAN3 dependency, and the different sensing modes may lead to different RAN1 dependency, for example, the scenario that RAN acts as both transmitter and receiver has no RAN1 dependency.

12 – China Telecommunications

Coordination with SA3 for security.

Coordination with RAN3 for protocol designing.

Different sensing mode has different RAN1/RAN4 impact, FFS.

13 – VIVO TECH GmbH

Have dependence on RAN, and different sensing mode may have different RAN dependency, which should be studied case by case.

14 – OPPO

WT-1, WT-2, WT-3, WT-9, WT-10, WT-12, WT-13 and WT-14 have RAN dependency. WT-5 and WT-8 have SA5 dependency. WT-6 has SA3 dependency. For the RAN dependent WTs, we can have the study work before RAN WGs. But the specification work should start after RAN WGs provide more information e.g. performance evaluation for sensing scenarios and sensing modes.

15 – Beijing Xiaomi Software Tech

WT-1, 2, 4 and 6 have dependency on RAN WGs.

For 3GPP data collection & processing, the following work may be required by RAN WGs:

- What measurement data to be collected?
- What parameters are provisioned & authorized to the UE/gNB?
- Communication establishment/modification/termination between 5GC and gNB for measurement data transmission, assistant data provisioning and capability exchange

Note: Communication establishment/modification/termination between 5GC and UE may also be required, but no RAN dependency.

- How to guarantee the required QoS?
- What sensing options are supported?

For non-3GPP data collection & processing, the following work may be required by RAN WGs:

- Communication establishment/modification/termination between 5GC and gNB for measurement data transmission, assistant data provisioning and capability exchange

Note: Communication establishment/modification/termination between 5GC and UE may also be required, but no RAN dependency.

For both 3GPP&non-3GPP data collection & processing, the architecture development for the following aspects are determined in SA2, and the corresponding RAN work will be dependent on the SA2 conclusion:

- Overall architecture, QoS mechanism and service flow
- Communication establishment/modification/termination between 5GC and gNB/UE for measurement data transmission, assistant data provisioning and capability exchange
- Mechanisms on parameter/policy provisioning & authorization.

The SA2 study can work in parallel with the corresponding RAN study.

16 – InterDigital Communications

3GPP RAT based sensing mechanism has high dependency with RAN work.

Therefore, SA2 study should start study for architecture and functional description supporting 3GPP sensing data and non3GPP sensing data.

Handling detail operation for 3GPP RAT based sensing needs interaction with RAN nodes may be studied with RAN coordination.

Feedback Form 7: Describe dependencies between the Work Tasks

1 – Qualcomm Incorporated

Refer to Feedback Form 3 for the dependencies.

(new) WT-2 has dependency on (new) WT-1.

2 – HuaWei Technologies Co.

WT#1(architecture) is the basis of the other residual WTs.

3 – Ericsson LM

WT#1 need to be basis

4 – MediaTek Inc.

All WTs depend on WT#1 and WT#1 is subject to RAN progress.

5 – Nokia

All other WTs have some relation to WT-1

6 – Lenovo Information Technology

WT-2, WT-3, WT-4, WT-5, WT-10 are closely related, which can be combined as one WT for E2E sensing procedure

7 – Nubia Technology Co.

[from ZTE]

•All WTs depend on the WT#1

8 – China Mobile Com. Corporation

All other WTs depend on the WT#1.

<p>9 – China Telecommunications</p> <p>All WTs depend on the WT#1</p>
<p>10 – VIVO TECH GmbH</p> <p>All other WTs depend on the WT#1.</p>
<p>11 – Beijing Xiaomi Software Tech</p> <p>Based on the answer to Feedback Form 7, WT-2 to WT-7 have dependency on WT-1.</p>

Feedback Form 8: Describe any dependencies on potential work/study items that might be created as a result of the other Q3 moderated discussions.

<p>1 – Qualcomm Incorporated</p> <p>No dependency on other moderated discussions.</p>
<p>2 – INSPUR</p> <p>There is a general requirement on computing in 3GPP service such as LCS, Ranging, Sensing and eNA/AI/ML. It is propose to think of computing service in 3GPP System to solve the general requirment in Rel-19 from the system architecture. User plane positioning in eLCS Rel-18 can be the starting point.</p>
<p>3 – HuaWei Technologies Co.</p> <p>No dependency</p>
<p>4 – Ericsson LM</p> <p>As a general observation, we may need to consider dependency aspects once the scope of this SI and other SIs are clearer</p>
<p>5 – Nokia</p> <p>No dependency seen on other SA2 SID/WID. However, we may have to revisit this when the WTs are finalized for this SID.</p>
<p>6 – Lenovo Information Technology</p> <p>No dependency</p>

7 – China Mobile Com. Corporation No dependency.
8 – China Telecommunications No dependency
9 – VIVO TECH GmbH No dependency on other moderated discussions.
10 – OPPO No dependency.
11 – Beijing Xiaomi Software Tech No dependency to other R19 work/study items

4 Partitioning

These questions will help determine whether there is one, or more than one, Study Item, Work Item or TEI-19 item to be created from these Work Tasks.

Feedback Form 9: Should there be more than one SID, WID or TEI-19 item created based on the Work Tasks?

1 – Qualcomm Incorporated No. One SID.
2 – HuaWei Technologies Co. No, only one.
3 – Ericsson LM Of course there needs to be phased approach to this very large and vaguely described proposal. So yes, the work needs to be across multiple releases and we can define the scope for initial phase via single SI.

Other approach, depending on RAN and SA1 input and scoping for Rel-19, one can consider single SI independent of release with phasing based on what needs to be studied first, dependent upon the WTs details.

4 – MediaTek Inc.

This is subject to RAN progress and consolidation of Stage-1 requirements.

5 – Nokia

We propose to have one SID in Rel-19, for study only and no normative work in Rel-19 (i.e. no WID for Rel-19). Also, it is clear that not everything can be studied in Rel-19, so there would be more studies needed in subsequent releases.

6 – Samsung R&D Institute UK

It can be one SID, but may need multiple releases to complete the work.

7 – LG Electronics France

SID seems NOT needed in Rel-19.

- Our understanding is that ISAC has heavy dependency on RAN and channel modeling for ISAC needs to be studied and discussed in RAN first before setting-up a study item for ISAC in SA2. Therefore, seems scoping, starting and progressing study for ISAC in SA2 difficult or not appropriate in Rel-19.

8 – Lenovo Information Technology

No, only one.

9 – Nubia Technology Co.

[from ZTE]
one SID

10 – China Mobile Com. Corporation

No, only one.

11 – China Telecommunications

Only one SID

12 – VIVO TECH GmbH

No, only one.

<p>13 – OPPO</p> <p>No, one SID.</p>
<p>14 – Beijing Xiaomi Software Tech</p> <p>One SID is fine.</p>
<p>15 – Deutsche Telekom AG</p> <p>This SID seems to be too early in SA2 and therefore NOT needed in Rel-19. We agree with the comment#7 from LG</p>
<p>16 – InterDigital Communications</p> <p>one SID is fine</p>
<p>17 – CICT</p> <p><i>[From CATT]</i></p> <p>One SID is fine.</p>
<p>18 – ROBERT BOSCH GmbH</p> <p>No, only one SID.</p>

Feedback Form 10: If the answer to the above question is yes, describe how the Work Tasks should be partitioned into different items.

--

5 Summary

5.1 Summary from sections 2.1 and 2.2 on scoping

Feedback Form 1: Which of the above Work Tasks should be in scope of Rel-19?

Level of feedback (i.e. how many companies engaged in the discussion): 20

Company feedbacks are summarized in below table.

Table 1:

	Supporting Companies	Comments

<p>WT-1: Overall architecture and function enhancement to support new sensing service.</p>	<p>Qualcomm, Inspur, Huawei, Ericsson, Nokia, Samsung, CATT, Lenovo, ZTE, CMCC, China Telecom, CEWiT, vivo, Apple, China Unicom, OPPO, Xiaomi, InterDigital, ROBERT BOSCH (19 companies)</p>	<p>Assumption is that only TR work is developed in R19 (Nokia) Can be an umbrella WT of the rest WTs (Samsung)</p>
<p>WT-2: Sensing service authorization and control</p>	<p>Qualcomm, Inspur, Huawei, Ericsson, Nokia, Samsung, CATT, Lenovo, ZTE, CMCC, China Telecom, CEWiT, vivo, Apple, China Unicom, OPPO, XiaomiInterDigital, ROBERT BOSCH (19 companies)</p>	<p>Related to the privacy protection of sensing service (Inspur) Assumption is that only TR work is developed in R19 (Nokia) WT #2, #3, #4, #10 can be merged as a new WT for E2E procedure (OPPO) WT-2/WT-3/WT-10 should be merged into WT-1 as those are basic functionality.(InterDigital)</p>
<p>WT-3: Sensing measurement collection/result calculation</p>	<p>Qualcomm, Inspur, Huawei, Nokia, Samsung, CATT, Lenovo, ZTE, CMCC, China Telecom, CEWiT, vivo, Apple, China Unicom, OPPO, Xiaomi, InterDigital, ROBERT BOSCH (18 companies)</p>	<p>Data collection and calculation should be a common feature for LCS, Ranging, NWDAF and Sensing. It had better to think of them holistically. (Inspur) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) Assumption is that only TR work is developed in R19. The WT description needs more clarity regarding what aspects of measurement collection/result calculation shall be studied. (Nokia) This can also include the sensing task configuration and node selection as per WT-10. (Lenovo) WT #2, #3, #4, #10 can be merged as a new WT for E2E procedure (OPPO) WT-2/WT-3/WT-10 should be merged into WT-1 as those are basic functionality.(InterDigital)</p>

<p>WT-4: Sensing result exposure</p>	<p>Qualcomm, Inspur, Huawei, Nokia, Samsung, CATT, Lenovo, ZTE, CMCC, China Telecom, CEWiT, vivo, Apple, China Unicom, OPPO, Xiaomi, InterDigital, ROBERT BOSCH (18 companies)</p>	<p>Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) Assumption is that only TR work is developed in R19. we need to study the enhancements needed in the exposure framework for exposing "sensing service". It is not just result exposure. (Nokia) WT #2, #3, #4, #10 can be merged as a new WT for E2E procedure (OPPO)</p>
<p>WT-5: Policy/Charging for Sensing</p>	<p>Inspur, Huawei, Nokia, Lenovo, ZTE, CMCC, China Telecom, CEWiT, vivo, China Unicom, OPPO, Xiaomi, InterDigital (14 companies)</p>	<p>Charging is SA5 work (Qualcomm, Nokia, CATT, CMCC, vivo, China Unicom, OPPO, Xiaomi, InterDigital, ROBERT BOSCH) Policy for Sensing is in the scope of Rel-19 study. The same as V2X policy/ProSe Policy, UE based sensing is out of the control of 3GPP. Policy for sensing is needed to constrain the sensing's scope, frequency and so on. (Inspur) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) Assumption is that only TR work is developed in R19. Can be rephrased to "Study whether and what enhancements are in UE/AM/SM policies for supporting sensing services". This is also a bit overlapping with WT-2, e.g. based on the authorization and control policies may be provided? (Nokia) Policy control and QoS mechanism are considered in the SA2 scope (Xiaomi)</p>
<p>WT-6: Security</p>	<p>Huawei, Ericsson, Samsung, Lenovo, ZTE, vivo, Apple, OPPO, InterDigital (9 companies)</p>	<p>SA3 work (Qualcomm, Inspur, Huawei, Nokia, CATT, ZTE, CMCC, China Telecom, CEWiT, vivo, Apple, China Unicom, OPPO, Xiaomi, InterDigital, ROBERT BOSCH)</p>

<p>WT-7: Support for non-3GPP RAT sensing</p>	<p>Qualcomm, Samsung, Lenovo, CEWiT, OPPO, Xiaomi, Inter-Digital, ROBERT BOSCH, Intel (based on comment in Feedback Form 3) (9 companies)</p>	<p>The support for non-3GPP type sensor is in the scope of SA1's requirement in Rel-19, but it should be in low priority in SA2. (Inspur, CATT, ZTE, CMCC) Can be considered in the next release (Huawei, Nokia, ZTE, vivo) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) "non-3GPP RAT sensing" should be reworded to "non-3GPP sensing" (Lenovo, China Telecom) More clarification is needed. (Lenovo, China Telecom, vivo, China Unicom) Not in SA2 scope (Apple) Enhanced feature based on WT#1, it can be a sub-WT of WT#1 or a standalone WT. (OPPO) WT-7 should be included in Rel-19 study as integrated sensing shall support service by integrating 3GPP sensing data and non3GPP sensing data. (InterDigital)</p>
<p>WT-8: How to combine with OAM or other NW Data</p>	<p>(0 company)</p>	<p>SA5 work (Qualcomm, Inspur, Huawei, CATT, ZTE, CMCC, China Telecom, China Unicom) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) Not very clear what's the potential relationship between SA5 data and propose to first clarify the motivation (vivo, Xiaomi) Not in SA2 scope (Apple) If it means that assistant data is required to facilitate generating, sensing result, it can be merged into WT-3. (Xiaomi)</p>
<p>WT-9: Sensing service continuity</p>	<p>Qualcomm, Inspur, CATT, ZTE, China Telecom, Xiaomi, InterDigital, ROBERT BOSCH (8 companies)</p>	<p>Low priority. (Inspur, Huawei, CMCC, China Unicom) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) Can be considered in the next release (Nokia, vivo, Apple)</p>

<p>WT-10: Discovery and selection of the sensing entities (e.g., UE, gNB, etc.)</p>	<p>Qualcomm, Inspur, Huawei, Samsung, CATT, Lenovo, ZTE, CMCC, China Telecom, CEWiT, vivo, Apple, China Unicom, OPPO, Xiaomi, InterDigital, ROBERT BOSCH (17 companies)</p>	<p>Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) WT #2, #3, #4, #10 can be merged as a new WT for E2E procedure (OPPO) WT-2/WT-3/WT-10 should be merged into WT-1 as those are basic functionality.(InterDigital) WT-10 is relating to the mobility support. Therefore, it should be changed to broad scope that how to support mobility for integrated sensing (including roaming). (InterDigital)</p>
<p>WT-11: Sensing deployment considerations</p>	<p>Inspur, Nokia, CATT, OPPO, Xiaomi, ROBERT BOSCH (6 companies)</p>	<p>They are part of the architecture design considerations and therefore should be made a sub-task for WT-1. (Qualcomm, Inspur, CATT, CMCC, China Telecom, China Unicom, OPPO, Xiaomi) Can be solution of WT#1 (Huawei) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) Assumption is that only TR work is developed in R19 (Nokia) Can be the informative part of WT#1. In some SID/WID, there are informative deployment alternatives in the Annex. (ZTE) Low priority (CMCC)</p>

WT-12: Power saving	Inspur, ROBERT BOSCH (2 company)	They are part of the architecture design considerations and therefore should be made a sub-task for WT-1. (Qualcomm, Inspur, ZTE) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) May be an objective for “Energy Efficiency” related SID. (Nokia) Low priority (CATT, China Unicom) Can be considered in R20 (Lenovo, ZTE, China Telecom) May be reflected by the other features, e.g., the sensing mode, sensing QoS. (CMCC) Not in SA2 scope (Apple) Should be considered by any WT while developing the solution, so no standalone WT is needed. (Xiaomi)
----------------------------	-------------------------------------	---

<p>WT-13: Integration with location services for combined and more accurate position estimation.</p>	<p>Inspur, ROBERT BOSCH (2 company)</p>	<p>Not needed before RAN WGs work out the baseline sensing design. (Qualcomm) Low priority/not essential (Inspur, Huawei, CATT, China Unicom) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) For sensing operation the network may need to use "location services" so we may have to re-use the existing LCS capability in sensing architecture. How we can have enhanced positioning using some sensing measurements should be studied as a next phase of LCS study. Rather, in Rel-19 study we should focus of architectural enhancements needed to support sensing. (Nokia) Consider in the next release (ZTE, vivo, Xiaomi) Can be considered under WT#1 (CMCC) Not in SA2 scope (Apple) If it means that location information can be used as the assistant data to facilitate generating sensing result, it can be merged into WT-3. (Xiaomi)</p>
<p>WT-14: ISAC for different scenarios, e.g., in network coverage, out of network coverage, partial coverage.</p>	<p>Inspur, CATT, OPPO, Xiaomi ROBERT BOSCH (5 companies)</p>	<p>They are part of the architecture design considerations and therefore should be made a sub-task for WT-1. (Qualcomm, CATT, ZTE, China Telecom, China Unicom, OPPO, Xiaomi) In network coverage should be prioritized (Inspur, CMCC, China Telecom) Can be solution of WT#1 (Huawei) Depending on RAN/SA1 requirements work further discussion needed. (Ericsson) Can be considered in future release (Lenovo, vivo, Apple)</p>

Other comments:

- Depending on RAN/SA1 requirements work further discussion needed. (Ericsson, MediaTek)
- SID scope for TR only in R19 or for TR+TS in R19 are different (Nokia)
- WT description is vague, and need to be clarified and rephrased. (Ericsson, Nokia, Xiaomi)

Observation 1: Work Task Ranking in terms of the number of supporting companies (high to low):

- **WT-1:** Overall architecture and function enhancement to support new sensing service. (19 supporters)
- **WT-2:** Sensing service authorization and control (19 supporters)
- **WT-3:** Sensing measurement collection/result calculation (18 supporters)
- **WT-4:** Sensing result exposure (18 supporters)
- **WT-10:** Discovery and selection of the sensing entities (e.g., UE, gNB, etc.) (17 supporters)
- **WT-5:** Policy/Charging for Sensing (14 supporters)
- **WT-6:** Security (9 supporters)
- **WT-7:** Support for non-3GPP RAT sensing (9 supporters)
- **WT-9:** Sensing service continuity (8 supporters)
- **WT-11:** Sensing deployment considerations (6 supporters)
- **WT-14:** ISAC for different scenarios, e.g., in network coverage, out of network coverage, partial coverage. (5 supporters)
- **WT-12:** Power saving (2 supporter)
- **WT-13:** Integration with location services for combined and more accurate position estimation. (2 supporter)
- **WT-8:** How to combine with OAM or other NW Data (no support)

Moderator Proposal 1.1 (Proposed conclusion):

- Based on a high support (>50%) from most of the companies, WT-1/2/10/3/4/5 should be in scope of SA2 Rel-19 study as a standalone WT or sub-WT
 - For WT-5, the charging work should be led by SA5
- For WT-6, security work should be led by SA3
- WT-11 and WT-14 can be merged into WT-1
 - For WT-14, “in network coverage” case will be considered in Rel-19
- Since there’s insufficient support (<15%) of WT-12/13/8, they will not be considered in Rel-19.

Moderator Proposal 1.2 (Proposed open issues for further study):

- For WT-14, whether “out of network coverage” and “partial network coverage” cases will be considered in Rel-19
- Whether WT-7 and WT-9 will be in scope of SA2 Rel-19 study
- How the work scope will be impacted by RAN and SA1 requirements
- Whether there is TR work only in R19 or TR+TS work in R19 (see summary of Feedback Form 6 and Feedback Form 9)

Feedback Form 2: Can any of the Work Tasks above be combined/merged?

Level of feedback (i.e. how many companies engaged in the discussion): 12

Company feedbacks are summarized in below table.

Table 2:

	Merged to	Comments
WT-1: Overall architecture and function enhancement to support new sensing service.		
WT-2: Sensing service authorization and control	WT-6 (OPPO) Combined WT for sensing operation and procedure definition (Qualcomm, Lenovo, ZTE, China Telecom, Xiaomi) WT-1 (InterDigital)	Reworded to “End to End Sensing service procedure” to merge WT-3/4/10 (OPPO) OK to merge the “Sensing service operation”-related WTs into one
WT-3: Sensing measurement collection/result calculation	WT-2 (OPPO, Huawei, vivo) Combined WT for sensing operation and procedure definition (Qualcomm, Lenovo, ZTE, China Telecom, Xiaomi) WT-1 (InterDigital)	
WT-4: Sensing result exposure	WT-2 (OPPO, Huawei, vivo) Combined WT for sensing operation and procedure definition (Qualcomm, Lenovo, ZTE, China Telecom, Xiaomi)	

WT-5: Policy/Charging for Sensing	WT-2 (Huawei, vivo) Combined WT for sensing operation and procedure definition (Lenovo, ZTE, China Telecom, Xiaomi)	
WT-6: Security		Based on Proposal 1.1, this WT will not be considered in the SA2 Rel-19 study
WT-7: Support for non-3GPP RAT sensing	WT-1 (Qualcomm) Combined WT for sensing operation and procedure definition (Xiaomi)	
WT-8: How to combine with OAM or other NW Data	WT-3 (OPPO)	Based on Proposal 1.1, this WT will not be considered in the SA2 Rel-19 study
WT-9: Sensing service continuity	Combined WT for sensing operation and procedure definition (Qualcomm, ZTE, China Telecom, Xiaomi)	
WT-10: Discovery and selection of the sensing entities (e.g., UE, gNB, etc.)	WT-2 (OPPO, Huawei, Nokia, vivo) Combined WT for sensing operation and procedure definition (Qualcomm, Lenovo, ZTE, China Telecom, Xiaomi, InterDigital) WT-1 (Nokia)	
WT-11: Sensing deployment considerations	WT-1 (OPPO, Qualcomm, Huawei, Nokia, ZTE, China Telecom, vivo, Xiaomi)	
WT-12: Power saving	WT-1 (Qualcomm, ZTE, vivo)	Based on Proposal 1.1, this WT will not be considered in the SA2 Rel-19 study
WT-13: Integration with location services for combined and more accurate position estimation.	WT-3 (OPPO) WT-1 (Inspur)	Based on Proposal 1.1, this WT will not be considered in the SA2 Rel-19 study
WT-14: ISAC for different scenarios, e.g., in network coverage, out of network coverage, partial coverage.	WT-1 (OPPO, Qualcomm, Huawei, Nokia, ZTE, China Telecom, Xiaomi)	focus only on the "in network coverage" case in R19, and consider out of network coverage and partial coverage cases in a later release. (Nokia)

Observation 2: For WT-2/3/4/5/10, convergence can be found with 2 options:

- Option 1: WT-3/4/5/10 are merged into WT-2, and WT-2 is rephrased to cover a larger scope
- Option 2: WT-2/3/4/5/10 are merged into a new WT covering sensing operation and procedure

Moderator Proposal 2.1 (Proposed conclusion): WT-2/3/4/5/10 are merged into a single WT covering end to end sensing operation and procedure, and WT-3/4/5/10 are considered as the sub-WT.

Moderator Proposal 2.2 (Proposed open issues for further study): Whether WT-2 is considered as the sub-WT of the merged WT.

Observation 3: For WT-11/14, agreement is reached to merge them into WT-1.

Moderator Proposal 3 (Proposed conclusion): WT-11/14 are merged into WT-1.

Observation 4: For WT-9, agreement is reached to merge them into the new WT for WT-2/3/4/5/10.

Moderator Proposal 4 (Proposed conclusion): WT-9 is merged into the new WT for WT-2/3/4/5/10, if it is considered in scope based on the conclusion of Feedback Form 1.

Observation 5: For WT-1, no merge proposal.

Moderator Proposal 5 (Proposed conclusion): WT-1 is not merged to any other WT.

Observation 6: For WT-7, no convergence on how to merge it or whether it will be merged into any other WT.

Moderator Proposal 6 (Proposed open issues for further study):

- Whether WT-7 is merged to any other WT?
- Whether to merge WT-7 into WT-1 or the WT covering end to end sensing operation and procedure, if it is considered in scope based on the conclusion of Feedback Form 1.

Feedback Form 3: Should any of the Work Tasks above be reworded?

If so, propose the required rewording.

Level of feedback (i.e. how many companies engaged in the discussion): 14

Company feedbacks are summarized in below table, based on conclusions of Feedback form 2, i.e. new WT structure is applied.

Table 3:

WT and sub-WT	Proposed rewording
WT-1	<p>WT-1.a: Study and define the architecture and function enhancement to support the Integrated sensing and communication (ISAC) service, including: (Qualcomm)</p> <p>WT-1.b: Study the overall architecture and function enhancement to support integrated sensing and communication service. (Huawei)</p> <p>WT-1.c: overall architecture and functionality consideration (ZTE)</p> <p>WT-1.d: Study the overall architecture, function enhancement and deployment considering to support integrated sensing and communication service. (vivo)</p> <p>WT-1.e: Overall architecture and function enhancement to support integrated sensing and communication service with the following considerations:</p> <ul style="list-style-type: none"> • The support of commercial, V2X, public safety and emergency services use cases. • The support of in-network coverage, out-of-network coverage, and partial coverage • The support of different service deployment scenarios <p>(Xiaomi)</p>
WT-1.NOTE	<p>NOTE.a: existing eLCS (TS 23.273) and Ranging_SL (TS 23.586) architecture should be reused as the baseline. (Qualcomm)</p> <p>NOTE.b: Reusing the existing architecture and minimal system impact is preferred. (Huawei)</p> <p>NOTE.c: Minimal impact to the existing system is preferred but considering backward compatibility and sensing modes extendibility. (vivo)</p> <p>NOTE.d: Existing architecture, e.g. architecture of eLCS and Ranging_SL, shall be reused as much as possible. (Xiaomi)</p>
WT-1.1	WT-1.1 determining ISAC service deployment cases for Rel-19 normative work; (Qualcomm)

WT-1.2	WT-1.2 support of sensing based on non-3GPP sensing data (as defined by SA1); (Qualcomm)
WT-1.3	WT-1.3 support of all the coverage scenarios: in-coverage, out-of-coverage, and partial coverage, including support of existing UE power saving mechanisms. (Qualcomm)
WT-1.4	WT-1.4 “Support for different kinds of sensing modes (i.e. UE monostatic, UE bistatic, UE-gNB bistatic (UL uu and DL uu), gNB bistatic, gNB monostatic)” (OPPO, CMCC)
WT-1.5	WT-1.5 “Support for Sensing data transmission in control plane and user plane”. (OPPO)
WT-2 (i.e. original WT-2/3/4/5/9/10)	WT-2.a: Study and define the operation and procedures for the ISAC service, including: (Qualcomm) WT-2.b: Study the Sensing service operation procedures, i.e.: (Huawei) WT-2.c: Sensing session management (ZTE) WT-2.d: Study E2E Sensing service procedures and operations, i.e.: (vivo)
WT 2.1	WT-2.1.a: ISAC service authorization and control; (Qualcomm, Huawei, ZTE, vivo) WT-2.1.b: Sensing service authorization and control accounting for user privacy. (Samsung) WT-2.1.c: Service authorization and policy/parameter provisioning (Xiaomi)
WT 2.2	WT-2.2.a: Discovery and selection of sensing devices (e.g. UE, gNB); (Qualcomm) WT-2.2.b: NF discovery and selection (ZTE) WT-2.2.c: Discovery and selection of the sensing entities (e.g., UE, gNB, etc.). (vivo) WT-2.2.d: Sensing Transmitter/Sensing Receiver discovery and selection (Xiaomi)
WT 2.3	WT-2.3.a: Sensing measurement data collection; (Qualcomm) WT-2.3.b: Sensing measurement collection/result calculation (Huawei, ZTE, vivo) WT-2.3.c: Sensing data collection and processing based on 3GPP sensing data or non-3GPP sensing data or both. (Xiaomi) Note: Existing solutions, e.g. solutions developed for eLCS and Ranging_SL, shall be reused as much as possible. (Xiaomi)

WT-2.4	<p>WT-2.4.a: Sensing result exposure; (Qualcomm, Huawei, vivo)</p> <p>WT-2.4.b: Sensing exposure framework (ZTE)</p> <p>WT-2.4.c: Sensing service invocation and exposure to the 3rd party application and to the UE. (Xiaomi)</p>
WT-2.5	<p>WT-2.5.a: support of ISAC service continuity for periodic, deferred, and event triggered sensing; (Qualcomm)</p> <p>WT-2.5.b: Service continuity (ZTE)</p> <p>WT-2.5.c: Sensing Service continuity (China Telecom)</p> <p>WT-2.5.d: Service continuity for periodic and triggered sensing service. (Xiaomi)</p> <p>WT-2.5.e: Mobility and Roaming support of integrated sensing service (InterDigital)</p>
WT-2.6	<p>WT-2.6.a: Policy/Charging for Sensing (Huawei)</p> <p>WT-2.6.b: Sensing policy framework (ZTE)</p> <p>WT-2.6.c: Policy for Sensing (CMCC, vivo)</p> <p>WT-2.6.d: QoS mechanism and QoS handling. (Xiaomi)</p>
WT-3 (original WT-7)	<p>WT-3.a: Support for non-3GPP sensing⁷. (OPPO, Samsung, Lenovo, InterDigital, ROBERT BOSCH)</p> <p>WT-3.b: Support for non-3GPP radio access based sensing (Intel)</p> <p>non3GPP sensing data may be further clarified as sensing data collected from non3GPP entity (InterDigital)</p>
WT-3.1	<p>whether and how the non-3GPP data is collected or handled by UE, RAN or 5GC? (CMCC)</p>
WT-3.2	<p>Which type of RAT could be selected, e.g., Trusted or Untrusted access? (CMCC)</p>
WT-3.3	<p>How the 5GC controls the non-3GPP sensing? (CMCC)</p>
NOTE 1	<p>Privacy protection and other security aspects will be tasked to SA3, and the related impact to architecture enhancement will be based on SA3 conclusion. (Xiaomi)</p>
NOTE 2	<p>Charging aspects will be tasked to SA5, and the related impact to architecture enhancement will be based on SA5 conclusion. (Xiaomi)</p>

Observation 7: For WT-1, some convergence can be found from the 5 wording proposals.

Moderator Proposal 7 (Proposed conclusion): Combined wording for WT-1: Overall architecture and function enhancement to support integrated sensing and communication service with the considerations of various use cases (e.g. commercial, V2X, public safety and emergency services), deployment options and sensing modes.

Observation 8: For WT-1.NOTE, some convergence can be found from the 4 wording proposals.

Moderator Proposal 8 (Proposed conclusion): Combined wording for WT-1.NOTE: Existing architecture, e.g. architecture of eLCS and Ranging_SL, shall be reused to assure minimum system impact.

Observation 9: For WT-2, some convergence can be found from the 4 wording proposals.

Moderator Proposal 9 (Proposed conclusion): Combined wording for WT-2: Study the end to end service operation and procedures for the ISAC service, including:

Observation 10: For WT-2.2, some convergence can be found from the 4 wording proposals.

Moderator Proposal 9 (Proposed conclusion): Combined wording for WT-2.2: Discovery and selection of sensing devices/entities (e.g. UE, gNB)

Observation 11: For WT-2.3, some convergence can be found from the 4 wording proposals.

Moderator Proposal 11 (Proposed conclusion): Combined wording for WT-2.3: Sensing measurement data collection and result calculation based on the collected data.

Observation 12: For WT-2.4, some convergence can be found from the 3 wording proposals.

Moderator Proposal 12 (Proposed conclusion): Combined wording for WT-2.4: Sensing result exposure.

Observation 13: For WT-2.5, some convergence can be found from the 5 wording proposals.

Moderator Proposal 13 (Proposed conclusion): Combined wording for WT-2.5: mobility and service continuity for periodic and triggered ISAC service.

Observation 14: For WT-2.1 and WT-2.6, some common aspects are found for “ISAC service authorization and control” and “policy framework for ISAC” and there are some different understandings on ISAC service authorization” (e.g. policy control or security)

Moderator Proposal 14 (Proposed open issues for further study):

- More clarifications are required for “ISAC service authorization and control”, in terms of the relationship with security and with policy control
- Whether the 2 sub-WT should be combined

Observation 15: For WT-3, WT-3.a has the support from majority.

Moderator Proposal 15 (Proposed conclusion): WT-3 is reworded to “Support for non-3GPP sensing”, if it is considered in scope based on the conclusion of Feedback Form 1.

Observation 16: For NOTE 1 and NOTE 2, the wording proposals are aligned with conclusions of Feedback Form 1.

Moderator Proposal 16 (Proposed conclusion): Wording proposals from Xiaomi are used as the baseline.

Observation 17: For other WT or sub-WT not mentioned in Proposal 7-16, there’s in-sufficient support

Moderator Proposal 17 (Proposed conclusion): They will not be considered.

Observation 18: There are some general comments about the RAN/SA1 dependency.

Moderator Proposal 18 (Proposed open issues for further study): All the proposed wordings will be revisited for the alignment with RAN and SA1 requirements.

Here is the list of the newly proposed wording for the WTs based on Moderator Proposal 7-13 and Moderator Proposal 15-17:

WT-1: Overall architecture and function enhancement to support integrated sensing and communication service with the considerations of various use cases (e.g. commercial, V2X, public safety and emergency services), deployment options and sensing modes.

NOTE: Existing architecture, e.g. architecture of eLCS and Ranging_SL, shall be reused to assure minimum system impact.

WT-2: Study the end to end service operation and procedures for the ISAC service, including:

WT-2.1: (Wording TBD)

WT-2.2: Discovery and selection of sensing devices/entities (e.g. UE, gNB)

WT-2.3: Sensing measurement data collection and result calculation based on the collected data.

WT-2.4: Sensing result exposure

WT-2.5: mobility and service continuity for periodic and triggered ISAC service.

WT-2.6: (Wording TBD)

WT-3: Support for non-3GPP sensing

Feedback Form 4: Are there any additional Work Tasks that should be part of Rel-19?

Level of feedback (i.e. how many companies engaged in the discussion): 11

10 companies (Qualcomm, Huawei, Nokia, Lenovo, ZTE, CMCC, China Telecom, vivo, OPPO, Xiaomi) don't think new WT is needed.

1 company (Inspur) propose to add a new WT: A genetic WT should be studies to cover the general topics and high level requirements.

Observation 19: There's insufficient support of adding a new WT.

Moderator Proposal 19 (Proposed conclusion): no new WT is needed.

Feedback Form 5: If there are any additional Work Tasks required, describe them

Level of feedback (i.e. how many companies engaged in the discussion): 0

5.1 5.3 Summary from Section 3 Dependencies

Feedback Form 6: Describe the dependencies that any of the Work Tasks have on other 3GPP Working Groups

Level of feedback (i.e. how many companies engaged in the discussion): 16

Company feedbacks are summarized in below table, based on conclusions of Feedback form 3 (i.e. WTs and sub-WTs are numerated based on proposals of Feedback form 3).

Table 4:

WT and sub-WT	Dependency
<p>WT-1: Overall architecture and function enhancement to support integrated sensing and communication service with the considerations of various use cases (e.g. commercial, V2X, public safety and emergency services), deployment options and sensing modes. NOTE: Existing architecture, e.g. architecture of eLCS and Ranging_SL, shall be reused to assure minimum system impact.</p>	<p>RAN (Qualcomm, OPPO, Xiaomi) Depending on the supported sensing modes, relationship with RAN could be different. gNB monostatic sensing can be supported by RAN implementation and is only related to RAN3. Other sensing modes with different Tx/Rx may have RAN1 dependencies. (Huawei) WT#1 would be the first phase of study before anything else can be handled, RAN scope, if included in Rel-19 is also important input in SA2 WT description. (Ericsson) Depending on scope: SA3, SA5, in addition to RAN WGs (Ericsson) There is strong dependency on RAN work. For example: depending on what sensing methods are supported by RAN, the SA2 SID have to be scoped accordingly. (Nokia, ZTE, CMCC, China Telecom, vivo)</p>
<p>WT-2: Study the end to end service operation and procedures for the ISAC service, including:</p>	<p>SA3 (Huawei)</p>
<p>WT-2.1 ISAC service authorization and control (FFS)</p>	<p>SA3 (Qualcomm) RAN (OPPO, Xiaomi)</p>
<p>WT-2.2: Discovery and selection of sensing devices/entities (e.g. UE, gNB)</p>	<p>RAN (Qualcomm, OPPO) SA3 (Qualcomm)</p>
<p>WT-2.3: Sensing measurement data collection and result calculation based on the collected data.</p>	<p>RAN (Qualcomm, OPPO, Xiaomi) RAN dependency should be identified after the sensing scope is determined, e.g., RAN 3 will be involved for RAN node reporting sensing measurement data. (Lenovo, CMCC) Coordination with RAN3 for protocol designing. (China Telecom)</p>
<p>WT-2.4: Sensing result exposure.</p>	
<p>WT-2.5: ISAC service continuity for periodic and triggered sensing service.</p>	<p>RAN (OPPO)</p>
<p>WT-2.6: policy control for ISAC (FFS)</p>	
<p>WT-3: Support for non-3GPP sensing (FFS)</p>	

<p>NOTE 1: Privacy protection and other security aspects will be tasked to SA3, and the related impact to architecture enhancement will be based on SA3 conclusion.</p>	<p>Security, Integrity protection and privacy shall be studied at SA3. In the SID we can have a NOTE that security, privacy aspects will be studied at SA3. (Nokia) Privacy aspects should be coordinated with SA3. (Samsung, Lenovo, ZTE, OPPO, Xiaomi)</p>
<p>NOTE 2: Charging aspects will be tasked to SA5, and the related impact to architecture enhancement will be based on SA5 conclusion.</p>	<p>Charging is in SA5 scope and hence shall be removed from the WT. In the SID we can have a NOTE that charging aspects will be studied at SA5. (Nokia, OPPO, Xiaomi)</p>

Other general comments:

- SA2 TS work should follow normative work done at RAN1/2. So, we may only do a study in Rel-19 and do a normative work in a later release. (Nokia, Ericsson)
- RAN dependency issues should be identified/considered during the study. Handling detail operation for 3GPP RAT based sensing needs interaction with RAN nodes may be studied with RAN coordination. (Samsung, InterDigital, Xiaomi)
- ISAC needs to be studied and discussed in RAN first before setting-up a study item for ISAC in SA2. Therefore, seems scoping, starting and progressing study for ISAC in SA2 difficult or not appropriate in Rel-19. (LGE)

Observation 20: At least 2 companies believe that WT-1, 2.1, 2.2 and 2.3 have RAN dependency.

Moderator Proposal 20 (Proposed conclusion): WT-1, 2.1, 2.2 and 2.3 have RAN dependency. SA2 work will be impacted by sensing methods supported by RAN, and RAN3 will be involved for data collection/reporting. RAN coordination is required.

Observation 21: Most companies believes there are SA3 dependency for security related WTs and SA5 dependency for charging related WTs.

Moderator Proposal 21 (Proposed conclusion): 2 NOTES to be added to respectively address the dependency to SA3 and dependency to SA5.

Observation 22: No dependency has been indicated for WT-2.4, 2.6 and WT-3.

Moderator Proposal 22 (Proposed conclusion): WT-2.4, 2.6 and WT-3 have no dependency to RAN WGs, SA3 and SA5.

Observation 23: Some of the WTs have strong RAN dependency and RAN requirements will impact SA2 scope, some companies believe the SA2 normative work should follow RAN normative work, and some others believe SA2 can develop the system architecture with RAN coordination.

Moderator Proposal 23 (Proposed open issues for further study): Way forward on whether TR work is developed or both TR and TS work are developed in Rel-19.

Feedback Form 7: Describe dependencies between the Work Tasks

Level of feedback (i.e. how many companies engaged in the discussion): 11

Observation 24: All companies believe WT-1 is the basis and all the rest WTs have dependency on WT-1.

Moderator Proposal 24 (Proposed conclusion): WT-1 is the basis and all the rest WTs have dependency on WT-1.

Feedback Form 8: Describe any dependencies on potential work/study items that might be created as a result of the other Q3 moderated discussions.

Level of feedback (i.e. how many companies engaged in the discussion): 11

Observation 25: 10 companies believe there is No dependency to other R19 work/study items. However, since the work scope is not finalized, dependency to other R19 work/study items should be revisited.

Moderator Proposal 25 (Proposed conclusion):

- No dependency to other R19 work/study items.
- Dependency to other R19 work/study items should be revisited.

5.1 5.4 Summary from section 4 Partitioning

Feedback Form 9: Should there be more than one SID, WID or TEI-19 item created based on the Work Tasks?

Level of feedback (i.e. how many companies engaged in the discussion): 18

Company feedbacks are summarized below:

- No Partition needed, one SID is enough. (Qualcomm, Huawei, Lenovo, ZTE, China Mobile, China Telecom, vivo, OPPO, Xiaomi, InterDigital, CATT, ROBERT BOSCH)
- One SID in Rel-19 for study only as the initial phase, and work needs to be across multiple releases. (Ericsson, Samsung, Nokia)
- Depending on RAN and SA1 input and scoping for Rel-19, one can consider single SI independent of release with phasing based on what needs to be studied first, dependent upon the WTs (Ericsson)

- ISAC needs to be studied and discussed in RAN first before setting-up a study item for ISAC in SA2. SID seems NOT needed in Rel-19. (LGE, DT)
- RAN/SA1 requirement dependency (MTK)

Observation 26: 15 companies believe one SID in R19 is needed, 3 of which indicates the work needs to be cross multiple releases. It is also alternatively proposed to develop a release independent SID in R19. 2 companies think no R19 SID is needed.

Moderator Proposal 26 (Proposed open issues for further study): Whether and how to develop ISAC work in Rel-19 and future releases

Feedback Form 10: If the answer to the above question is yes, describe how the Work Tasks should be partitioned into different items.

Level of feedback (i.e. how many companies engaged in the discussion): 0