



MediaTek Thoughts – Rel-19

MediaTek Inc.

Outline

- Overall View On Rel-19 Content
- Snapshot
- Rel-19 Proposals
- Summary

Overall View On Rel-19 Content



Overall View on Rel-19 Content [1/5]

S.NO.	Title	Brief Description and Key Objectives	Related Stage-1 Study/Work Item	Lead Stage-2 WG	RAN dependencies	Other WG dependencies
1.	System Architecture enablers for AI/ML Radio (See slide 12 for more details)	Study how the 5G System Architecture can be enhanced to enable AI/ML Radio. The following aspects will be studied. Key Work Tasks includes defining - <ol style="list-style-type: none"> Whether (and how) to support a common 5GS AI/ML framework to enable AI/ML Radio Whether (and how) to enhance UE data collection framework to meet requirements for AI/ML model training (for RAN). Whether (and how) to support model transfer/delivery to the UE <ul style="list-style-type: none"> From CN (enabling AI/ML CSI feedback enhancement, Beam Mgmt) From LMF (enabling AI/ML Positioning) From an OTT Server (enabling AI/ML CSI feedback enhancement, Beam Mgmt) Support for security and privacy aspects on data collection and model transfer/delivery to UE (Authentication, Authorization, Subscription management). 	No NOTE: TR 38.843 (RAN initiated)	SA2	Yes	SA3 for security, SA4 for data collection (TBD)
2.	Further Sidelink Relay Enhancements (See slide 13 for more details)	Study and specify support for multi-hop and multipath relay, as well as non-3GPP transport for U2U/U2N relay. Key Work Tasks includes defining - <ol style="list-style-type: none"> Possible enhancements to existing SL procedures to support Multi-hop for U2U relay Possible enhancements to existing SL procedures to support Multi-hop for U2N relay Possible enhancements to support multi-path via two indirect paths Possible enhancements to support U2N and U2U relay with non-3GPP transport 	Yes TS 22.261 (SMARTER) (REFEC) TS 22.261 - FFS (MultiRelay) (UEMHopRelay)	SA2	Yes	SA3 for security, SA5 for charging aspects



Overall View on Rel-19 Content [2/5]

S.NO.	Title	Brief Description and Key Objectives	Related Stage-1 Study/Work Item	Lead Stage-2 WG	RAN dependencies	Other WG dependencies
3.	Further NTN Enhancements (See slide 14 for more details)	Study and specify how 5GS (resp. EPS) can be enhanced to support Regenerative payload (resp. Regenerative payload with Store & Forward) for NTN NR (resp. for NTN IoT) Key Work Tasks includes defining - <ol style="list-style-type: none"> 1. Study Store & Forward alternatives depending on the level of service (and associated requirements) i.e. from CP only to CP+UP 2. Support for Regenerative Architecture in the 3GPP system 3. Security aspects (data handling depending on acquisition vs. flown-over country) 	Yes TS 22.261-FFS (5GSAT_Ph3) TR 22.865 (FS_5GSAT_Ph3)	SA2	Yes	SA3 for security aspects
4.	XR Enhancements (See slide 15 for more details)	Enhance XR support beyond Rel-18 (enabling metaverse services, Localized services for side-link/ tethered devices and tackling service interruptions in case of mobility) Key Work Tasks includes defining - <ol style="list-style-type: none"> 1. Whether and how D2D connection (e.g., via SL or tethering) can be leveraged for localized compute/rendering offloading in order to reduce motion-to-photon latency for power and resource constrained devices. 2. Whether and how 5GS authenticates/authorizes tethered devices for localized compute/rendering offload. 3. Whether and how the 5GS QoS framework can be enhanced to distribute tracking (position/motion/pose/gesture), sensor and remote user representation information for localized scene rendering at the remote device. 4. Whether and how 5GC can provide assistance information to a 3rd party to support metaverse services. 5. Support pre-emptive rate control enhancement beyond L4S. 	Yes TS 22.261- FFS (XRMobility) TR 22.856 (FS_Metaverse)	SA2	Yes	SA3 for security, SA4 for media types of emerging and XR-based services, SA5 for charging aspects



Overall View on Rel-19 Content [3/5]

S.NO.	Title	Brief Description and Key Objectives	Related Stage-1 Study/Work Item	Lead Stage-2 WG	RAN dependencies	Other WG dependencies
5.	5GS Enhancements to Support Energy Efficiency as a Service (See slide 16 for more details)	Study 5GS enhancements to enable information exposure on systematic energy consumption or level of energy efficiency to vertical customers. This also includes Tracking (identification, monitoring and exposure) of energy source. Key Work Tasks includes defining - <ol style="list-style-type: none"> 1. Study the possible architectural and functional enhancements to support monitoring/exposure of EE information in 5GS 2. Study the possible architectural and functional enhancements in 5GS <ul style="list-style-type: none"> ○ to support EE-aware subscription policies ○ to support different EE modes of NFs with dynamic changes (incl. charging) ○ to enhance Alternative QoS Profile framework based on EE 	Yes TS 22.261- FFS (EnergyServ) TR 22.882 (FS_EnergyServ)	SA2	Don't know (Possibly RAN3)	SA3 for security aspects SA5 for charging aspects
6.	System Architecture enablers for AI/ML App. Operation (See slide 17 for more details)	Support distributed AI/ML App. training and inference using direct device connection Key Work Tasks includes defining - <ol style="list-style-type: none"> 1. Whether (and how) to support exposing 5GC Information to the UE to assist in distributed AI/ML App. training and inference 2. Security and privacy aspects on exposing AI/ML App. data via SL to third party or exposing 5GC information to the UE. 3. Possible enhancements (if any) to existing SL procedures to support distributed AI/ML App. training and inference 4. Possible enhancements (if any) to existing SL procedures to expose AI/ML App. Data via SL to a third party Application. 	Yes TS 22.261 (AMMT) TS 22.261- FFS (AIML_MT_Ph2) TR 22.876 (FS_AIML_MT_Ph2)	SA2	No	SA3 for security, SA5 for charging aspects



Overall View on Rel-19 Content [4/5]

S.NO.	Title	Brief Description and Key Objectives	Related Stage-1 Study/Work Item	Lead Stage-2 WG	RAN dependencies	Other WG dependencies
7.	<p>Upper layer Traffic Steer & Switch over Dual 3GPP Access (TN xor NTN)</p> <p>(See slide 18 for more details)</p>	<p>Gap analysis for ATSSS to support traffic steering/ switching between concurrent (max 1) 3GPP TN and (max 1) NTN access (NR only) and no N3GPP access.</p> <p>Key Work Tasks includes defining -</p> <ol style="list-style-type: none"> How the registration to each access is triggered/maintained/released Definition and handling of MA-PDU Session in the target scenario <ul style="list-style-type: none"> Incl. MA-PDU Session establishment / modification / release Incl. handling depending on registration status (one / two reg) How session continuity is supported between the two accesses Traffic switching/steering and associated changes to ATSSS rules <p>Assumption: With Single PLMN or different PLMNs (single subs.), home-routed NR access only i.e. TN NR, NTN NR.</p>	<p>Yes</p> <p>TR 22.841 (FS_DualSteer)</p>	SA2	<p>Don't know</p> <p>(feedback from RAN WGs required)</p>	<p>SA3 for security aspects,</p> <p>SA5 for charging aspects</p>
8.	<p>Further MEC Enhancements</p>	<p>Enhance 5GS to allow decoupled evolution of MEC deployments.</p> <p>Key Work Tasks includes defining -</p> <ol style="list-style-type: none"> Whether (and how) to support localized MEC Management Whether (and how) to enable localized collaboration of edge networks/ MEC services 	No	SA2	No	<p>SA3 for security,</p> <p>SA5 for charging aspects</p>



Overall View on Rel-19 Content [5/5]

S.NO.	Title	Brief Description and Key Objectives	Related Stage-1 Study/Work Item	Lead Stage-2 WG	RAN dependencies	Other WG dependencies
9.	Ambient IoT (See slide 19 for more details)	Study possible enhancements to 5GS for use cases and scenarios that cannot otherwise be fulfilled with existing 3GPP LPWA IoT (incl. with reduced peak Tx power) Key Work Tasks includes defining - The study should focus on carrying out a gap analysis to support Ambient IoT as a PIN.	Yes TR 22.840 (FS_AmbientIoT)	SA2	Yes, Major	SA3 for security, SA5 for charging aspects
10.	Enhancement of Usage of User Identifiers in the 5G System	Enhance 5GS to allow the creation and usage of user-specific identifiers for different users. User can be a human being, an application or a device behind UE gateway. Based on different user-specific identifiers, the operator is able to configure different network settings to improve user experience and to obtain optimized performance Key Work Tasks includes defining - <ol style="list-style-type: none"> How to enhance 5GS architecture to enable the support of user-specific identifiers What information is required by 5GS to store and generate user-specific identifiers (e.g. for application or devices behind gateway UE) How the user-specific identifiers are associated with a subscription What user-specific profile (and how) can be exposed to application function 	Yes TS 22.101 TS 22.115	SA2	Don't know	SA3 for security aspects, SA5 for charging aspects



Snapshot

Snapshot

(e)MBB	IoT Industry 4.0	Services OTT enablers	Generic	Arch/Topology Sidelink	Multi-Access
NTN NR <ul style="list-style-type: none">• Regen Arch. ★	NTN IoT <ul style="list-style-type: none">• Store and Forward (incl. Regen arch.) ★ Ambient IoT <ul style="list-style-type: none">• =f (RAN SID) <i>Study</i> ★	XR enh. <ul style="list-style-type: none">• Metaverse ★• XR mobility ★ Enablers-AI/ML App. <ul style="list-style-type: none">• AIML APP D2D (AIMLsys enh.) MEC enh. <ul style="list-style-type: none">• Localized MEC	System Energy <ul style="list-style-type: none">• EE as a service <i>Study</i> ★? Enablers – AI/ML Radio <ul style="list-style-type: none">• Model Transfer ★• Data Collection ★ User Identifiers in 5GS <ul style="list-style-type: none">• User Identifiers ★?	Sidelink <ul style="list-style-type: none">• Multi-hop Relay ★• MP Relay ★• N3GPP over Relay ★	ATSSS Ph4 <ul style="list-style-type: none">• Dual Steer (TN ⊕ NTN) ★?

★ RAN dependencies



Rel-19 Proposals

System Arch. enablers for AI/ML Radio

Motivation

- RAN work:
 - Rel-18 RAN study covers CSI, BM, Positioning: expected to be converted (where applicable) to Feature WI
 - Rel-19: expected proposal for study on AI/ML mobility
- SA2 Work:
 - Establishing a common 5GS AI/ML framework (across WGs).
 - UE-Data collection for AI/ML model training (RAN dependency)
 - Ongoing RAN discussion on choices between
 - CP (MDT, LPP for AI/ML PoS, other AS level measurements)
 - UP (RAN-aware vs. RAN-transparent)
 - Model Transfer to the UE (RAN dependency)
 - Ongoing RAN discussion on model delivery/ transfer method:
 - Model transfer: UE <-> gNB (CP or UP)
 - Model Transfer: UE <-> CN (non pos) (CP or UP)
 - Model Transfer: UE <-> LMF (pos) (CP or UP)
 - Model Transfer: UE <-> Server
 - Security and Privacy aspects

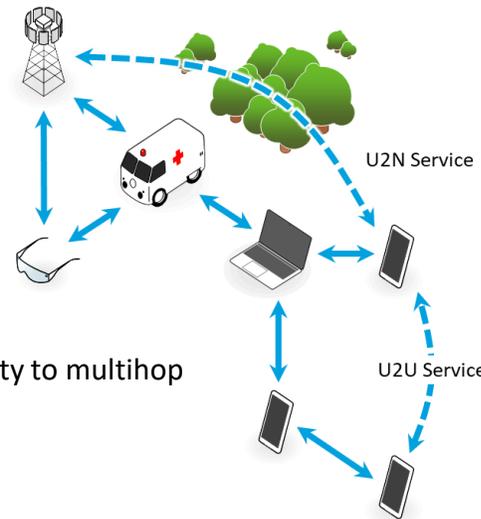
Proposals (Study + Feature)

- Whether (and how) to support a common 5GS AI/ML framework to enable AIML Radio
- Whether (and how) to enhance UE data collection framework
 - to meet requirements for AI/ML model training (for RAN)
- Whether (and how) to support model transfer to the UE
 - UE <-> CN (enabling AI/ML CSI/BM)
 - UE <-> LMF (enabling AI/ML Pos)
 - UE <-> Server (enabling AI/ML CSI/BM)
- Security and Privacy aspects on data collection and Model transfer to UE (incl. Authentication, Authorization and Subscription management).

Further Sidelink Relay Enhancements

Motivation

- U2N/U2U relaying models for services from anywhere to anywhere
 - Multi-hop combining U2N and U2U
 - Multi-path via two indirect paths
 - Integration of non-3GPP transport
- More dramatic coverage extension via multihop
- Public safety, IoT, etc.
- Devices can extend services to distant peers e.g.
 - Shared XR activities
 - 
 - V2X: vehicles sharing environment/sensor info
- NOTE:
 - Rel-18 considers U2U fwd compatibility to multihop



Proposals (Study + Feature)

- Possible enhancements to existing SL procedures to support Multi-hop for U2U relay
- Possible enhancements to existing SL procedures to support Multi-hop for U2N relay
- Possible enhancements to support multi-path via two indirect paths
- Possible enhancements to support U2N and U2U relay with non-3GPP transport

Further NTN Enhancements

Motivation

- Only transparent payloads are supported in 3GPP NTN Rel-17~Rel-18 (aka bent-pipe)
 - I.e. if the feeder link is unavailable – no service can be provided as the Satellite is basically a remote RF Unit of an eNB on the ground
- For NGSO deployments – the availability of the feeder link hence ground station cannot be guaranteed
 - This creates wide areas of no coverage (besides the known discontinuous coverage inherent to “early” NGSO constellations) e.g. in the middle of oceans
- Regenerative payload can alleviate the above i.e. provide *basic service or handling* and coverage in areas with no feeder link
 - This requires some OBP on the satellite incl. RAN and possibly CN NFs.
 - RAN-only functions allow to advertise cells (typ. could display “barring”) but cannot provide service as such (no reachable CN) in absence of feeder link
 - RAN and CN functions could allow *basic service or handling* (from basic CP NAS signalling handling to CP and UP handling – depending on the architecture) in absence of feeder link i.e. “Store and Forward”
 - mobility of the satellite (hence onboard RAN/CN functions) vs. the remainder of the network
- Store & Forward requires enabling some Regenerative payload (RAN+CN functions)

Proposals (Study + Feature)

- Study Store & Forward alternatives depending on the level of service (and associated requirements) i.e. from CP-only to CP+UP
 - Incl. identification of satellite-borne RAN+CN functions
 - Associated parameters e.g. storage buffers and related handling
- Support for Regenerative Architecture in the 3GPP system
 - As a function of the identified satellite-borne RAN+CN functions and related interface between the satellite and the rest of the network on the ground e.g. S1-U, S11, S8
 - Mobility of large amount of UEs from one “satellite-borne” network to another while *avoiding* the use of ISL (ISL can be a showstopper for IoT NTN)
- Security aspects
 - E.g. data handling depending on country of data acquisition vs. country being flown over

XR Enhancements

Motivation

- Enhancing XR support and related features beyond Rel-18.
- Provide Metaverse services (e.g., Immersive interactive experience)
 - Based on R18 and R19 Stage 1 requirements.
 - Local representation of remote users (or their digital representations/avatars) and interaction between them.
- Provide Localized services for side-link or tethered devices (e.g., smart glasses/HMD)
 - Extension of PDU Set and multi-modality for localized service delivery
 - Local compute/rendering offloading to reduce motion-to-photon latency in AR/VR for power and resource constrained devices.
 - Localized immersive FoV/foveated streaming
 - Accurate Field of View (FoV) position for 360 experience
 - Integrate other applications, such as virtual goods, virtual participation of avatars and conversational streams.
 - 3GPP system to provide security and authentication for tethered services.
- Mobility introduces service interruptions as it takes place at cell edge where capacity is constrained

Proposals (Study + Feature)

Possible architectural and functional enhancements to support XR services

- Whether and how D2D connection (e.g., via SL or tethering) can be leveraged for localized compute/rendering offloading in order to reduce motion-to-photon latency for power and resource constrained devices.
- Whether and how 5GS authenticates/authorizes tethered devices for localized compute/rendering offload.
- Whether and how the 5GS QoS framework can be enhanced to distribute tracking (position/motion/pose/gesture), sensor and remote user representation information for localized scene rendering at the remote device.
- Whether and how 5GC can provide assistance information to 3rd party to support metaverse services.
- Support pre-emptive rate control enhancement beyond L4S.

Energy Efficiency as a Service

🌿 Motivation

- Current 5G focus on satisfying user experience and achieving energy efficiency at the same time.
- Energy efficiency as a service allows users to select proper energy efficiency criteria as well as other QoS parameters.
 - Support energy efficiency criteria (e.g., low energy usage, high renewable energy ratio etc.) as part of communication service to user and application services.
 - EE-aware service
 - Provide mechanisms for information exposure on systematic energy consumption or level of energy efficiency via 5GS.
 - Tracking (Identification, monitoring and exposure) of energy source in a finer granularity (e.g., per network node).

🌿 Proposals (Study only)

- Study the possible architectural and functional enhancements to support monitoring/exposure of EE information in 5GS.
- Study the possible architectural and functional enhancements in 5GS
 - to support EE-aware subscription policies (e.g. for a dedicated NPN or a network slice),
 - to support different EE modes of NFs with dynamic changes (based on pre-configured policy with 3rd party), and charging mechanisms considering different EE modes of NFs
 - to operate 5GS under trade-offs between EE and QoS
 - to enhance Alternative QoS Profile framework based on EE

NOTE: No UE impact expected

System Arch. enablers for AI/ML App.

📶 Motivation

- Remaining issues from Rel-18
 - 5GC Information Exposure to UE
- Support of distributed AI/ML App. training and inference using direct device connection
- The distributed AI/ML App. training and inference can be leveraged for AI/ML App. Federated Learning Operation

📶 Proposals (Study + Feature)

- Whether (and how) to support exposing 5GC Information to the UE to assist in distributed AI/ML App. training and inference
- Security and privacy aspects on exposing AI/ML App. data via SL to third party or exposing 5GC information to the UE.
- Possible enhancements (if any) to existing SL procedures to
 - support distributed AI/ML App. training and inference
- Possible enhancements (if any) to existing SL procedures to
 - expose AI/ML App. Data via SL to a third party Application.

ATSSS-Ph4: Dual Steer (TN xor NTN)

Motivation

- TN and NTN coverage can complement /supplement each other
 - Complementary coverage: reduces areas of no coverage
 - Supplementary coverage: TN coverage offers higher user experience than NTN (using both concurrently offers no substantial benefit)
- Although TR 22.841 addresses all possible combinations the following scenarios are the most useful and simple
 - TN xor NTN: use any coverage available
 - TN and NTN: use TN
- TR22.841 addresses PLMNs and NPNs however
 - NPN support for NTN has *never* been discussed or studied
 - Focusing on PLMNs is therefore preferred
- TR22.841 restricts to single subscription (single SIM scenario)
- NOTE: ATSSS R16 ~ R18
 - R16: Concurrent (1) 3GPP + (1) n3GPP access (split/switch/steer)
 - Single PLMN; different PLMNs (single subscription) with Home-routing
 - R17: Concurrent (1) 3GPP access EPC + (1) n3GPP access 5GC (split/switch/steer)
 - Single PLMN; different PLMNs (single subscription) with Home-routing
 - R18: MP-QUIC + (2) n3GPP access (switch)
 - Single PLMN; different PLMNs (single subscription) with Home-routing

Proposals (Study + Feature)

- Gap analysis for ATSSS to support traffic steering/ switching between concurrent (max 1) 3GPP TN and (max 1) NTN access (NR only) and no N3GPP access, incl.
 - How the registration to each access is triggered/maintained/released
 - Definition and handling of MA-PDU Session in the target scenario
 - Incl. MA-PDU Session establishment / modification / release
 - Incl. handling depending on registration status (one / two reg)
 - How session continuity is supported between the two accesses
 - Traffic switching/steering and associated changes to ATSSS rules
 - Assumption:
 - With Single PLMN or different PLMNs (single subs.), home-routed
 - NR access only i.e. TN NR, NTN NR
- RAN WGs feedback on potential AS considerations required

Ambient IoT

Motivation

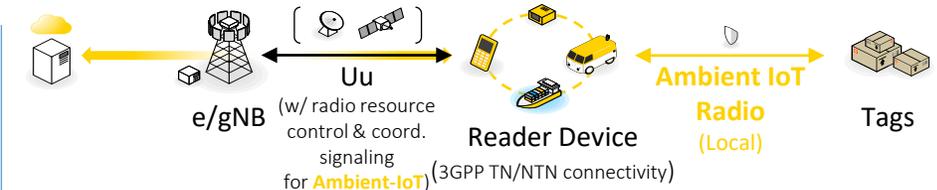
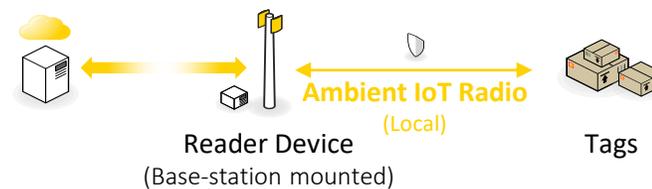
- Tags can remain as simple as possible i.e. their behavior is agnostic to the deployment scenario itself
 - Tags need not be UEs
- System impact is minimal i.e. focusing on integrating and managing the Reader Device in the system
 - No integration and management of individual Tags in the system
- Very simple low-overhead Tag deployments once a Reader Device is deployed
- Ambient IoT can be deployed in “any” network regardless of the supported (radio) access between the Reader Device and this network

The primary SA2 effort is on

- Integration & management of Reader Devices in the 3GPP system

Proposals (Study only)

- Gap analysis of Ambient IoT as a simple variant (subset) of PIN.
- a Reader device supports
 - PEMC functionality
 - optionally, PEGC functionality
- a Tag is a PINE
 - without PEGC or PEMC functionality
 - without PINE-to-PINE communication functionality
 - without PINE-to-PINE direct or indirection connection
- PINE-to-Network routing is supported
- PINE-to-PINE routing is not supported





Summary

Summary

MediaTek Key areas of interest, SA2, Rel-19

- Top-Tier
 - System Arch. enablers for AI/ML Radio*
 - Further Sidelink Relay Enhancements
 - Further NTN Enhancements
- High-Tier
 - XR Enhancements
 - Energy Efficiency as a Service
- Mid-Tier
 - System Arch. enablers for AI/ML App.*
 - ATSSS-Ph4: Dual Steer (TN xor NTN)
 - Further MEC Enhancements
- Low-Tier
 - Ambient IoT
 - User Identifiers in the 5G System
- *NOTE: Crucial to differentiate scope of enablers for AI/ML Radio from enablers for AI/ML App due to difference in use cases and the scope of requirements.

Rel-19 planning

- Support SA2 Chair endorsed proposal ([S2-2308264](#)).
- The above leads to better management of SA2 workload.
- SA Rel-19 WS to provide clear Guideline to SA2
 - Key initial Directions (of high interest).
 - Above to include top-level objectives when possible.
 - Other Directions identified.
 - Assign moderator(s) per Direction.
 - No Rapporteur information
- SA2 to define SIs/WIs based on Key Directions Set (incl. Objectives, TUs) following moderated discussions.
- SA2 to submit agreed SIs/WIs to subsequent SA Plenary (without Rapporteur Information).
- SA plenary to approve SIs/WIs (also assigning Rapporteurs).
- NOTE: Rel-19 SA Package approval (first part Sep. 2023, final in Dec. 2023).



Thank you!