3GPP TSG-RAN WG4 Meeting #112 R4-2413529

Maastricht, NL, 19th - 23th Aug 2024

Agenda Item: 8.26.1

Source: MediaTek Inc.

Title: Work Plan for Rel-19 IoT NTN ph3

WID/SID: IoT\_NTN\_Ph3-Core

Document for: Approval

# 1 Introduction

In RAN#104 meeting, the “Revised WID on Non-Terrestrial Networks (NTN) for Internet of Things (IoT) Phase 3” has been approved in [1], and the objectives of this WID are listed below.

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| --- |
| * Support of Store&Forward (S&F) satellite operation with full eNB as regenerative payload, therefore:
	+ Define the necessary enhancements into E-UTRAN (network & UE) to support S&F operation for delay-tolerant services [RAN3, RAN2]
		- At least specify necessary enhancements e.g. related to S1 protocol, especially to address the feeder link switch over as needed [RAN3]

Note: Strive to minimise UE impact.Note: Coordination with SA2 (Rel-19 SA2 led Sat-Arch ph3 SI) is needed on the detail requirements (e.g. traffic type, or QoS parameters for S&F), network architecture (e.g. whether consider (partial) core network on satellite) etc.; further coordination with CT1 might be required* Support of Capacity enhancements for uplink
	+ Study then specify, if beneficial, enhancements to enable multiplexing of multiple UEs (e.g. up to the min of 4 and the maximum allowed by the existing UL and DL signalling) in a single 3.75 kHz or 15 kHz subcarrier via orthogonal cover codes (OCC) for NPUSCH format 1 and NPRACH [RAN1, RAN2, RAN4]
		- Multi-tone support for 15 kHz SCS should also be considered
		- Specify necessary signalling, if needed
		- Update RF requirements accordingly, if needed

Note: Impact of impairment shall be taken into account* + Study and specify, if beneficial the following enhancements to reduce the necessary uplink and downlink signaling to complete an Early Data Transmission (EDT) transaction [RAN2]:
		- Msg3 transmission without msg1/ Random Access Response (RAR)
		- Efficient delivery (reduced overhead) of msg4 / RRCEarlyDataComplete
		- Study and specify RRM requirement, if identified [RAN4]
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In this contribution, we provide the work plan for Rel-19 IoT NTN work item for RAN1, 2, 3 and 4.

# 2 Work Plan

Based on the work plan from Rel-19 IoT NTN Rapporteur (MediaTek) in [2], our RAN4 can follow the guidance as below.

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| --- | --- | --- | --- |
| **Month** | **Meeting#** | **#TU** | **Work plan** |
| **2024 Q3** | RAN1#118 | 0.5 | Capacity enhancements for uplink* Continue discussion on the benefits and the options to use OCC on NPUSCH and NPRACH
 |
|  | RAN2#127 | 1 | Capacity enhancements for uplink* Continue discussion on the benefit and options for EDT enhancement
* Study the RAN2 impacts on usage of OCC (coordinate with RAN1 if needed)

S&F operation for delay-tolerant services* Study on potential RAN2 impact due to S&F operation (coordinate with CT1/SA2/RAN3 if needed)
 |
|  | RAN3#125 | 0.5 | * Discuss RAN3 work plan

S&F operation for delay-tolerant services* Initial discussion on necessary enhancements for S&F
 |
|  | RAN4#112 | 0.5 (RD)0.5 (RF) | * General aspect: agree work plan.
* Identify items for discussion on possible RAN4 RF/RRM core requirement impact.
* Evaluation on RF core requirements impacts for PUSCH format 1 with OCC schemes.
	+ Decide whether update UE requirements
	+ Discuss whether update SAN requirements
* If applicable, make agreements on UE RF impact evaluation result for PUSCH with OCC schemes.
 |
| **2024 Q4** | RAN1#118bis | 0.5 | Capacity enhancements for uplink* Down-select the options for the design of OCC on NPRACH
 |
|  | RAN2#127bis | 1 | Capacity enhancements for uplink* Continue discussion on the benefit and options for EDT enhancement
* Study the RAN2 impacts on usage of OCC (coordinate with RAN1 if needed)

S&F operation for delay-tolerant services* Study on potential RAN2 impact due to S&F operation (coordinate with CT1/SA2/RAN3 if needed)
 |
|  | RAN3#125bis | 0 |  |
|  | RAN4#112bis | 0.5 (RD)0.5 (RF) | * Evaluate RAN4 RF/RRM core requirement impact
	+ Further evaluation on SAN RF requirements impacts for PUSCH with OCC schemes.
	+ Evaluation on UE RF requirements impacts for PRACH with OCC schemes for 3.75kHz, 15kHz tone and multiple tones.
	+ Evaluation on SAN RF requirements impacts for PRACH with OCC schemes.
* If applicable, make agreements on SAN RF impact evaluation result for PUSCH with OCC schemes.
 |
|  | RAN1#119 | 0.5 | Capacity enhancements for uplink* Discuss on further details for usage of OCC on NPUSCH and NPRACH
 |
|  | RAN2#128 | 1 | Capacity enhancements for uplink* Conclude on baseline procedure of EDT enhancement
* Study the RAN2 impacts on usage of OCC (coordinate with RAN1 if needed)

S&F operation for delay-tolerant services* Study on potential RAN2 impact due to S&F operation (coordinate with CT1/SA2/RAN3 if needed)
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|  | RAN3#126 | 0.5 | S&F operation for delay-tolerant services* Continue discussion on necessary enhancements for S&F (coordinate with CT1/SA2/RAN2 if needed)
 |
|  | RAN4#113 | 0.5 (RD)0.5 (RF) | * Continue evaluating RAN4 RF/RRM core requirement impact.
	+ Further evaluation on UE RF requirements impacts for PRACH with OCC schemes for 3.75kHz, 15kHz tone and multiple tones.
	+ Further evaluation on SAN RF requirements impacts for PRACH with OCC schemes.
* If applicable, make agreements on UE RF impact evaluation result for PRACH with OCC schemes.
 |
| **2025 Q1** | RAN1#120 | 0.5 | * Further stage-3 works (draft CR, RRC Parameter list) on usage of OCC on NPUSCH and NPRACH
 |
|  | RAN2#129 | 1 | Capacity enhancements for uplink* Stage-3 details discussion for EDT enhancement and usage of OCC
* Identify the RAN2 impacts on usage of OCC (coordinate with RAN1 if needed)

S&F operation for delay-tolerant services* Identify the RAN2 impact due to S&F operation (coordinate with CT1/SA2/RAN3 if needed)
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|  | RAN3#127 | 0.5 | S&F operation for delay-tolerant services* Continue discussion on necessary enhancements for S&F (coordinate with CT1/SA2/RAN2 if needed)
* Endorse draft CRs
 |
|  | RAN4#114 | 0.5 (RD)0.5 (RF) | * Continue evaluating RAN4 RF/RRM core requirement impact
	+ Further evaluation on SAN RF requirements impacts for PRACH with OCC schemes.
* If applicable, make agreements on SAN RF impact evaluation result for PRACH with OCC schemes.
* Identify whether update UE feature list
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| **2025 Q2** | RAN1#120bis | 0.5 | * Further stage-3 works (draft CR, RRC Parameter list) on usage of OCC on NPUSCH and NPRACH
* Initial discussion on UE feature list
 |
|  | RAN2#129bis | 1 | * Further stage-3 works (draft CRs) on UL capability enhancement and S&F operation.
 |
|  | RAN3#127bis | 0 |  |
|  | RAN4#114bis | 0.5 (RD)0.5 (RF) | * Complete evaluating all RAN4 RF/RRM core requirements impact and make conclusion.
* LS R2 on the UE feature list, if any
* Initial draft of corresponding CRs
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|  | RAN1#121 | 0.5 | * Approve corresponding CRs
* Finalize RRC parameter list and UE feature list
 |
|  | RAN2#130 | 1 | * Remaining stage-3 details discussion for draft CR endorsement
* UE Capability discussion
 |
|  | RAN3#128 | 0.5 | * Conclude the remaining details for S&F operation
* Endorse draft CRs
 |
|  | RAN4#115 | 0.25 (RD)0.5 (RF) | * Finalisation of the remaining issues if any.
* Endorse corresponding draft CRs if any
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| **2025 Q3** | RAN1#122 | 0 | * Note: R1 in maintenance phase.
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|  | RAN2#131 | 1 | * Conclude on UE Capability
* Approve corresponding CRs
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|  | RAN3#129 | 0.5 | * Approve corresponding CRs
 |
|  | RAN4#116 | 0.25 (RD)0.5 (RF) | * Approve corresponding CRs
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**Proposal 1:** **RAN4 to take above work plan into consideration.**

# 3 Conclusion

**Proposal 1: RAN4 to take above work plan into consideration.**

# References

1. RP-241624,Revised WID on Non-Terrestrial Networks (NTN) for Internet of Things (IoT) Phase 3, MediaTek Inc. (Rapporteur)
2. R2-2402941, Work Plan for Rel-19 IoT NTN, MediaTek Inc. (Rapporteur)