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] |

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) |
|  | 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) |
|  | 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 |
| **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 |
|  | 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 |
| **2025 Q3** | RAN1#122 | 0 | * Note: R1 in maintenance phase. |
|  | RAN2#131 | 1 | * Conclude on UE Capability * Approve corresponding CRs |
|  | RAN3#129 | 0.5 | * Approve corresponding CRs |
|  | RAN4#116 | 0.25 (RD)  0.5 (RF) | * Approve corresponding CRs |

**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)