

[eMBB] NTN NR Enhancements

eMBB consumer

MIMO

- CSI enh.
- BM: [subject to R17]
- Stationary: 8Rx, overhead redux
- UL sub-band precod.
- UL 4+ layers

DC/CA Enh.

- X-carrier HARQ: feedback & re-Tx
- Fast re-Tx split bearer
- Temporal RS PScell act
- Scalable x-carrier sch.

XR/CG Enh.

- QoS+, x-layer opt.

MBS

- SFN+
- QoS+ (Tput, reliab.)
- TV (ATSC3.0 ref)

NW Topology

Sidelink LLeMBB

- SL-U esp. <7GHz, FR2
- Low latency 1Gbps
- SL-U RedCap

Sidelink Relay

- U2U relay
- UE scheduling UE
- mPath, mHop
- Mobility (Remote, Relay)
- Network coding

Smart Repeaters

- Beamforming
- Interf. Mgmt (T/F DD)
- Integration (UE authorization)

NTN Evolution

NTN NR

- Mobility
- Regenerative arch
- HD-FDD, VoNR, MBS
- R17 leftovers

NTN IoT

- Mobility (connected)
- R17 leftovers

SID Spectr. sharing

- Study scenarios, target spectrum and regulation status

Long-term explor.

SID AI/ML integr.

- NG-RAN/AS integrat.
- DMRS ch. est., Rx noise suppress, CSI-RS overhead, CSI feedback
- (UE-based) Mobility predict., Pos. enh.
- NW functions (load balancing, radio resource planning..)

SID AI traffic

- Traffic and arch.
- Overhead optim.

SID >71GHz

- Spectrum charac.

Common tech.

[FR2] Mobility

- L1/L2 trig. CHO
- Inter-/intra-cell beam switching delay redux
- RRC DAPS HO mPanel

System Energy

- DCI-based pwr sav mTRP and mPanel
- gNB/TRP dormancy (UE -trig. / -imposed)
- Eval. Methodology (Pwr. Cons. Models)

POS (NR, SL, RedCap)

- cm-level (Tx + meas related to signal ϕ)
- SL (-based, -assisted)
- RedCap UE
- R17 leftovers

SID gNB Full Duplex

- Partitioning, scenarios, interf.

Verticals

URLLC

- DL control efficiency
- NR-U enh

RedCap

- PA-less
- (POS)
- NO LPWA

(UAV: neutral)

| | | | | | |
|------------------------------|--|--|--|---|---|
| eMBB | MIMO | DC/CA Enh. | Sidelink LLeMBB | NTN NR | MBS |
| | <ul style="list-style-type: none"> CSI enh. BM: [subject to R17] Stationary: 8Rx, overhead redux UL sub-band precod. UL 4+ layers | <ul style="list-style-type: none"> X-carrier HARQ: feedback & re-Tx Fast re-Tx split bearer Temporal RS PScell act Scalable x-carrier sch. | <ul style="list-style-type: none"> SL-U esp. <7GHz, FR2 Low latency 1Gbps SL-U RedCap | <ul style="list-style-type: none"> R17 leftovers Mobility Regenerative arch VoNR, MBS, HD-FDD | <ul style="list-style-type: none"> SFN+ QoS+ (Tput, reliab.) TV (ATSC3.0 ref) <p>(may also be seen as non-eMBB)</p> |
| Non-eMBB | URLLC | RedCap | | NTN IoT | |
| | <ul style="list-style-type: none"> DL control efficiency NR-U enh | <ul style="list-style-type: none"> PA-less (POS) NO LPWA | | <ul style="list-style-type: none"> R17 leftovers Mobility (connected) | (UAV: neutral) |
| X-areas New areas | System Energy | Sidelink Relay | POS (NR, SL, RedCap) | <i>SID</i> NTN f sharing | <i>SID</i> AI/ML integr. |
| | <ul style="list-style-type: none"> DCI-based pwr sav mTRP and mPanel gNB/TRP dormancy (UE -trig. / -imposed) Eval. Methodology (Pwr. Cons. Models) | <ul style="list-style-type: none"> U2U relay UE scheduling UE mPath, mHop Mobility (Remote, Relay) Network coding | <ul style="list-style-type: none"> cm-level (Tx + meas related to signal ϕ) SL (-based, -assisted) RedCap UE R17 leftovers | <ul style="list-style-type: none"> Study scenarios, target spectrum and regulation status | <ul style="list-style-type: none"> NG-RAN/AS integrat. DMRS ch. est., Rx noise suppress, CSI-RS overhead, CSI feedback (UE-based) Mobility predict., Pos. enh. NW functions (load balancing, radio resource planning..) |
| | [FR2] Mobility | Smart Repeaters | | <i>SID</i> gNB Full Duplex | <i>SID</i> AI traffic |
| | <ul style="list-style-type: none"> L1/L2 trig. CHO Inter-/intra-cell beam switching delay redux RRC DAPS HO mPanel | <ul style="list-style-type: none"> Beamforming Interf. Mgmt (T/F DD) Integration (UE authorization) | | <ul style="list-style-type: none"> Partitioning, scenarios, interf. | <ul style="list-style-type: none"> Traffic and arch. Overhead optim. |

Introduction

- Release-17 is the first release for NTN NR with minimum essential functionality for a working NTN NR system
- Release 18 should
 - Prioritize the service aspects of NTN NR with minimum additional enhancements to Release-17 NTN NR functionalities as needed: enhancements for VoNR should be studied (due to e.g. UL link budget limitation) and MBS support defined.
 - Enable single device availability to cover all NTN bands (half-duplex FDD)

NTN NR Enhancements

RAN1-led

Increase the viability and versatility of NTN NR access: mobility, coverage, services
 Enable single device availability to cover all NTN bands (half-duplex FDD)

Objective I: Rel-17 Leftovers [RAN1, 2]

[subject to R17 status]

Objective II: Mobility enhancements [RAN2, 1]

[subject to R17 status]

- Scope would depend on whether Release-17 NTN NR can significantly benefit from additional enhancements in some scenarios and use cases

Objective III: Regenerative architecture [RAN3, 2]

- Support very dense LEO satellite deployment where the number of LEO satellite greatly outnumbers the number of GateWay stations on the ground, and also where it is not possible to locate GateWay stations – i.e. in the middle of vast oceans

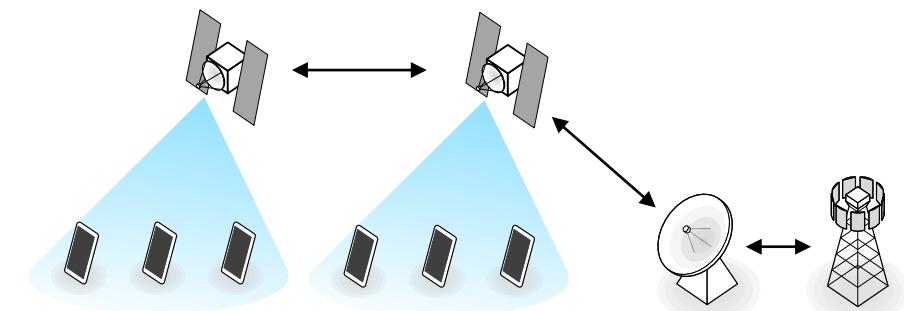
Objective IV: HD-FDD [RAN1, 2]

- Re-use RedCap work while avoiding BW/antenna restrictions

Objective V: VoNR Enh., MBS support [RAN1, 2]

| 3GPP TUs (Total w/ 9 meetings) | | | |
|--------------------------------|------|------|------|
| RAN1 | RAN2 | RAN3 | RAN4 |
| TBD | TBD | TBD | TBD |

SA/CT Dependency: Yes



Thank You!

MediaTek TDocs to RAN Rel-18 Workshop

| | | |
|----------------------------|---------------------------------------|---------------|
| RWS-210092 | MediaTek Views on Rel-18 content | MediaTek Inc. |
| RWS-210093 | [eMBB] MIMO Enhancements | MediaTek Inc. |
| RWS-210094 | [eMBB] DC/CA Enhancements | MediaTek Inc. |
| RWS-210095 | [eMBB] XR/CG Enhancements | MediaTek Inc. |
| RWS-210096 | [eMBB/Other] MBS Enhancements | MediaTek Inc. |
| RWS-210097 | [eMBB] Sidelink Enhancements - LLeMBB | MediaTek Inc. |
| RWS-210100 | [eMBB] NTN NR Enhancements | MediaTek Inc. |
| RWS-210101 | [non-eMBB] NTN IoT Enhancements | MediaTek Inc. |
| RWS-210108 | [non-eMBB] URLLC Enhancements | MediaTek Inc. |
| RWS-210109 | [non-eMBB] NR RedCap Enhancements | MediaTek Inc. |
| RWS-210098 | [x-area] Sidelink Relay Enhancements | MediaTek Inc. |
| RWS-210099 | [x-area] Smart Repeaters Enhancements | MediaTek Inc. |
| RWS-210102 | [x-area] NTN/TN Spectrum Sharing | MediaTek Inc. |
| RWS-210103 | [x-area] AI/ML Integration | MediaTek Inc. |
| RWS-210104 | [x-area] AI/ML Traffic | MediaTek Inc. |
| RWS-210105 | [x-area] Mobility Enhancements | MediaTek Inc. |
| RWS-210106 | [x-area] System Energy Enhancements | MediaTek Inc. |
| RWS-210107 | [x-area] Positioning Enhancements | MediaTek Inc. |
| RWS-210197 | [x-area] Sub-band Full-duplex for gNB | MediaTek Inc. |
| RWS-210110 | Draft WID: System Energy Enhancements | MediaTek Inc. |
| RWS-210111 | Draft WID: Mobility Enhancements | MediaTek Inc. |
| RWS-210112 | Draft WID: DC/CA Enhancements | MediaTek Inc. |
| RWS-210113 | Draft WID: NTN IoT Evolution | MediaTek Inc. |