

# [non-eMBB] NTN IoT 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  $\phi$ )
- 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)

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

# Introduction

- Release-17 is the first 3GPP release for NTN IoT supporting minimum essential functionality for a working NTN IoT system
- Release 18 should prioritize NTN IoT *minimum* additional enhancements to Release-17 NTN IoT functionalities as needed in terms of data rate, long connection and mobility

# NTN IoT Enhancements

## RAN1-led

Additional enhancements for NTN IoT access: data rates, long connection, mobility

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

*[subject to R17 status]*

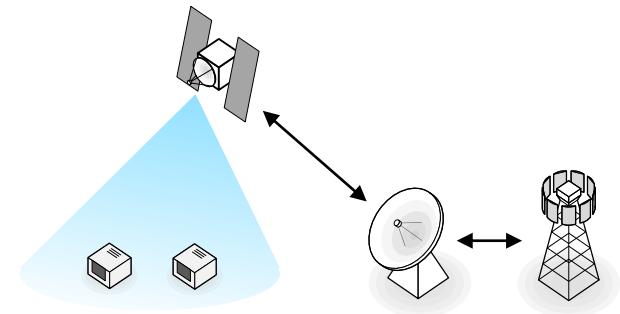
- HARQ enhancements to support higher UE data rates
- Enhancements to support long connection times

### Objective II: Mobility enhancements [RAN2, 1]

- Connected mode mobility: Scope depends on whether Release-17 NTN IoT can significantly benefit from additional enhancements in some scenarios and use cases

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

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