**3GPP TSG RAN Meeting #104 draft RP-241632**

**Shanghai, China, June 17-20, 2024**

**Source: Moderator (RAN4 Vice Chair, China Telecom)**

**Title: Moderator's summary for discussion on R19-RAN4-OtherSpectrumItem\_Part2**

**Agenda Item: 9.1.5**

**Document for: Information**

1. **Introduction**

This document summarizes following RAN4 R19 new non-basket spectrum proposals under AI 9.1.5:

|  |  |  |  |
| --- | --- | --- | --- |
| LTE new bands | RP-241518 -> RP-241619 | New WID: Introduction of LTE FDD band in 1800 – 1830 MHz for Canada | NOVAMINT, Sequans, Semtech, Telit, Ubiik |
| RP-241519 | Motivation for introduction of LTE FDD band in 1800 – 1830 MHz for Canada | NOVAMINT, Sequans, Semtech, Telit, Ubiik, EDF, EUTC |
| NR new bands | RP-240943 -> RP-241627 | New WID on introduction of NR bands n87 and n88 | Nokia |
| RP-241050 | New WID on introduction of NR band n68 | Ericsson Limited |
| RP-241216 -> RP-241605 | Introduction of the 1.4 GHz Band | MidWave Wireless |
| RP-241511 | Motivation of introduction of NR based AeroMacs system | ZTE Corporation, Sanechips |
| RP-241512 | New WID on NR based AeroMACS | ZTE Corporation |
| Other spectrum related | RP-241256 | Discussion on SUL for 2.6 GHz TDD band (n41) and 4.9 GHz TDD band (n79) | Huawei, HiSilicon |
| RP-241312 | New WID on NR power class 2 RedCap (Reduced Capability) UE in FR1 | China Telecom, MediaTek |
| RP-241313 | Motivation on NR PC2 RedCap UE (Practical network test for RedCap) | China Telecom |

1. **Topics**

### **2.1 LTE FDD band in 1800 - 1830 MHz for Canada**

#### Discussion on the objective

Moderator: Based on the online discussion, the yellow highlighted part need to be discussed further.

Objective of SI or Core part WI or Testing part WI

The objectives of core part of this work item include:

* Specify a new LTE FDD operating band operating in the range 1800-1830 MHz
	+ Specify in a Release independent manner the characteristics of the new band:
		- UL: 1800 – 1810 MHz and DL: 1820 – 1830 MHz
		- Band numbering and RF characteristics
		- Support the following channelization: 10, 5, 3 and 1.4 MHz
		- Support of Full Duplex operation
	+ Define maximum transmit power for both eNB and UE in compliance with the regulations
	+ Update the related 3GPP E-UTRA technical specifications to include support for the new band
* Note: the definition of this band will not impose new requirements on existing bands
* Specify and modify core requirements (e.g. UE power class, Additional Maximum Power Reduction (A-MPR), Reference sensitivity, blocking performance) and specifications for the new LTE band to support UE categories 1-4, M1&M2 and/or UE NB1&NB2 in a Release-independent way.

Objective of Performance part WI

Update the related 3GPP E-UTRA technical specifications to include support for the new band, if necessary.

Specify and modify performance requirements and specifications for the new LTE band to support UE categories 1-4, category NB1&NB2 and category M1&M2 in a release-independent way.

**NOVAMINT Updated Proposal:**

Objective of Core part WI:

* Specify a new LTE FDD operating band operating in the range 1800-1830 MHz
	+ Specify in a Release independent from Release 13 the characteristics of the new band:
		- UL: 1800 – 1810 MHz and DL: 1820 – 1830 MHz
		- Band numbering and RF characteristics
		- Support the following channelization: 10, 5, 3 and 1.4 MHz
		- Support of Full Duplex operation
	+ Define Wide Area eNB class
	+ Define PC3 UE power class
	+ Update the related 3GPP E-UTRA technical specifications to include support for the new band

Note: the definition of this band will not impose new requirements on existing bands

* Specify and modify core requirements (e.g. UE power class, Additional Maximum Power Reduction (A-MPR), Reference sensitivity, blocking performance) and specifications for the new LTE band to support UE categories M1&M2 and/or UE NB1&NB2 in a Release-independent way from Rel 13.

Objective of Performance part WI

Update the related 3GPP E-UTRA technical specifications to include support for the new band, if necessary.

Specify and modify performance requirements and specifications for the new LTE band to support UE categories category NB1&NB2 and category M1&M2 in a release-independent way from Rel 13.

#### Discussion on the New/Affected specifications:

**NOVAMINT Updated Proposal:**

|  |
| --- |
| **New specifications** *{One line per specification. Create/delete lines as needed}* |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Remarks |
|  |  |  |  |  |  |

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| Affected existing specifications [None in the case of Study Items] |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
| 36.101 | Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception | RAN#107 | Core UE part |
| 36.133 | Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management | Same as above | Core part |
| 36.104 | Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception | Same as above | Core BS part |
| 36.141 | Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing | Same as above | Perf. BS part |
|  |  |  |  |
|  |  |  |  |
| 36.307 | Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements on User Equipments (UEs) supporting a release-independent frequency band | Same as above | Core UE part |

Outcome of offline discussion:

### **2.2 NR bands n87 and n88**

#### Discussion on the objective

Moderator: Based on the online discussion, the yellow highlighted part need to be discussed further.

Objective of Core part WI

* Standardization of two new NR FDD bands n87 and n88 in the 410 MHz range based on
	+ E-UTRA band 87 (UL 410 ‑ 415, DL 420 – 425 MHz)
	+ E-UTRA band 88 (UL 412 ‑ 417, DL 422 – 427 MHz)
* During the work evaluate potential impacts of NR. If any impact on performance or any changes w.r.t. existing requirements of band 87 and 88. are found, address those during the work.
* Specify band numbering (i.e. n87 and n88) system parameters and RF characteristics for 3 and 5 MHz channel bandwidth of the new bands, with xxx kHz SCS.
	+ Only symmetric bandwidths are supported.
* Address potential BS and UE co-existence issues, if any.
* Specify the UE RF requirements for the new bands based on 2 Rx operation.
* Update the related technical specifications to include support for the new band

Note: These 2 new NR bands will be introduced in a REL-independent way starting from REL-15.

Objective of Performance part WI

The objectives of the Performance part work item are to

* Update the related 3GPP NR technical specifications to include support for the new band e.g. BS conformance testing and RRM test cases.

#### Discussion on the New/Affected specifications

Remove OTA specification?

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| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 36.101 | Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception | TSG-RAN#106 | Core Part |
| 36.104 | Evolved Universal Terrestrial Radio Access (E-UTRA);Base Station (BS) radio transmission and reception | TSG-RAN#106 | Core Part |
| 37.104 | E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception – Band n87 and n88 specific requirements/changes | TSG-RAN#106 | Core Part |
| 37.105 | Active Antenna System (AAS) Base Station (BS) transmission and reception | TSG-RAN#106 | Core Part |
| 38.101-1 | NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone – Band n87 and n88 specific requirements/changes | TSG-RAN#106 | Core part |
| 38.104 | NR; Base Station (BS) radio transmission and reception – Band n87 and n88 specific requirements/changes | TSG-RAN#106 | Core part |
| 38.106 | NR repeater radio transmission and reception | TSG-RAN#106 | Core part |
| 38.174 | NR; Integrated Access and Backhaul (IAB) radio transmission and reception | TSG-RAN#106 | Core part |
| 38.307 | NR; Requirements on User Equipments (UEs) supporting a release-independent frequency band | TSG-RAN#106 | Core part |
| 36.141 | Evolved Universal Terrestrial Radio Access (E-UTRA);Base Station (BS) conformance testing | TSG-RAN#106 | Perf Part |
| 37.141 | E-UTRA, UTRA and GSM/EDGE;Multi-Standard Radio (MSR) Base Station (BS) conformance testing | TSG-RAN#106 | Perf Part |
| 37.145-1 | Active Antenna System (AAS) Base Station (BS)conformance testing;Part 1: Conducted conformance testing | TSG-RAN#106 | Perf Part |
| 37.145-2 | Active Antenna System (AAS) Base Station (BS)conformance testing;Part 2: radiated conformance testing | TSG-RAN#106 | Perf Part |
| 38.115-1 | NR; Repeater conformance testing - Part 1: Conducted conformance testing | TSG-RAN#106 | Perf part |
| 38.141-1 | NR; Base Station (BS) conformance testingPart 1: Conducted conformance testing – Band n87 and n88 specific requirements/changes | TSG-RAN#106 | Perf part |
| 38.141-2 | NR; Base Station (BS) conformance testingPart 2: Radiated conformance testing – Band n87 and n88 specific requirements/changes | TSG-RAN#106 | Perf part |
| 38.176-1 | NR; Integrated Access and Backhaul (IAB) conformance testing; Part 1: Conducted conformance testing | TSG-RAN#106 | Perf part |
| 38.176-2 | NR; Integrated Access and Backhaul (IAB) conformance testing; Part 2: Radiated conformance testing | TSG-RAN#106 | Perf part |
| 38.133 | NR; Requirements for support of radio resource management – Band n87 and n88 specific requirements/changes | TSG-RAN#106 | Perf part |
| 38.307 | Requirements on User Equipments (UEs) supporting a release-independent frequency band | TSG-RAN#106 | Core part |

### **2.3 NR band n68**

#### Discussion on the objective

Moderator: Based on the online discussion, the yellow highlighted part need to be discussed further.

Objective of SI or Core part WI or Testing part WI

The core objectives of this WI are:

* Specify a new NR FDD operating band n68 (the uplink band for this new band is 30 MHz, 698-728 MHz; the downlink band is 30 MHz, 753-783 MHz; the duplex gap is 25 MHz, 728-753 MHz) to support subcarrier spacing of 15 kHz for 5 MHz channel bandwidth, and subcarrier spacing of 15 kHz and 30 kHz for 10 and 15 MHz channel bandwidths.
	+ Only symmetric bandwidths are supported.
* Specify system parameters and RF characteristics of the new band.
* Address potential BS and UE co-existence issues, if any.
* Update the related technical specifications to include support for the new band
* Specify the UE RF requirements for the new bands based on 2 Rx operation.

Note: This new NR band will be introduced in a REL-independent way starting from REL-15.

Note: Only co-location/co-existence core requirements shall be specified in TS 37.105.

Objective of Performance part WI

The objectives of the Performance part work item are to

* Specify a new NR FDD operating band n68 to include the performance requirements with supported subcarrier spacing of 15 kHz for 5 MHz channel bandwidth, and subcarrier spacing of 15 kHz and 30 kHz for 10 and 15 MHz channel bandwidth.

Note: Only co-location/co-existence performance requirements shall be specified in TS 38.141-2, 37.145-1 and 37.145-2.

#### Discussion on the New/Affected specifications

LTE spec are impacted or not?

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| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 36.101 | Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception | TSG-RAN#106 | Core Part |
| 36.104 | Evolved Universal Terrestrial Radio Access (E-UTRA);Base Station (BS) radio transmission and reception | TSG-RAN#106 | Core Part |
| 37.104 | E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception – Band n68 specific requirements/changes | TSG-RAN#106 | Core Part |
| 37.105 | Active Antenna System (AAS) Base Station (BS) transmission and reception | TSG-RAN#106 | Core Part |
| 38.101-1 | NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone – Band n87 and n88 specific requirements/changes | TSG-RAN#106 | Core part |
| 38.101-5 | NR; User Equipment (UE) radio transmission and reception; Part 5: Satellite access Radio Frequency (RF) and performance requirements | TSG-RAN#106 | Core part |
| 38.104 | NR; Base Station (BS) radio transmission and reception – Band n68 specific requirements/changes | TSG-RAN#106 | Core part |
| 38.106 | NR repeater radio transmission and reception | TSG-RAN#106 | Core part |
| 38.174 | NR; Integrated Access and Backhaul (IAB) radio transmission and reception | TSG-RAN#106 | Core part |
| 38.307 | NR; Requirements on User Equipments (UEs) supporting a release-independent frequency band | TSG-RAN#106 | Core part |
| 36.141 | Evolved Universal Terrestrial Radio Access (E-UTRA);Base Station (BS) conformance testing | TSG-RAN#106 | Perf Part |
| 37.141 | E-UTRA, UTRA and GSM/EDGE;Multi-Standard Radio (MSR) Base Station (BS) conformance testing | TSG-RAN#106 | Perf Part |
| 37.145-1 | Active Antenna System (AAS) Base Station (BS)conformance testing;Part 1: Conducted conformance testing | TSG-RAN#106 | Perf Part |
| 37.145-2 | Active Antenna System (AAS) Base Station (BS)conformance testing;Part 2: radiated conformance testing | TSG-RAN#106 | Perf Part |
| 38.115-1 | NR; Repeater conformance testing - Part 1: Conducted conformance testing | TSG-RAN#106 | Perf part |
| 38.141-1 | NR; Base Station (BS) conformance testingPart 1: Conducted conformance testing – Band n68 specific requirements/changes | TSG-RAN#106 | Perf part |
| 38.141-2 | NR; Base Station (BS) conformance testingPart 2: Radiated conformance testing – Band n68 specific requirements/changes | TSG-RAN#106 | Perf part |
| 38.176-1 | NR; Integrated Access and Backhaul (IAB) conformance testing; Part 1: Conducted conformance testing | TSG-RAN#106 | Perf part |
| 38.176-2 | NR; Integrated Access and Backhaul (IAB) conformance testing; Part 2: Radiated conformance testing | TSG-RAN#106 | Perf part |
| 38.133 | NR; Requirements for support of radio resource management – Band n68 specific requirements/changes | TSG-RAN#106 | Perf part |
| 38.307 | Requirements on User Equipments (UEs) supporting a release-independent frequency band | TSG-RAN#106 | Core part |

### **2.4 NR 1.4 GHz Band**

#### Discussion on the objective

Moderator: Based on the online discussion, the yellow highlighted part need to be discussed further.

Objective of SI or Core part WI or Testing part WI

The objective of this work item is to:

* Specify a new NR FDD operating band for the US 1.4 GHz allocation spanning 1390-1395 MHz for UL and 1432-1435 MHz for DL.
* Specify band numbering and RF characteristics of the 1.4 GHz band.
* Specify 3 MHz channel BW for DL and UL in the 1.4 GHz band, with 15kHz SCS.
* Note: This new NR band will be introduced in a REL-independent way starting from REL-15.

Objective of Performance part WI

Define performance requirements for a new NR FDD operating band for the US 1.4 GHz allocation.

#### Discussion on the New/Affected specifications

Any comments?

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| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 38.101-1 | NR; UE Radio transmission and reception | RAN#107 | Core UE part |
| 38.133 | NR; Requirements for support of radio resource management | RAN#107 | Core UE part |
| 38.104 | NR; BS Radio transmission and reception | RAN#107 | Core BS part |
| 36.104 | Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception | RAN#107 | Core BS part |
| 37.104 | Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception | RAN#107 | Core BS part |
| 37.105 | Active Antenna System (AAS) Base Station (BS) transmission and reception | RAN#107 | Core BS part |
| 38.141-1 | NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing | RAN#107 | Perf. BS part |
| 38.141-2 | NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing | RAN#107 | Perf. BS part |
| 36.141 | Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing | RAN#107 | Perf. BS part |
| 37.141 | Multi-Standard Radio (MSR) Base Station (BS) conformance testing | RAN#107 | Perf. BS part |
| 37.145-1 | Active Antenna System (AAS) Base Station (BS) conformance testing; Part 1: conducted conformance testing | RAN#107 | Perf. BS part |
| 37.145-2 | Active Antenna System (AAS) Base Station (BS) conformance testing; Part 2: radiated conformance testing | RAN#107 | Perf. BS part |

### **2.5 NR based AeroMacs system**

#### Discussion on the objective

Moderator: Based on the online discussion, the yellow highlighted part need to be discussed further.

Objective of SI or Core part WI or Testing part WI

Specify core requirements for NR based AeroMACS (Aeronautical Mobile Airport Communication System) system [RAN4]

* To specify two bands: 5091~5150MHz ~~and 5000~5150MHz~~.
	+ Channel bandwidth: 5, 20, 30, 40, 50MHz
	+ Duplex mode: TDD
* To define the RF requirements for BS and UE
* [This new NR will be only used in China.]

Objective of Performance part WI

Specify test procedures for AeroMACS BS conformance testing and conformance requirements [RAN4]

#### Discussion on the New/Affected specifications

Any comments?

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| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| TS 38.104 | NR; Base Station (BS) radio transmission and reception | RAN#109 | Core part |
| TS 38.101-1 | NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone  | RAN#109 | Core part |
| TS 38.133 | NR; Requirements for support of radio resource management | RAN#109 | Core part |
| TS 36.104 | Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception | RAN#109 | Core part |
| TS 37.104 | NR, E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception | RAN#109 | Core part |
| TS 37.105 | Active Antenna System (AAS) Base Station (BS) transmission and reception | RAN#109 | Core part |
| TS 38.174 | NR; Integrated Access and Backhaul (IAB) radio transmission and reception | RAN#109 | Core Part  |
| TS 38.106 | NR repeater radio transmission and reception | RAN#109 | Core Part  |
| TS 38.141-1 | NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing | RAN#111 | Perf part |
| TS 38.141-2 | NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing | RAN#111 | Perf part |
| TS 36.141 | Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing | RAN#111 | Perf part |
| TS 37.141 | NR, E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing | RAN#111 | Perf part |
| TS 37.145-1 | Active Antenna System (AAS) Base Station (BS) conformance testing; Part 1: conducted conformance testing | RAN#111 | Perf part |
| TS 37.145-2 | Active Antenna System (AAS) Base Station (BS) conformance testing; Part 2: radiated conformance testing | RAN#111 | Perf part |
| TS 38.176-1 | NR; Integrated Access and Backhaul (IAB) conformance testing; Part 1: Conducted conformance testing | RAN#111 | Perf part |
| TS 38.176-2 | NR; Integrated Access and Backhaul (IAB) conformance testing; Part 2: Radiated conformance testing | RAN#111 | Perf part |
| TS 38.115-1 | NR; Repeater conformance testing - Part 1: Conducted conformance testing | RAN#111 | Perf part |
| TS 38.115-2 | NR; Repeater conformance testing - Part 2: Radiated conformance testing | RAN#111 | Perf part |

### **2.6 NR PC2 RedCap UE in FR1**

#### Discussion on the objective

Moderator: Based on the online discussion, the yellow highlighted part need to be discussed further.

Objective of SI or Core part WI or Testing part WI

The objectives of the core part are as follows:

* Apply the PC2 RF requirements for non-RedCap UE to RedCap UE, based on 1Tx architecture with 26 dBm PA.
	+ The PC2 RF requirements include: UE maximum output power, Tx power tolerance, MPR, A-MPR and RSD requirements if needed.
	+ For TDD and HD-FDD, PC2 RF requirements for non-RedCap UE can be re-used for PC2 RedCap UE in a band agnostic way.
	+ For FD-FDD:
		- RSD for non-RedCap 2Rx PC2 UE can be re-used for RedCap PC2 2Rx UE for the bands, on which RSD requirements for non-RedCap 2Rx PC2 are defined based on 1Tx architecture.
		- Based on 1 Tx architecture, specify A-MPR and single Rx antenna port RSD allowance for PC2 RedCap UE re-using the non-RedCap PC2 and RedCap PC3 specifications where applicable.
* Discuss and decide whether the form factor for RedCap will be explicitly listed in the specification:
	+ RedCap PC2 UE is feasible for some form factors, e.g., sensor and camera, with the same set of PC2 requirements for different form factors.
	+ FFS on whether RedCap PC2 UE is feasible for wearable

Note 1: Only the operating bands for which PC2 on non-RedCap UE has been introduced can be considered for RedCap UE.

Note 2: PC2 for Rel-17 Redcap and Rel-18 eRedcap are considered for this WI.

Table: Requested example frequency bands for PC2 RedCap UE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NR band** | **contact****name, company** | **Contact email** | **other supporting companies****(min. 3)** | **status****(new, ongoing, completed, stopped)** |
| n77, n78 | Bo Liu, China Telecom | liubo1@chinatelecom.cn | MediaTek, ZTE, Sanechip, Vodafone, Verizon | completed for non-RedCap PC2, new for RedCap PC2 |
| n5 | Zheng Zhao, Verizon | zheng.zhao@verizonwrieless.com | China Telecom, MediaTek, ZTE, Sanechips | new for RedCap PC2NOTE: the work will be started after the completion of non-RedCap PC2 |

#### Discussion on the New/Affected specifications

Any comments?

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| --- |
| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
| 38.101-1 | Introduce core requirements for NR PC2 RedCap UE to the specification of NR User Equipment (UE) radio transmission and reception; Part 1 | RAN #106 | Core part |

### **2.7 NR SUL for 2.6 GHz TDD band (n41) and 4.9 GHz TDD band (n79)**

#### Proposal in RP-241256

*Proposal 1: Define new SUL band corresponding to 2.6GHz band n41 and 4.9GHz band n79.*

In addition, the following directions can be set for further discussions for Rel-19 MC WI:

* *Define new SUL bands corresponding to 2.6GHz band n41 and 4.9GHz band n79 respectively.*
	+ ***Comment:*** *no benefit to use TDD as SUL band*
* *Define new band combinations comprise of the new SUL bands corresponding to 2.6GHz band n41 only, 4.9GHz band n79 only, and both band n41 and n79.*
* *Define new RF requirements for the new SUL bands and band combinations.*
* *When UE indicates to support the capability of “SwitchedUL” and 2Tx, it is allowed that UE performs simultaneous transmissions on new SUL bands and NUL on corresponding TDD band.*
	+ ***Comment:*** *no simultaneous transmission on SUL and NUL bands, also impact RAN1. Not spectrum item*
* *Design new signaling to configure/indicate the TDD configuration in the new SUL bands.*
	+ ***Comment:*** *need more discussion*
1. **Conclusions**

Below are the outcomes for the discussed topics during offline sessions.