ITU REGIONAL SEMINAR
5G IMPLEMENTATION IN EUROPE AND CIS
Budapest 3-5 July 2018

ETSI & 3GPP 5G standardization toward IMT-2020

Radio spectrum and interface

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European Telecommunication Standardization Institute

ETSI is a standards developing organization with European roots and global outreach recognized by EU and most of the CEPT countries.

As such it supports industry and EU regulation through development of specification and testing methodologies as well as interoperability testing.

3rd Generation Partnership Project

The 3rd Generation Partnership Project (3GPP) unites 7 telecommunications standard development organizations and provides their members with a stable environment to produce the Reports and Specifications that define 3GPP technologies.

3GPP ecosystem
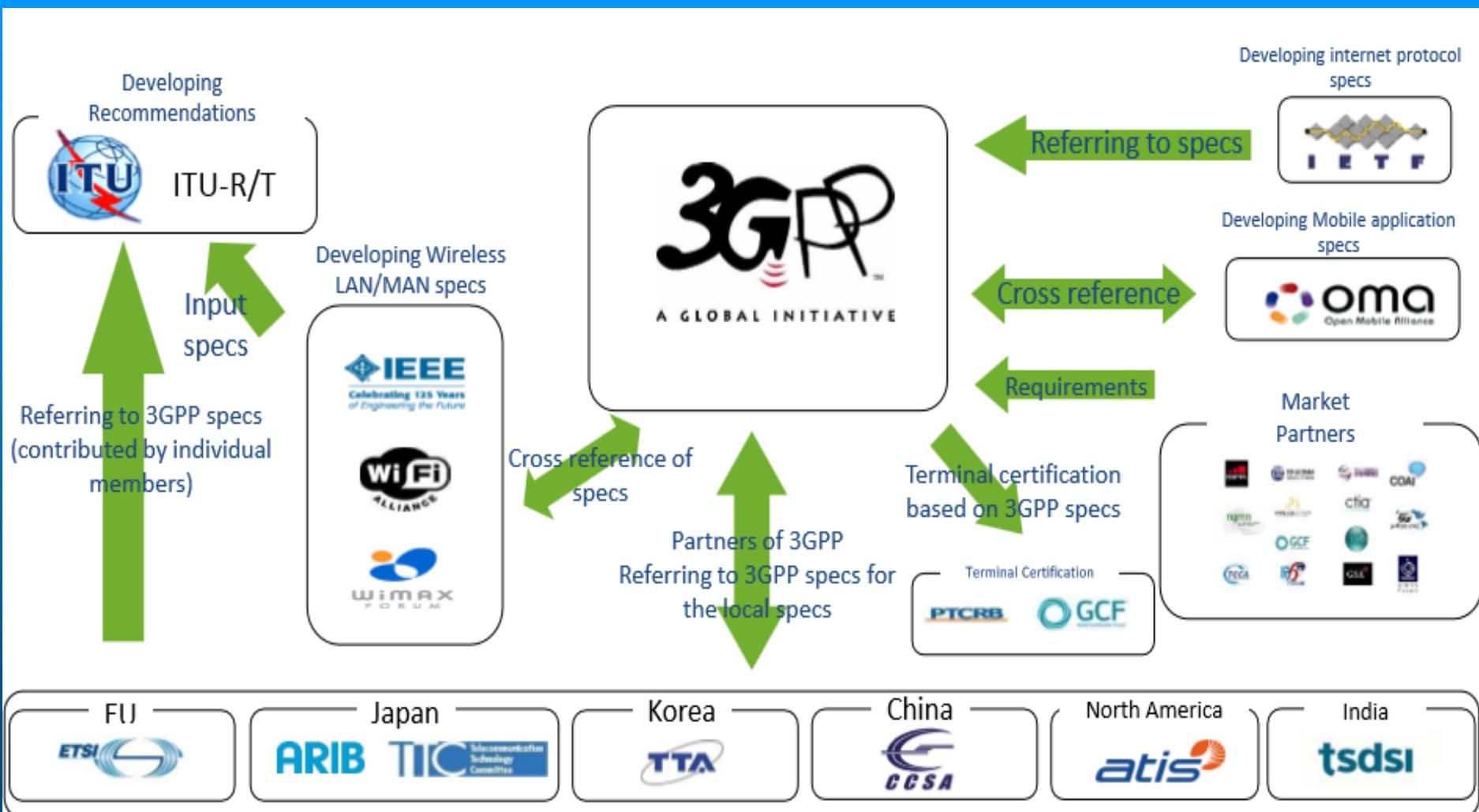
3GPP Technical Specification Groups

3GPP Figures

- ~400 Companies from 39 Countries
- 50.000 delegate days per year
- 40.000 documents per year
- 1.200 specs per Release
- New Release every ~18 months
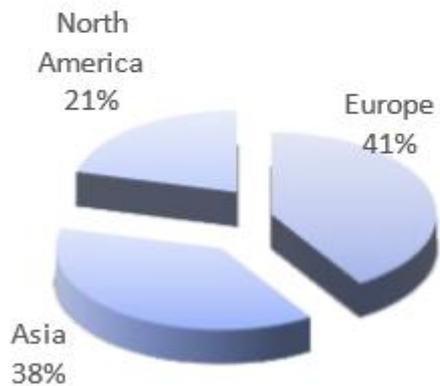
Participation by Region

North America 21%

Europe 41%

Asia 38%

Approved CRs per year per Release

R99, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016
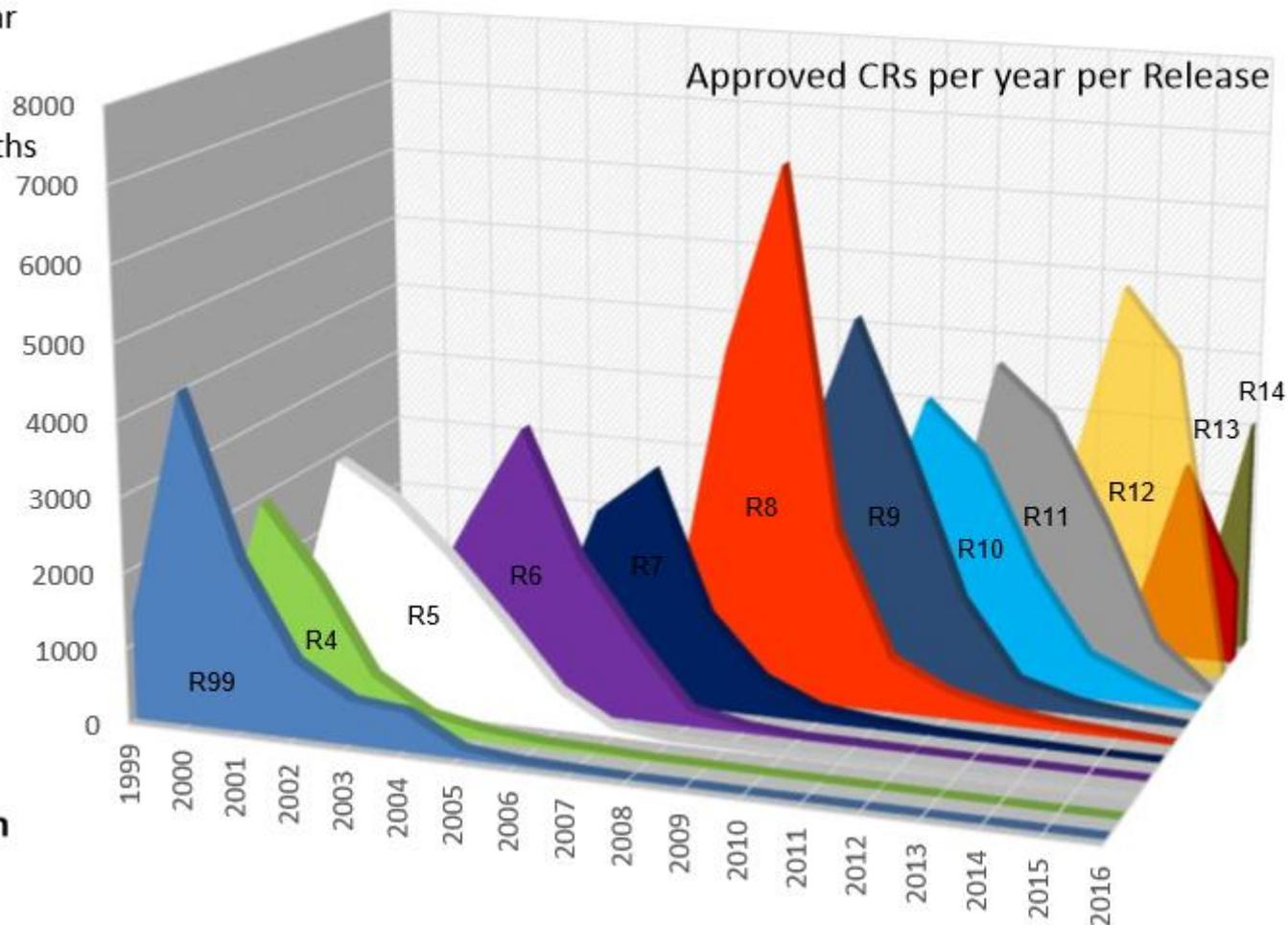
3GPP Process

Stage 1: Requirements

Stage 2: Architecture
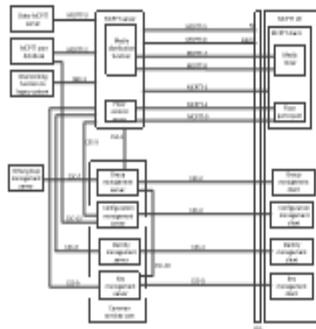
Stage 3: Protocols
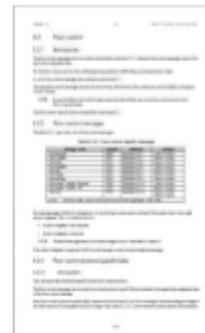
- Work is completed in Releases of typically 15 – 18 months

- New specifications issued at the completion of each release

- Change requests then make corrections as needed

Working groups involved in Mission Critical standardisation:

SA1
- Requirements normally come from operators (MNOs)
- High public safety presence from Europe and USA for Mission Critical applications

SA6
- Mission Critical application architecture

SA3
Security architecture and protocols

SA2
- Overall LTE (2G, 3G etc) system architecture

CT1
- Core protocols

CT4
- Database aspects

SA3
- Security protocols

SA4
- Codec and multicast aspects

+ **RAN** groups for radio specifications

An example of approved specification

5G LIST OF SPECICATIONS

An IMT2020 status – 5G 3GPP
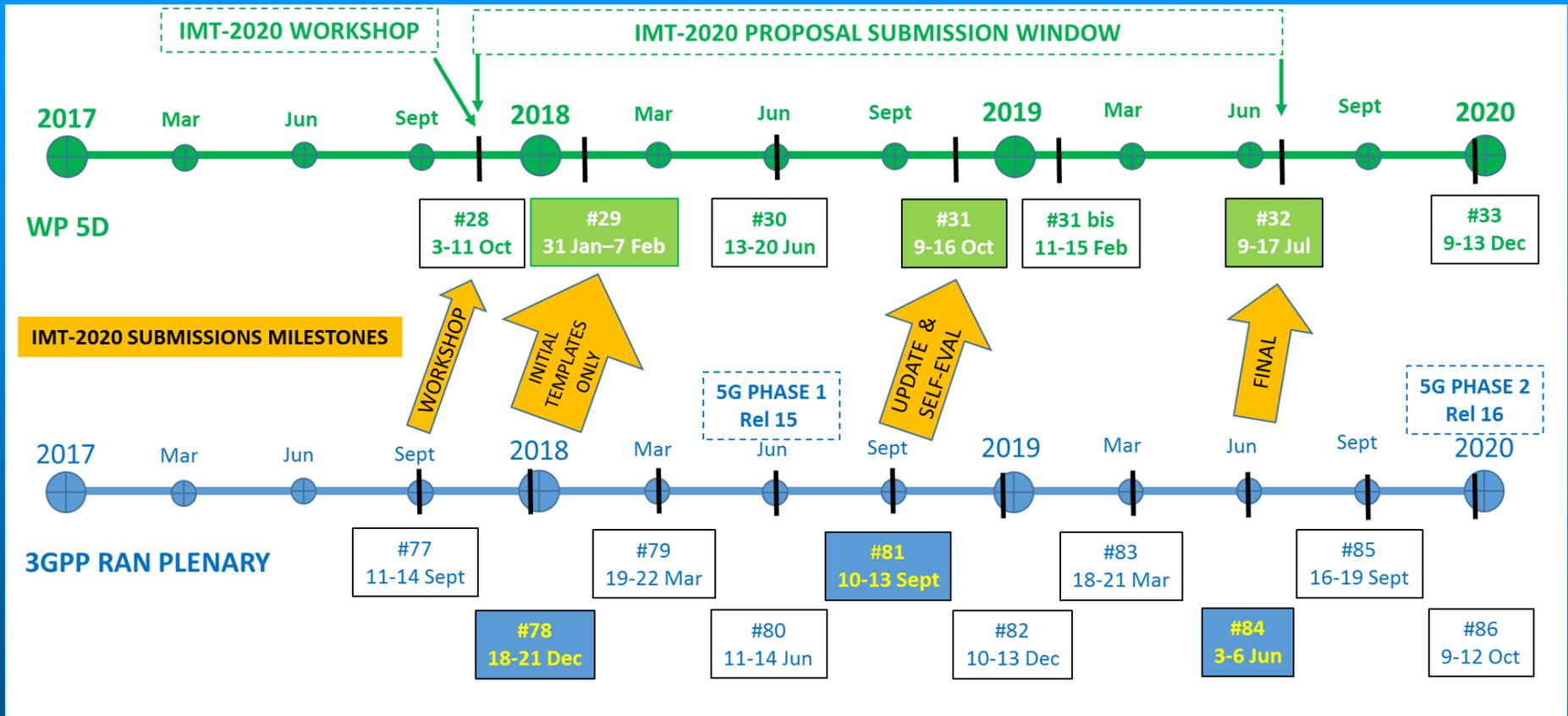
3GGP has submitted to the ITU initial "Description template of 3GPP 5G Candidate for inclusion in IMT2020". The final one will be July 2019.

An IMT2020 status – ITU

Detailed Timeline & Process For IMT-2020 in ITU-R
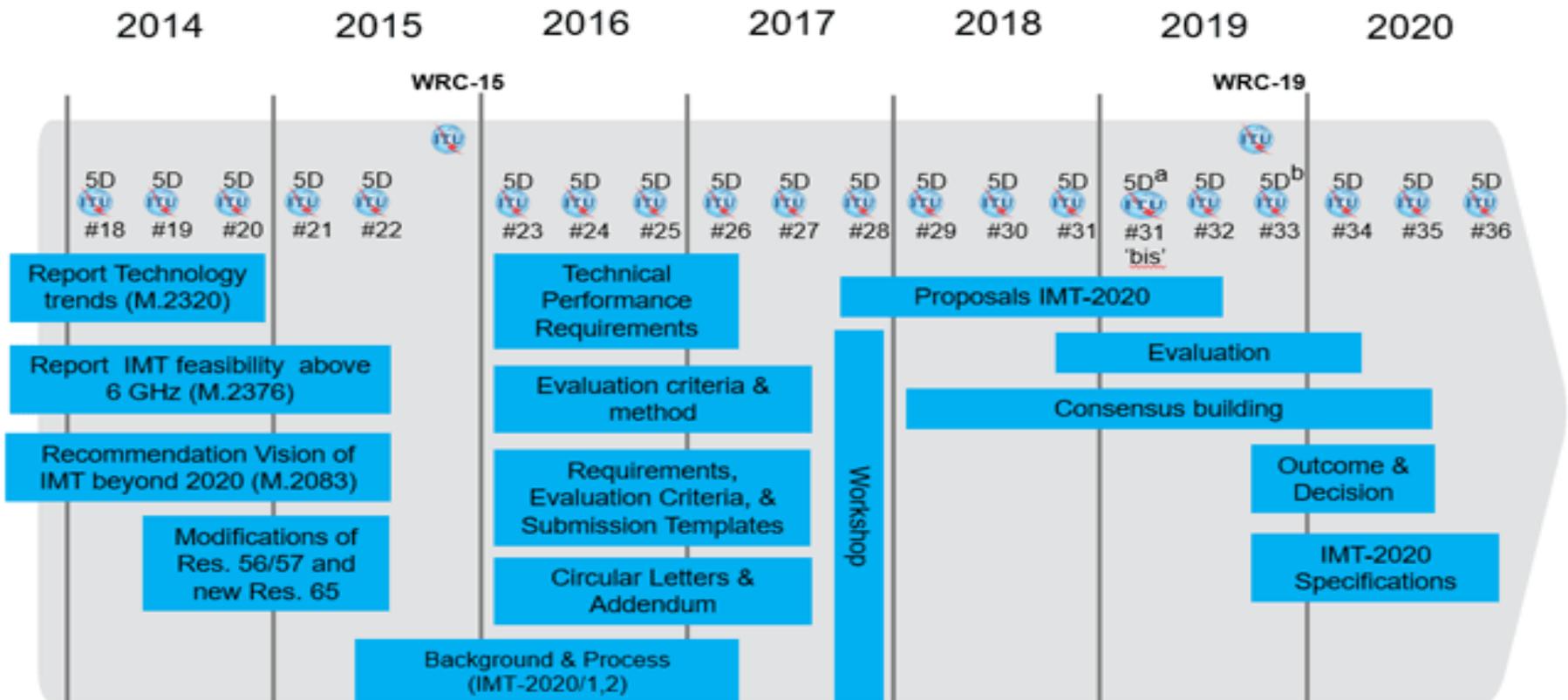
SUBMISSION TO ITU WP 5D

Naming
- Name : 5G
- Footnote: Developed by 3GPP as 5G, Release 15 and beyond

Submission 1

SRIT
Componant RIT: NR
Componant RIT: E-UTRA/LTE

Submission 2

NR RIT

SRIT – Standalone radio interface template
NR RIT – New radio interface template

International Telecommunication Union

3GPP Spectrum – 38.104 & 38.101

Definition of frequency ranges

Frequency range designation	Corresponding frequency range
FR1	450 MHz – 6000 MHz
FR2	24250 MHz – 52600 MHz

International Telecommunication Union

Operating bands in FR1

NR operating band	Uplink (UL) operating band BS receive / UE transmit $F_{UL\_low} - F_{UL\_high}$	Downlink (DL) operating band BS transmit / UE receive $F_{DL\_low} - F_{DL\_high}$	Duplex Mode
n1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
n2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	FDD
n3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
n5	824 MHz – 849 MHz	869 MHz – 894 MHz	FDD
n7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
n8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
n20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
n28	703 MHz – 748 MHz	758 MHz – 803 MHz	FDD
n38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
n41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
n50	1432 MHz – 1517 MHz	1432 MHz – 1517 MHz	TDD
n51	1427 MHz – 1432 MHz	1427 MHz – 1432 MHz	TDD
n66	1710 MHz – 1780 MHz	2110 MHz – 2200 MHz	FDD
n70	1695 MHz – 1710 MHz	1995 MHz – 2020 MHz	FDD
n71	663 MHz – 698 MHz	617 MHz – 652 MHz	FDD
n74	1427 MHz – 1470 MHz	1475 MHz – 1518 MHz	FDD
n75	N/A	1432 MHz – 1517 MHz	SDL
n76	N/A	1427 MHz – 1432 MHz	SDL
n77	3300 MHz – 4200 MHz	3300 MHz – 4200 MHz	TDD
n78	3300 MHz – 3800 MHz	3300 MHz – 3800 MHz	TDD
n79	4400 MHz – 5000 MHz	4400 MHz – 5000 MHz	TDD
n80	1710 MHz – 1785 MHz	N/A	SUL
n81	880 MHz – 915 MHz	N/A	SUL
n82	832 MHz – 862 MHz	N/A	SUL
n83	703 MHz – 748 MHz	N/A	SUL
n84	1920 MHz – 1980 MHz	N/A	SUL

Operating bands in FR2

NR operating band	Uplink (UL) and Downlink (DL) operating band BS transmit/receive UE transmit/receive $F_{UL\_low} - F_{UL\_high}$ $F_{DL\_low} - F_{DL\_high}$	Duplex Mode
n257	26500 MHz – 29500 MHz	TDD
n258	24250 MHz – 27500 MHz	TDD
n260	37000 MHz – 40000 MHz	TDD

Maximum transmission bandwidth configuration

SCS kHz	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	70 MHz	80 MHz	90 MHz	100 MHz
15	242.5	312.5	382.5	452.5	522.5	[592.5]	552.5	692.5	N.A	N.A	N.A	N.A	N.A
30	505	665	645	805	785	[945]	905	1045	825	[965]	925	[885]	845
60	N.A	1010	990	1330	1310	[1290]	1610	1570	1530	[1490]	1450	[1410]	1370

SCS [kHz]	50MHz	100MHz	200MHz	400 MHz
60	1210	2450	4930	N.A
120	1900	2420	4900	9860

Channel bandwidth per operating band

NR band / SCS / BS channel bandwidth														
NR Band	SCS kHz	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	70 MHz	80 MHz	90 MHz	100 MHz
n41	15		Yes	Yes	Yes			Yes	Yes					
	30		Yes	Yes	Yes			Yes	Yes	Yes		Yes		Yes
	60		Yes	Yes	Yes			Yes	Yes	Yes		Yes		Yes
n50	15	Yes	Yes	Yes	Yes			Yes	Yes					
	30		Yes	Yes	Yes			Yes	Yes	Yes		Yes		
	60		Yes	Yes	Yes									
n77	15		Yes		Yes		Yes	Yes	Yes					
	30		Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	60		Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
n78	15		Yes		Yes		Yes	Yes	Yes					
	30		Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	60		Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
n79	15							Yes	Yes					
	30							Yes	Yes	Yes		Yes		Yes
	60							Yes	Yes	Yes		Yes		Yes

NR band / SCS / BS Channel bandwidth					
NR Band	SCS kHz	50 MHz	100 MHz	200 MHz	400 MHz
n257	60	Yes	Yes	Yes	Yes
	120	Yes	Yes	Yes	Yes
n258	60	Yes	Yes	Yes	Yes
	120	Yes	Yes	Yes	Yes
n260	60	Yes	Yes	Yes	Yes
	120	Yes	Yes	Yes	Yes

THANK YOU

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http://www.itu.int/ITU-D/tech/spectrum_management/**