pectrum update

Noman M Alam

Agenda

- The key for success
 - Spectrum availability
 - Harmonization
 - Spectrum licensing
 - Technology neutrality regulations
- Other regulatory aspects
- Spectrum market update around the world



The key for success

SPECTRUM AVAILABILITY

✓ High✓ Mid

✓ Low

HARMONIZATION

- ✓ global / regional
- ✓ spectrum allocation

 $\checkmark\,$ technical conditions

LICENSING

- ✓ Dedicated spectrum for high QoS services
- ✓ Large spectrum blocks

TECHNOLOGY NEUTRAL

Spectrum combinations



A combination low/mid/high bands is critical

Spectrum market update around the world



5G market snapshot 524 operators investing in 5G 249 commercial 5G networks launched worldwide



Source: 5G Market Snapshot, May. 2023 (gsacom.com)



3

Mid bands - 3300-4200 MHz Region 1

- Large spectrum blocks are key in the range 3300-4200 MHz
 At least 100 MHz per MNO for 5G
- The 3400–3800 MHz range has been harmonized in CEPT for MFCN (Mobile/Fixed Communications Networks) since 2011
- Defined as the 5G primary band in Europe

Commission Implementing Decision (EU) 2019/235 of 24 January 2019 on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3400-3800 MHz frequency band: <u>https://docdb.cept.org/document/8822</u>

ECC Decision of 9 December 2011 on harmonised frequency arrangements and least restrictive technical conditions (LRTC) for mobile/fixed communications networks (MFCN) operating in the band 3400-3800 MHz, amended on 14 March 2014 and amended 26 October 2018 ECC Decision (11)06: https://docdb.cept.org/document/433

Ukraine

3300

3400

3500

3600

3700

3800

3900

4000

4100

4200





CEPT & RCC (ITU Region 1)

Source: GSA National Spectrum Positions, March 2023 (gsacom.com)

Mid bands - 3300-4200 MHz Region 1 Bahrain Burkina Faso Comoros Côte d'Ivoire Cyprus Djibouti Egypt Ghana Iran Iraq Israel Jordan Kuwait Assigned* Lebanon -Libya Planned assignment* Mauritania Ongoing assignment Mauritius Ongoing consultation Mayotte Morocco Planned assignment (local/private networks)** Nigeria Considering/consulting on options Oman Local/private licensing 1 Qatar Réunion Precise range to be confirmed le se . Saudi Arabia * Nationwide or regional individual licensing for public mobile or fixed wireless access networks Somalia ** Spectrum set aside for individual licensing on a local basis South Africa State of Palestine

Sudan Syrian Arab Republic Tanzania Tunisia Inited Arab Emirates Yemen Zambia

3300

3400

3500

3600

MHz

3700

3800

3900

4000

4100

4200

2

Mid bands - 3300-4200 MHz Region 2 & 3



Source: GSA National Spectrum Positions, March 2023 (gsacom.com)

3

Local licensing for Private Networks

Country	Licensing Approach	Spectrum Available	
France	Local licenses available on a trial basis from 2019. Trial extended to December 2023	3.8 – 4.2 GHz	
Germany	Spectrum for local network usage for private companies from 2019. Users include Bosch, BMW & Siemens	3.7 – 3.8 GHz	
Norway	Nkom announced local access licenses to be made available in 2022. Intended uses include provision of standalone private networks and FWA	3.8 – 4.2 GHz	
Sweden	Section of auctioned spectrum reserved for local and regional licenses	3720 – 3800 MHz	
Finland	Spectrum available for local access. Traficom envisage these licenses being used for factories, ports, airports and shopping centers.	2300 – 2320 MHz and 24.25 – 25.1 GHz	
US	Lightly licensed PAL & GAA for shared commercial use	3.55 – 3.7 GHz (CBRS)	
Canada	Non-Competitive Licensing framework as a way to provide a broad range of users, including businesses and industry verticals, with the opportunity to acquire licenses in localized areas across the country. First come first serve	3.9 – 3.98 GHz /26 GHz (200 MHz) 28 GHz (50 MHz) / 38 GHz (800 MHz	
UK	Shared Access License Framework for shared and private usage	1.8 GHz / 2.3 GHz / 3.8 – 4.2 GHz / 26 GHz	

Spectrum Position in United States

Current 5G Spectrum View for the U.S.

600MHz 700M	Hz 2GHz	3GHz	4G	Hz 5GHz	6GHz
617-652/663-698 (2X35MHz)	AWS, PCS and BRS/EBS	3.45-3.55 3.9	3.7-3.98 55-3.7	■ 4.94-4.99GHz	5.85 – 5.895/ 5.925 – 7.125
24-30GHz		37-57GHz		57-710	GHz
24.25-24.45GHz 24.75-25.25GHz 27.5-28.35GHz	-	37-37.6 37.6-40 GHz	■ 47.2-48.2 GHz	57-64 64-71	4GHz 1GHz
			Li Dy SI	LicensedDynamic sharingShared/Unlicensed	



US Mid-band spectrum status

Current low and mid-band landscape in US



- Average mid-band holding of > 100 MHz between 2 – 4 GHz TDD
- All major operators leveraging midband TDD for 5G deployments
- Low band critical during early phase for achieving nationwide 5G coverage (600 MHz, 850 MHz)
- Regional players have also invested in mid-band TDD for 5G deployments



The future of mid-band

- 4500 5000 MHz
 - WRC-23 AI 1.1 on 4.8-4.99 GHz
 - Increasing interest across the world
- 5925/6425 7125 MHz
 - WRC-23 AI1.2 on 6425-7125 MHz

ITU WRC-2023



The International

Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies (ICTs)

- World Radiocommunication Conferences (WRC) every three to four years
- Newly elected Secretary-General Doreen Bogdan-Martin (US)
- WRC-23 provides an opportunity to obtain additional spectrum or protect existing spectrum

Fixed, Mobile and Broadcasting Agenda Items

- 1.1 4800~4990 MHz
- 1.2 Identification of frequency bands for IMT
- 1.3 3600~3800 MHz mobile allocation (Region 1)
- 1.4 HIBS below 2.7GHz
- 1.5 470~694 MHz R1 broadcast and mobile

* 1

Final remarks

- Spectrum is key for the connected society. The key for success:
 - >Spectrum availability; harmonization; licensing for QoS and technology neutrality
- 3300-4200 MHz, 700 MHz and 26/28 GHz are the first 5G bands across the world
- Future mid-band: 4500-5000 MHz; 5925/6425-7125 MHz
- 600/700 MHz are very important to address an equal digital society
- 37-40 GHz will follow allocations within 26/28 GHz





ericsson.com