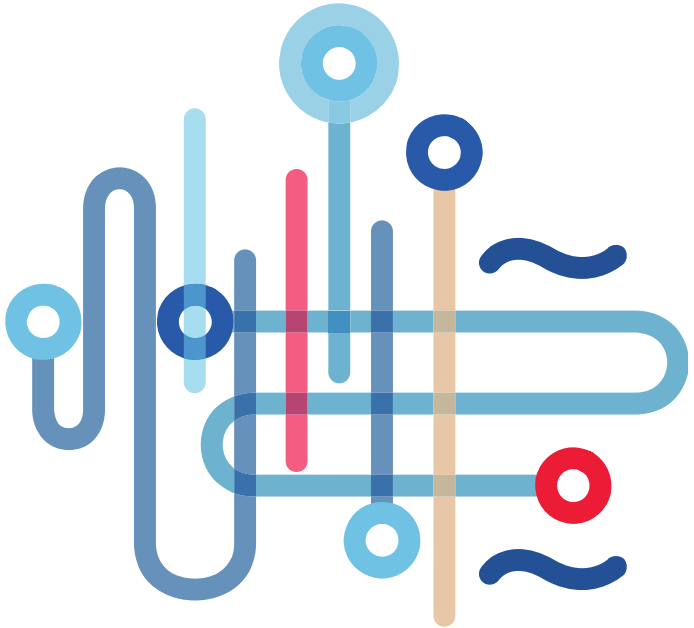
5G in Serbia – challenges and opportunities

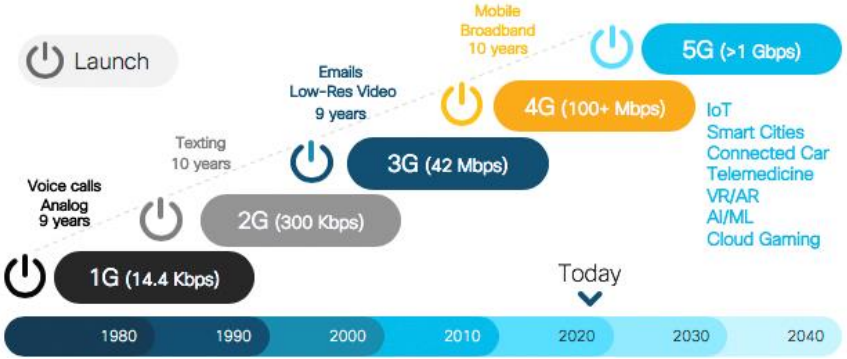
Goran Laovski

REPUBLIC OF SERBIA
RATEL
REGULATORY AGENCY FOR ELECTRONIC COMMUNICATIONS AND POSTAL SERVICES



30.9.2019.-1.10.2019., Budva, Montenegro

5G is coming



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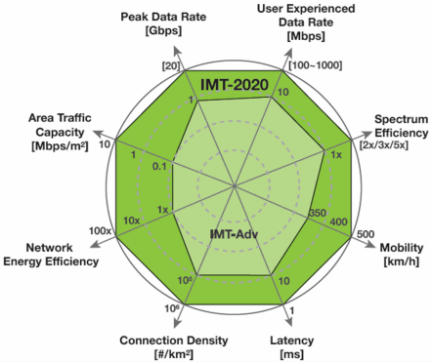
What capabilities differentiate 5G?



Peak data rate	**1-20 Gbps** *Total amount of traffic handled by a single cell*		Latency	**1-10 ms** *Round trip time for a packet of data*
User experienced data rate	**10 - 100 Mbit/s** *Total amount of traffic experienced by the end-user*		Connection density	**10k-1million devices/km²** *Number of devices fulfilling a certain QoS*
Peak spectral efficiency	**15 - 30 bit/s/Hz** *Information rate that can be transmitted*		Network energy efficiency	**90% more efficient** *Capability of a RIT (radio interface technology) to minimize energy consumption*
Mobility	**350-500 km/h** *Maximum mobile station speed at which certain QoS is achieved*		Area traffic capacity	**0.1– 10 Mbit/s/m²** *Total traffic throughput served per geographic area*

5G brings a number of enhancements:

- ❑ High speeds, low latencies, enhanced reliability, lower power consumption, greater terminal device densities, etc
- ❑ Possibilities for innovative new services (connected vehicle, augmented reality, IoT, ...)
- ❑ Enable a single physical network to support a number of virtual networks with different performance characteristics (NW slicing)
- ❑ Potential to change business model for network operators (services targeted to the verticals´ needs)

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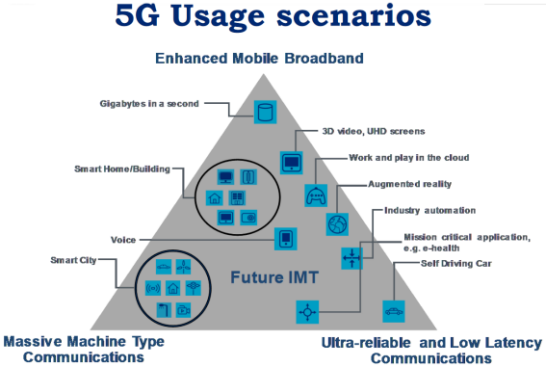
5G changing the world

How 5G is going to change the world?

- ❑ Disrupt the way we live and work
- ❑ Enable a fully connected, mobile, intelligent world
- ❑ Serve a larger portfolio of applications with strict requirements
- ❑ Create an ecosystem for technical and business innovation
- ❑ Essential enabler of Industry 4.0
- ❑ Cornerstone for digital connectivity - major driver of economic growth and serving societal needs



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5G vision

- New technological generation has reached us before we expected it and it has the potential to be a significant generator of the development of digital and related industries
- Establishing the 5G environment in Serbia is an important step forward in a promising future
- In accordance with the current strategy of developing electronic communications which aims to make Serbia the regional leader in development of digital economy and innovation

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5G NSA test case

- On the 22nd June 2019 Telenor has launched the first 5G base station in Serbia in Science Technology Park Belgrade, creating a 5G test environment that can be used by domestic and foreign companies, startups and students of technical faculties to develop technological solutions for the future
- Throughput greater than 1Gbps achieved using test equipment - Huawei Mate 20X
- RATEL issued frequency licences for temporary 5G spectrum usage in 3,4-3,8GHz (100MHz; 3,45-3,55GHz) with LTE anchor in 2,6GHz (2x20MHz; 2,64-2,66GHz DL; 2,52-2,54GHz UL)

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Smart Cites (LTE NB-IoT→5G)

GOING TO BE

- ❑ The Serbian Government signed an agreement regarding the Smart Cities projects between Serbia and Huawei Technologies company
- ❑ The project will encompass the biggest cities in the country: Belgrade, Novi Sad and Nis – pilot project
- ❑ System of transmitters and the development of an information system which should enable an economic implementation of various services (sensors, lights and counters for collecting and analyzing data - traffic signalization, parking spaces, water meter control, public lighting...)

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Basic preconditions for 5G launching (estimated timeline)

- ❑ Electronic Communications Law – National Assembly of Serbia
- ❑ Radio Frequency Allocation Plan – Government of Republic of Serbia
- ❑ Radio Frequency Allotment Plan – Ministry of Trade, Tourism and Telecommunications
- ❑ Rulebook on the Minimum Requirements for the Issuance of Individual Licences for Radio Frequency (2020) - Ministry of Trade, Tourism and Telecommunications
- ❑ Spectrum awards procedure (2020) – RATEL
- ❑ Spectrum assignament (2020/2021)
- ❑ 5G Implementation (2021) - MNOs

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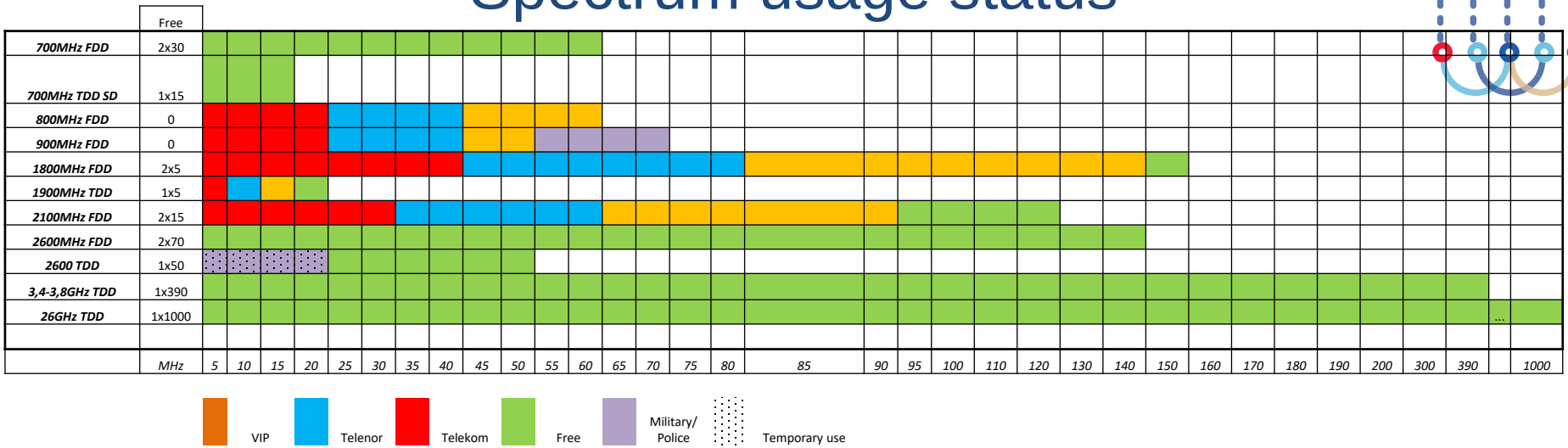
Spectrum usage status



- ❑ 3 MNOs are present on the market TELEKOM, TELENOR and VIP (800/900/1800/2100MHz)
- ❑ All MNOs provide quality service and successfully track changes in user behavior with regards to using telecommunication servises
- ❑ The total revenue of all MNOs has been constant over the last 3 years, but individual net realized profits are declining at the same time

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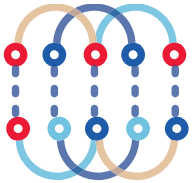
Primary bands suitable for the 5G introduction



3,4-3,8GHz (3,4-3,6GHz; 3,6-3,8GHz)

- No changes
- Ready for 5G

700MHz (694-790MHz)

- Currently w/o MFCN
- Adoption of new Radio frequency Allocation Plan (in procedure)/Radio Frequency Allotment Plan
- Ready for 5G - at the end of 2020

26GHz (24,25-27.5GHz)

- Adoption of new Radio frequency Allocation Plan (in procedure)/Radio Frequency Allotment Plan

5G launching

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5G spectrum auction preparation

RATEL commissioned the development of the feasibility study with the main objective to enable successful and efficient RF spectrum allocation in accordance with market conditions in the Republic of Serbia

Faculty of Electrical Engineering in Belgrade designed the study "The selection of the optimal spectrum auction model for the existing and the future 5G technologies"

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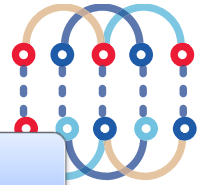
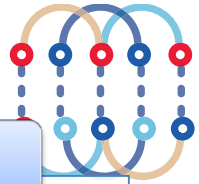
Feasibility study recommendations – 1/2



- Provide sufficient resources in terms of the available RF spectrum
- Spectrum distributed in different RF bands that allow service availability with different characteristics
- Sufficient spectrum bandwidth (continuous spectrum allocated to one network)
- Adoption of Radio Frequency Allocation/Allotment Plan that would allow spectrum auction for appropriate bands
- Need to develop long-term strategy (spectrum maps) for all RF bandsand with timelines for estimated auction and adopt it through public consultation
- The primary interest - the allocation of the spectrum in the 700MHz and 3,4-3,8GHz bands; 26GHz band should be postponed (public consultation with MNOs)
- MNOs would be reluctant to start using the 5G license by the first half of 2021
- Spectrum auction should be scheduled for early 2021 on technology neutral basis and with national allocation

Feasibility study recommendations – 2/2



- Optimal auction model (single/combined) – CCA (Combinatorial Clock Auction) with predefined number/size of generic lots and spectrum caps
- Potential simultaneous auction for new and already used frequency bands (900/1800/2100MHz) with postponed use date (additionaly for 2600MHz if MNOs express their needs)
- The 4th MNO? - possibly from a technical point of view, but not economically justified
- “The verticals” are not yet ready to deploy 5G technology
- The most suitable option: CCA auction for 700MHz/3,4-3,8GHz and/or 900/1800/2100MHz (possible pre-auction phase with spectrum provisioning for existing MNOs) with generic lots 2x5MHz for FDD, 1x5/1x10MHz for TDD, common spectrum cap for low bands and global spectrum cap for all paired spectrum
- Licence fulfillment requirements should be related to the quality of service provided and independent of technology used
- Licence duration – minimum 15 years
- Overcome different issues related to local regulation restrictions in building high density NW (and accessing to infrastructure/capacity by service providers/intermediaries), security/electromagnetic emission concerns, backhaul infrastructure

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Thank you !

Goran Laovski
goran.laovski@ratel.rs

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