



Spectrum Management Policy for Mobile Broadband Promotion in Serbia

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Talk overview

- History
- Digital Agenda for Serbia
- National legislation
- Spectrum management
- Frequency information
- Mobile Broadband Market
- Future plans



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History



Republic of Serbia

- Member of the International Telecommunication Union (ITU) since 1866
- Member of the European Conference of Postal and Telecommunications Administrations (CEPT) since 1969



A Digital Agenda for Europe

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - COM (2010) 245

A Digital Agenda for Serbia until 2020

- 1. Electronic Communications Strategy from 2010 until 2020*
- 2. Information Society Strategy from 2010 until 2020*

Adopted in 2010



Broadband development goals

✓ **Strategy for Information Society Development**

“High quality Internet with speed above 100 Mbps should be available for all citizens of Serbia until 2020.”

✓ **Strategy for Electronic Communications Development**

“It is necessary that Republic of Serbia reach the following goals:

...

- Increase of networks availability for all users;*
- Providing broadband access by FTTH/B/C to all users;*
- Broadband services with speed rate of at least 100 Mbps;*
- Allocation of 120 MHz band (digital dividend) for mobile broadband access”*



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National legislation

Law

- Law on Electronic Communications (*Official Gazette of RS*, no. 44/10 and 60/13 - CC Decisions and 62/14)
- Draft of the new Law on Electronic Communications- public consultation finished, adoption procedure in progress
- Draft of the new Law on Broadband Infrastructure

Allocation Plan

- Radio Frequency Allocation Plan (*Official Gazette of RS*, no. 99/12)



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National legislation

Allotment Plans

- Radio Frequency Allotment Plan for Operation in the Frequency Bands 791-821/832-862 MHz (*Official Gazette of RS*, no. 94/14)
- Radio Frequency Allotment Plan for Operation in the Frequency Bands 1710-1785/1805-1880MHz (*Official Gazette of RS*, no. 112/14 and 125/14)
- Radio Frequency Allotment Plan for systems capable of providing public electronic communications services- Broadband Wireless Access (BWA) systems, mobile/fixed communications networks (MFCN) in frequency bands 3400-3600 MHz and 3600-3800 MHz (*Official Gazette of RS*, no. 10/14)



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National legislation

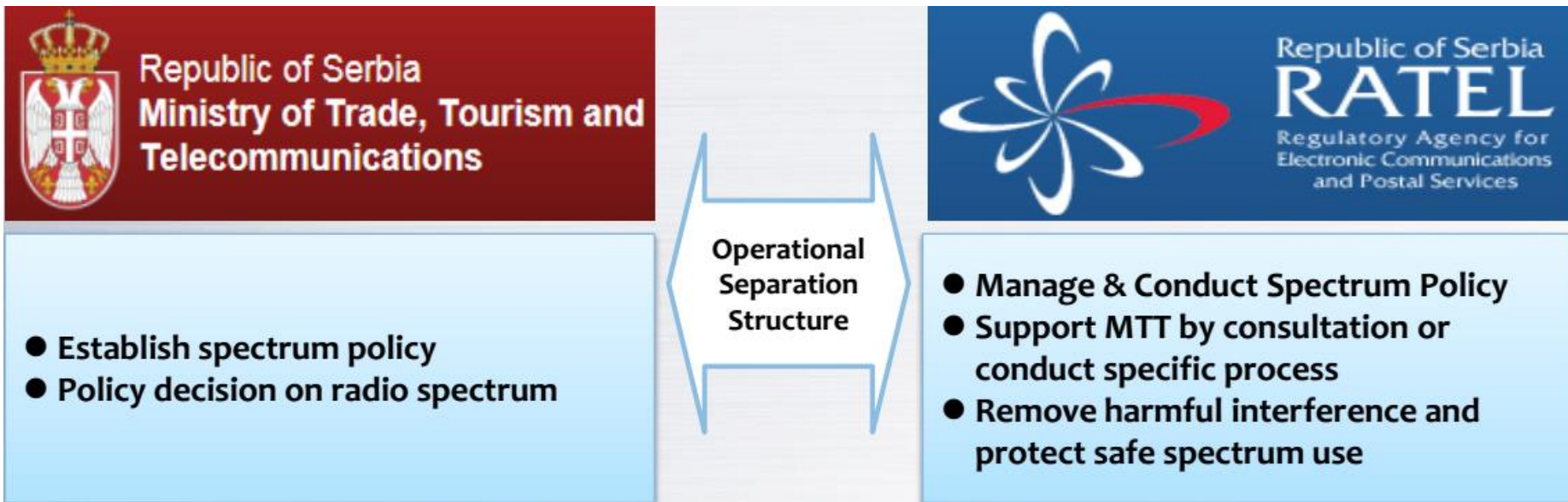
Allotment Plans

- Radio Frequency Allotment Plan of the Frequencies/ Locations/Allotments for Digital Terrestrial TV Broadcasting Stations in UHF band on Territory of Republic of Serbia (“Official Gazette of RS”, no. 73/13)
- Radio Frequency Allotment Plan for GSM/DCS 1800 Radio System (*Official Gazette of RS*, no. 17/08)
- Radio Frequency Allotment Plan for UMTS/IMT-2000 Radio System (*Official Gazette of RS*, no. 17/08)



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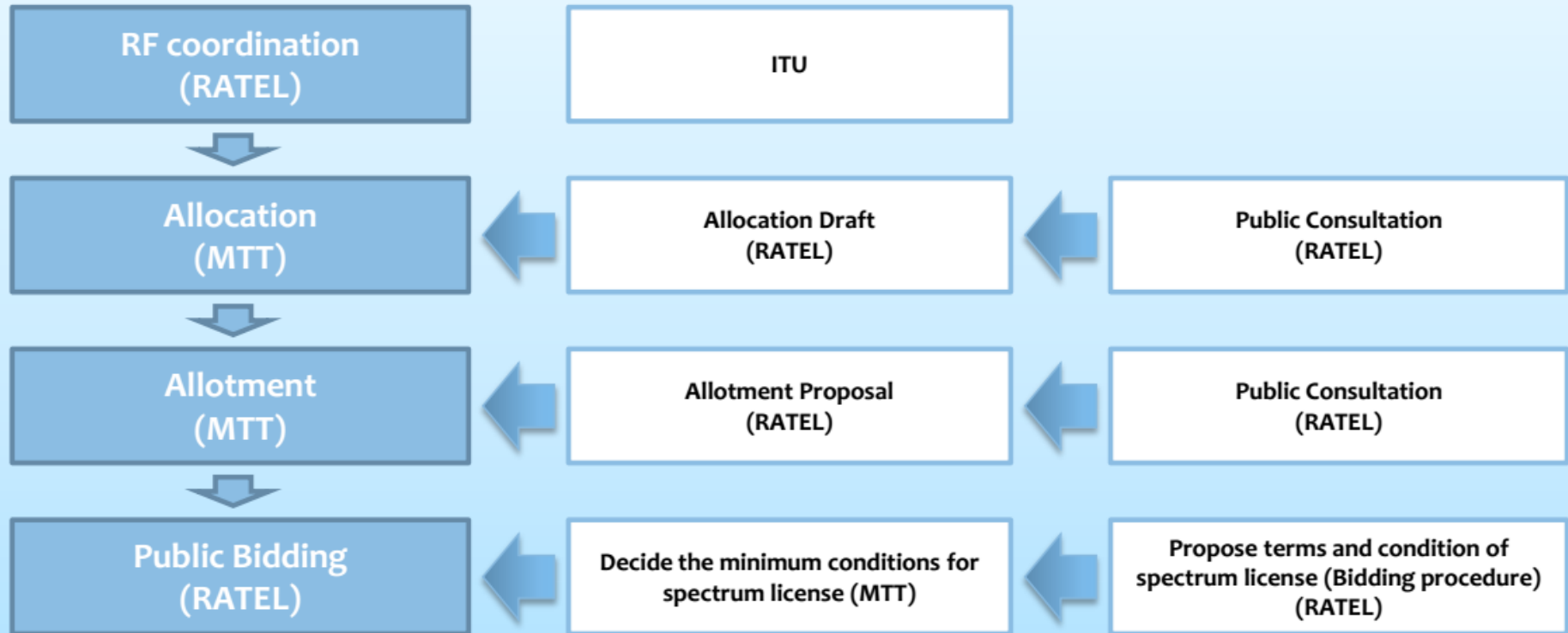
Responsibilities





Spectrum assignment procedure in Serbia

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Frequency Information

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Relevant data about allocations and applications in the appropriate frequency bands in the Republic of Serbia are available in EFIS

Frequency band	Serbia
614 MHz - 790 MHz	<ul style="list-style-type: none">BROADCASTINGAeronautical Radionavigation
790 MHz - 862 MHz	<ul style="list-style-type: none">BROADCASTINGFIXEDMOBILE EXCEPT AERONAUTICAL MOBILE

- Data base of use of radio frequency spectrum are available in the website <http://registar.ratel.rs/>

952363 016/000046/001 "TELENOR" Д.О.О. 801.0000 MHz - 811.0000 MHz 842.0000 MHz - 852.0000 MHz 21.03.2016 20.03.2026 FB/CP	ОМЛАДИНСКИХ БРИГАДА 90 Мање ▲
Додатни подаци	Адреса: Омладинских бригада 90 11000 БЕОГРАД Технички преглед: 12.05.2016 Датум почетка коришћења: 21.03.2016 Врста станице/службе: FB, Базна станица (предајна станица у копненој мобилној служби)/CP, Станица отворена за јавну комуникацију



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DSO transition

- March 2012: Initial network for testing of digital broadcasting
 - Signal broadcasted from 15 locations, population coverage was 15%
- November 2013: Extended initial network
 - Signal broadcasted from 35 locations, population coverage was 75%
- 2015: Final network
 - Population coverage is over 97%
- DSO ended on 7 June 2015.



How to maximize Digital Dividend?

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Efficient Broadcasting Standard DVB-T2 – enables high bit rates in TV channel 8MHz (UHF).

- **Efficient compression** allows small bit rates for satisfactory video/audio quality (MPEG-4, part 10, i.e. ITU-T Recommendation H.264 AVC),
- **Single Frequency Networks** introduction over the allotments enable efficient spectrum usage.
- **Efficient TV Distribution Network Architecture** (headends within a decentralized network)



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Digital dividend 1

- Spectrum of the “digital dividend 1” has been offered to operators for further enhancement of the mobile broadband.
- Public bidding procedure was carried out by RATEL, in November 2015, in line with the Rulebook on minimum requirements for the issuance of individual licences for the usage of radio frequencies in 791-821/832-862 MHz radio frequency bands, adopted by the Ministry.
- All 3 mobile operators providing services in Serbia obtained 2x5MHz blocks.
- Total price: 105.053.111 EUR



Mobile electronic communications market

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- Spectrum refarming in 1800MHz finished.

- Technology neutrality is enabled.
- LTE is implemented (Advanced LTE – 1800/800 Bands).
- Mobile operators needed more spectrum – the 1800MHz auction finished in 2015th (21MEuros for 3x10MHz).
- Broadband in urban areas



700MHz

- Maximization of the digital dividend 1 and 2
 - Decision on broadcasting standard - DVB-T2,
 - Decision on compression standard - MPEG-4 p.10;
 - Design of the final network based on the SFN network type within allotments;
- Digital dividend 2 is ready to be used for mobile broadband
- Selling of *digital dividend is expected to stimulate the investment in the broadband access networks.*



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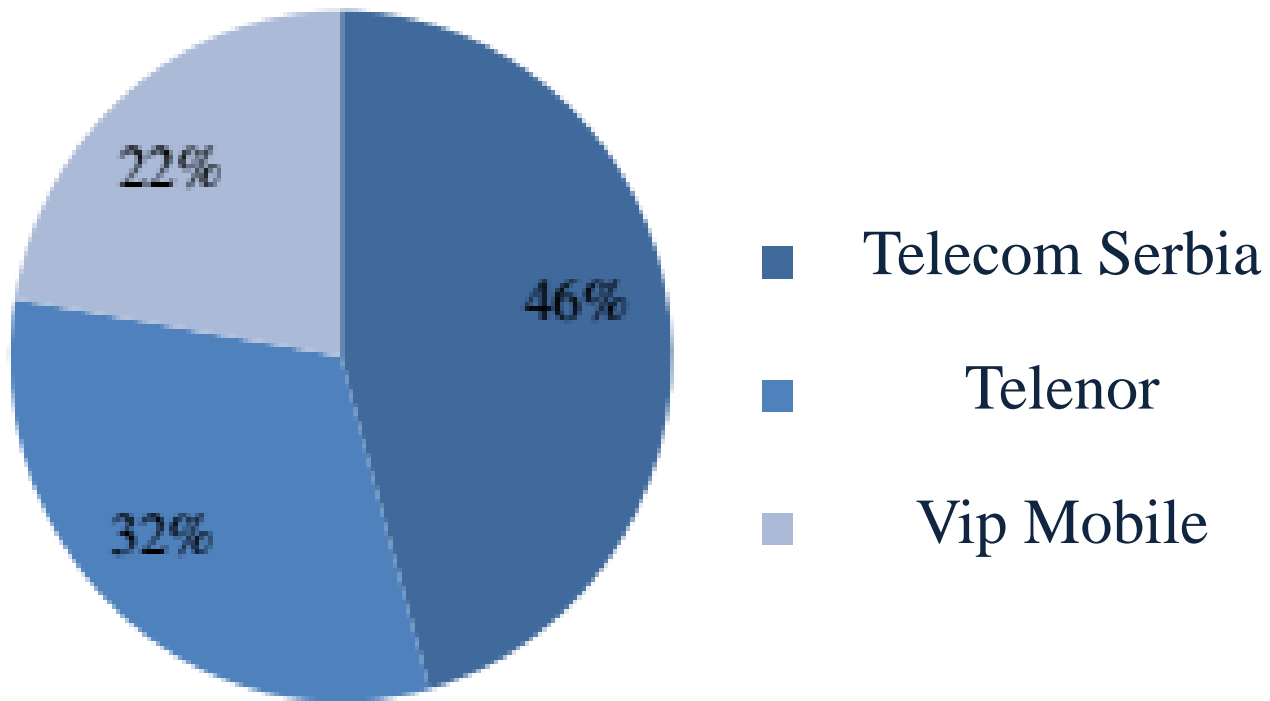
Mobile Broadband Operators

- Telecom Srbija
 - 58.11% owned by the Republic of Serbia
 - License replaced on August 15, 2006
- Telenor
 - 100% owned by Telenor A/S, Denmark
 - License issued on August 31, 2006
- Vip mobile
 - 100% owned by Mobilkom CEE Beteiligungsverwaltung GmbH, Austria
 - License issued on December 1, 2006



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Mobile Broadband Operators





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Mobile Broadband Market

- Mobile penetration rate is very high in Serbia
- The market benefits from a high level of foreign investment (two of Serbia's three mobile operators are controlled by foreign operators)
- Share of pre-paid subscribers is continuously declining, partly due to the fact that smart-phone is available with more affordable price with long-term contract
- Demand for mobile multimedia services is strong, and the use of such services continues to grow even at penetration rates in excess of 142%.

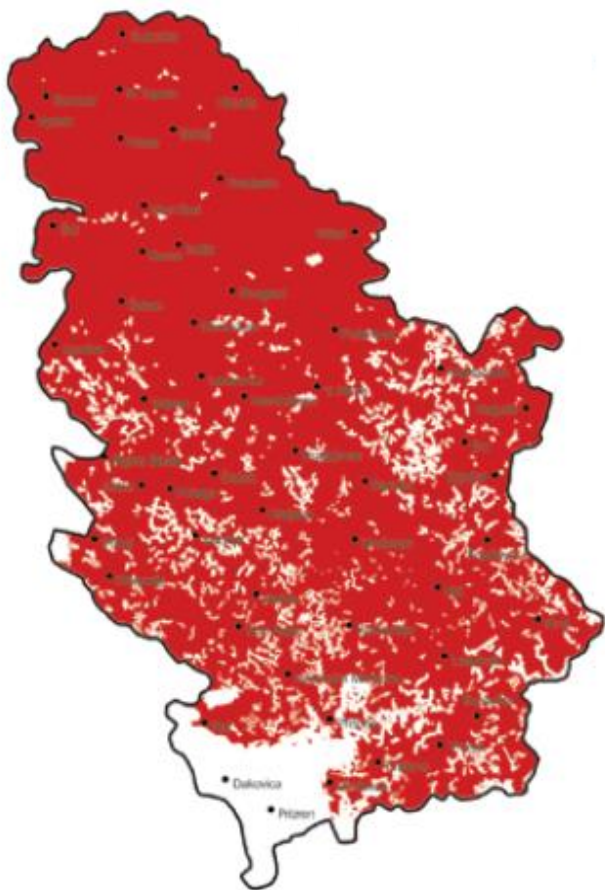


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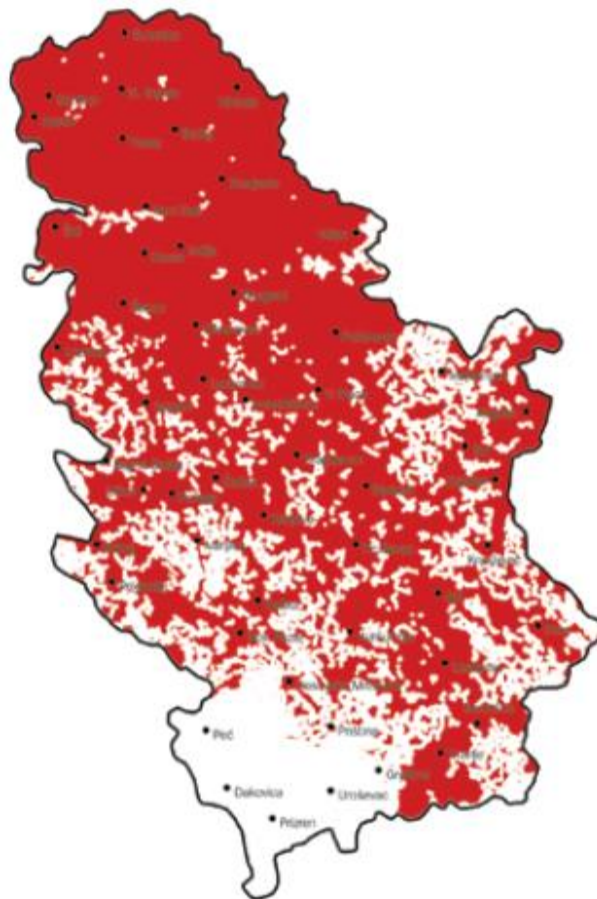
Mobile Network Coverage

TELECOM SERBIA

Source: RATEL, 2016



GSM 99,75%



UMTS 97,29%



LTE 56,74%

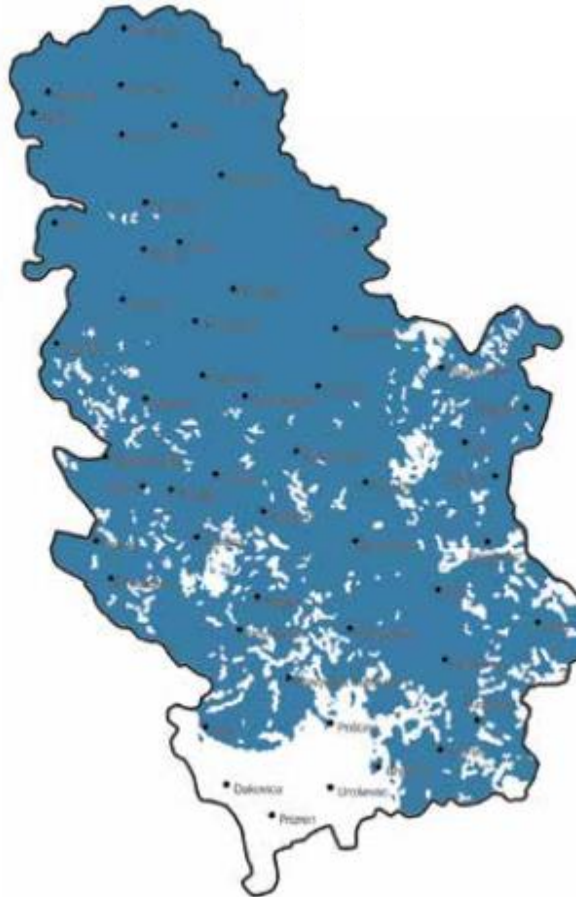


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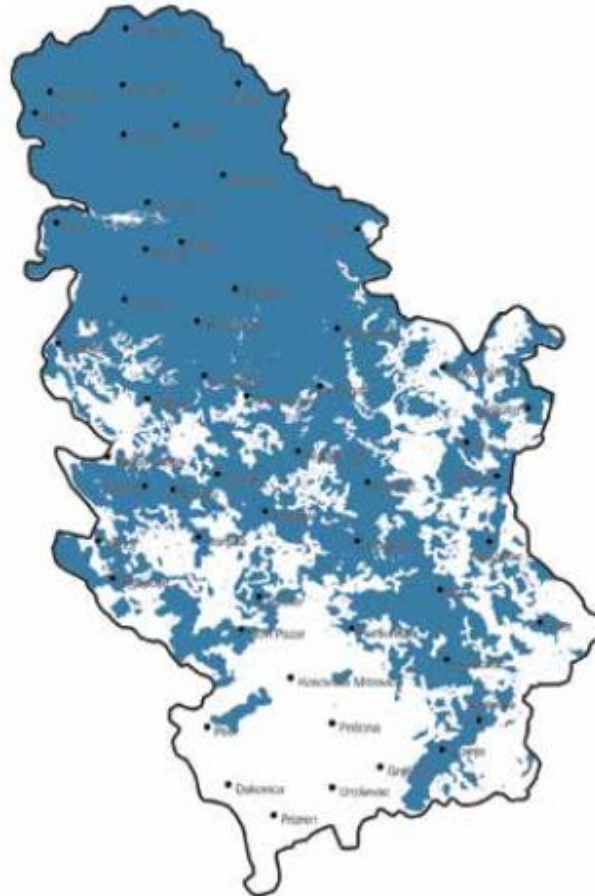
Mobile Network Coverage

TELENOR

Source: RATEL, 2016



GSM 99,42%



UMTS 94,72%



LTE 6,47%

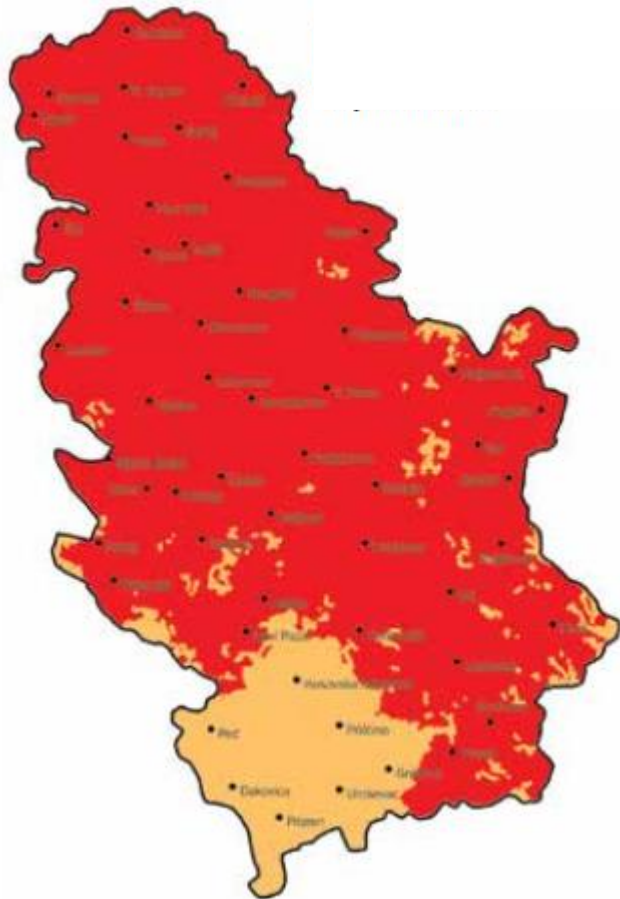


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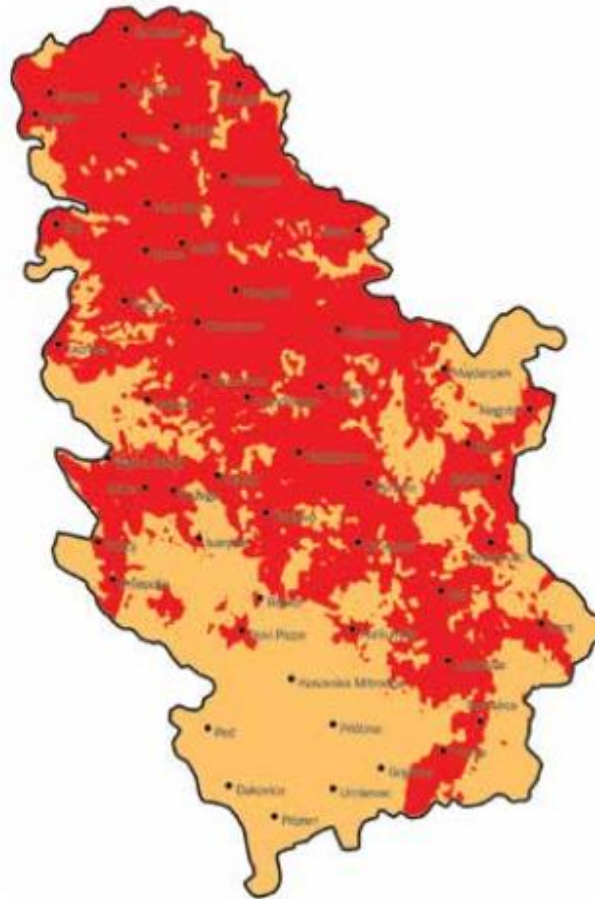
Mobile Network Coverage

VIP MOBILE

Source: RATEL, 2016



GSM 99,00%



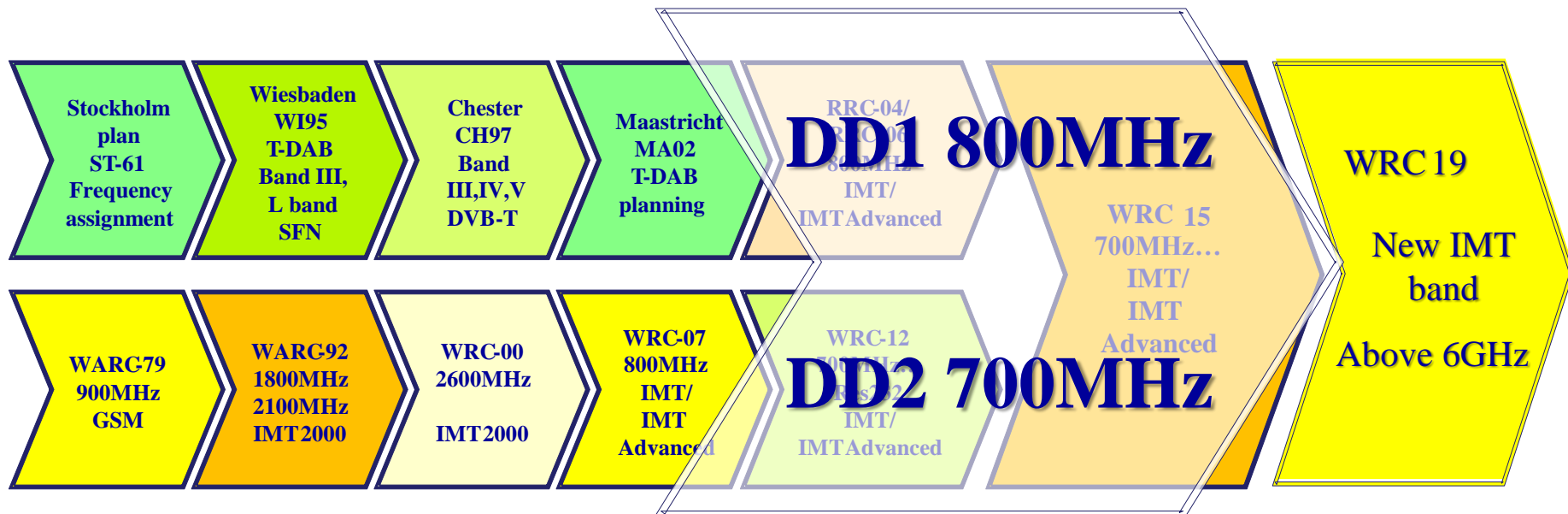
UMTS 88,7%



LTE 26,3%



From 5% of radio frequency spectrum - towards 5G



Terrestrial video broadcasting is going to be limited to:
21 - 48 UHF channels and few VHF channels



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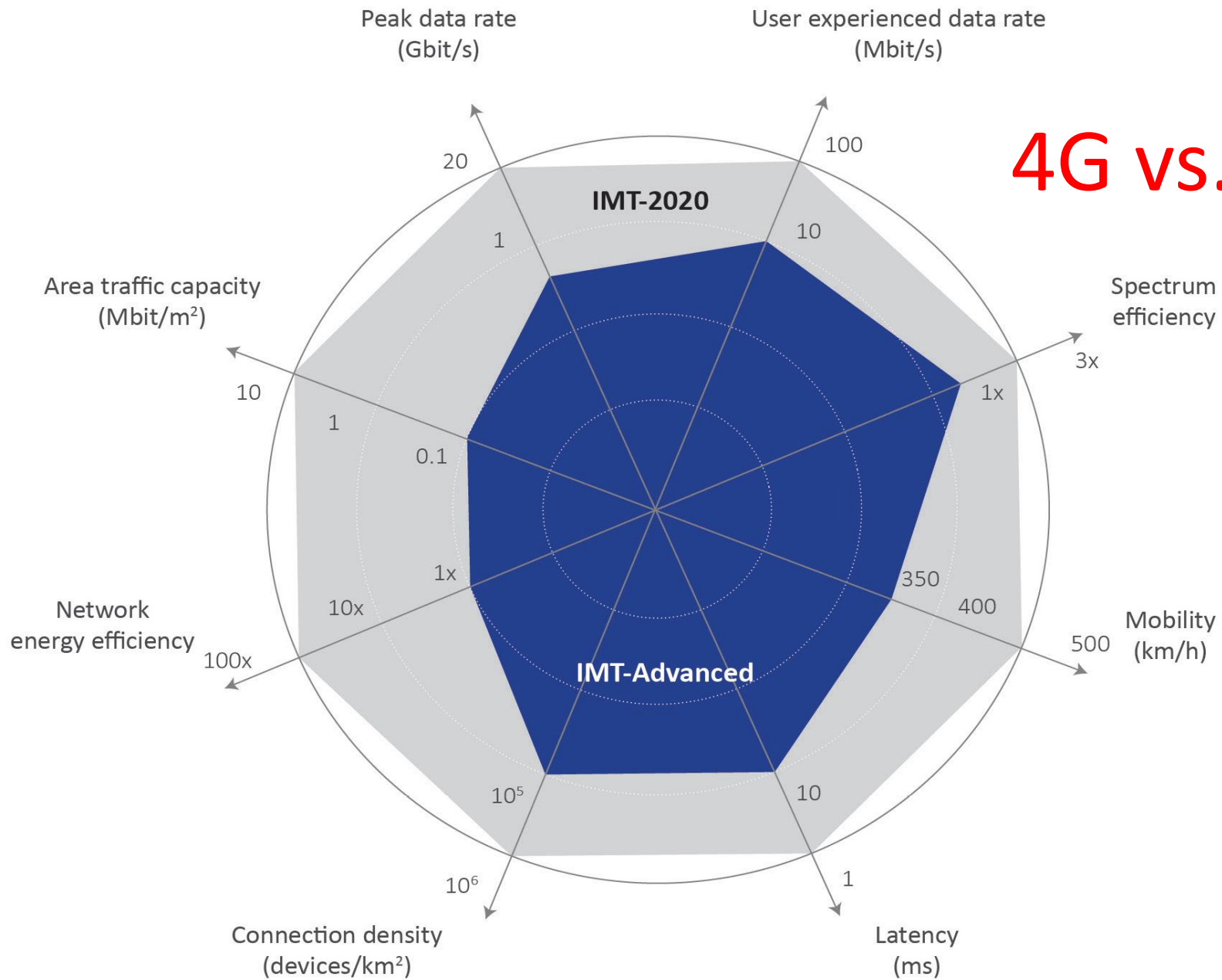
5G as a global technology

The fifth generation of communications infrastructures, or 5G, is the future network infrastructure supporting the digitisation of the economic and societal activities worldwide.

- It is expected that the future 5G infrastructure will serve a wide range of applications and sectors including professional uses (e.g. assisted driving, eHealth, energy management, possibly safety applications, etc).
- Standardization of 5G- one of the five priority areas under the recently launched Digitising European Industry initiative.



4G vs. 5G





DESI - Digital Economy and Society Index

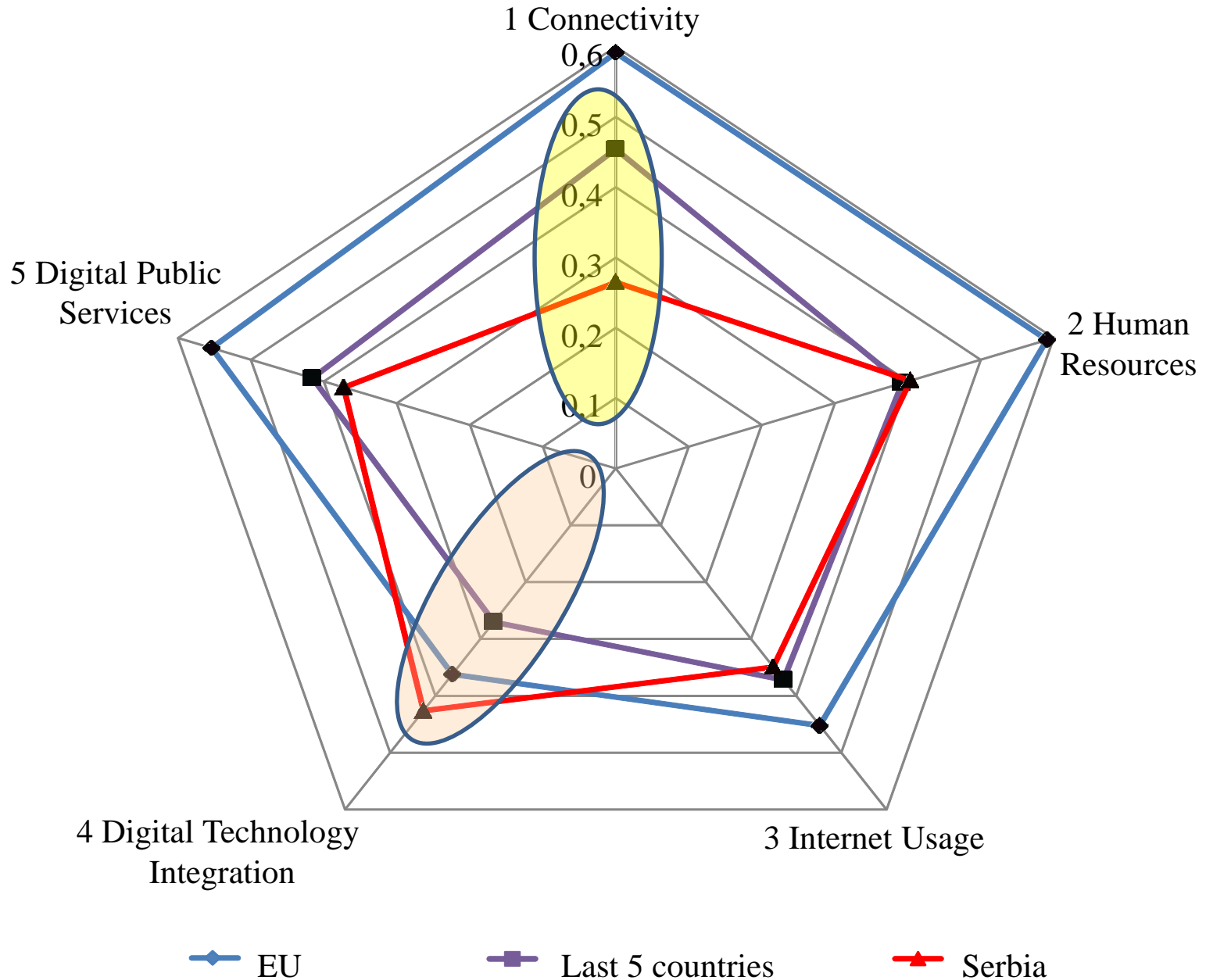
Digital Economy and Society Index (*DESI*) collects different indicators relevant for realization of digital development in the country.

DESI consists of 5 main areas that are represented by 30 indicators.

DESI has a tree layers architecture.



DESI components - Serbia vs. EU average





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Future plans?

- Adoption of secondary legislation
- Continuation of the coordination procedure with neighboring and other affected countries
- Interoperability standards
- Open data
- Cyber Security
- 4G, 5G ...6G



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