5G in Macedonia and QoS Regulation

Regulatory Activity in the Electronic Communications Sector

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AGENDA

- Spectrum for 5G

- 5G in Macedonia

- AEC measures and tasks

- QoS Regulation

- QoS Measurements

- Discussions

Spectrum for 5G

- It is expected that the first major commercial deployment will be based on lower frequencies. One of the reasons is the possibility to reach rapidly a sufficient coverage for addressing enhanced broadband communications and, above all, machine type communications market, which may require ubiquitous coverage, low latency and low complexity

- The implementation of frequency bands above 24 GHz remains needed to ensure all the performance targets of 5G, for example multi gigabit per second data rates. RSPG has strictly limited its considerations of bands above 6 GHz to the bands listed by WRC-15, focusing on the frequency bands proposed by Europe at WRC-15, in order to strengthen the global harmonization opportunities, in particular for the bands 24.25-27.5 GHz, 31.8-33.4 GHz and 40.5-43.5 GHz

Spectrum for 5G

Harmonization and timely availability of spectrum are the cornerstones for the success of 5G. In accordance with RSPG opinion, for the Europe there are three pioneer frequency bands:

- 694-790 MHz band: This band will be harmonized in 2020 and would enable nationwide and indoor 5G coverage
- 3.4–3.8 GHz band: This band is already harmonized within Europe for Mobile/Fixed Communication Networks (MFCN) and is primary band for early 5G developments in Europe
- 24.25-27.5 GHz: Due to the fact that 5G envisages very high data rates, much larger bandwidths than ever before will be required (up to several GHz), which can only be found in higher frequency bands above 24 GHz. To respond to this demand, ECC has identified the band 24.25-27.5 GHz (called the 26 GHz band) for early European harmonization, as it provides over 3 GHz of contiguous spectrum and more favorable propagation than the higher frequency bands under consideration

Spectrum for 5G

The European Commission is also considering the following bands:
- existing EU harmonized bands below 6 GHz, focusing initially on 900 MHz and 1800 MHz bands. These have to be used on a technology neutral basis and service neutral to be available for new services (e.g. transport and healthcare) and the Internet of Things (IoT);
- 31.8-33.4 GHz and 40.5-43.5 GHz as recommended by RSPG; and
- 66-71 GHz for license exempt use. The larger 57-71 GHz band could be included in this context

The 28 GHz band should not be used for terrestrial mobile access but it could be feasible for satellite services in the 5G hybrid ecosystem.

5G in Macedonia: 700 MHz Band

700 MHz band

- At the moment DVB-T frequency authorizations according to the GE06 Agreement

- AEC participate in the work of SEDDIF and is trying to prepare the terrain to free the 694-790 MHz frequency band
- AEC sent the letter to the Ministry regarding the strategy for DVB-T(2) migration and assignment of the DD2

ECC/DEC/(15)01: HARMONISED FREQUENCY ARRANGEMENT FOR MFCN (FDD AND OPTION FOR SDL)

694-703	703-708	708-713	713-718	718-723	723-728	728-733	733-738	738-743	743-748	748-753	753-758	758-763	763-768	768-773	773-778	778-783	783-788	788-791
Guard band	Uplink						Gap	SDL (A)				Downlink						Guard band
9 MHz	30 MHz (6 blocks of 5 MHz)						5 MHz	20 MHz (zero up to 4 blocks of 5 MHz)				30 MHz (6 blocks of 5 MHz)						3 MHz

Macedonian NFAT

470-790 MHz

- **470-694 MHz (Broadcast)**
- **694-790 MHz (Broadcast, Land Mobile)**

| ЦИВИЛНИ	ВЛАДИНИ	Апликации	Меѓународни одлуки и препораки	Стандарди
465 - 470 MHz				
ФИКСНА **M20**		PMR/PAMR: FB пар со 460-465 MHz	ECC/DEC/(06)06	МКС EN 300 086
МОБИЛНА			T/R 25-08	МКС EN 300 113
				МКС EN 300 219
				МКС EN 300 296
				МКС EN 300 341
				МКС EN 300 390
				МКС EN 300 471
				МКС EN 301 166
				МКС EN 302 426
				МКС EN 302 561
		PPDR: 380-470 MHz	ECC/DEC/(08)05	
M32 M35		Пејџинг		МКС EN 300 224
470 - 694 MHz				
РАДИОДИФУЗИЈА **M18**		ТВ радиодифузија: Женева 2006		МКС EN 302 296
				МКС EN 302 998
Копнена мобилна				МКС EN 300 744
		Радио микрофони и слушни помагала: 470-789 MHz SAP/SAB	ERC/REC 70-03	МКС EN 300 422
		RA: 608-614 MHz (VLBI)		
M14				
694 - 790 MHz				
РАДИОДИФУЗИЈА **M18A**		ТВ радиодифузија: Женева 2006		МКС EN 302 296
				МКС EN 302 998
КОПНЕНА МОБИЛНА **M36A**		MFCN	ECC/DEC/(15)01	МКС EN 301 908
			ECC/REC/(15)01	
		Радио микрофони и слушни помагала: 470-789 MHz SAP/SAB	ERC/REC 70-03	МКС EN 300 422

5G in Macedonia: 3.6 MHz Band

3.4-3.8 GHz band

At the moment 31.5 MHz (3545-3576.5 MHz) assigned to NEOTEL for FWA

Ready for assignment and use

ECC/DEC/(11)06: Harmonized frequency arrangements for MFCN operating in the bands 3400-3600 MHz and 3600-3800 MHz

3.41 GHz | Free | Neotel | Free | 3.8 GHz
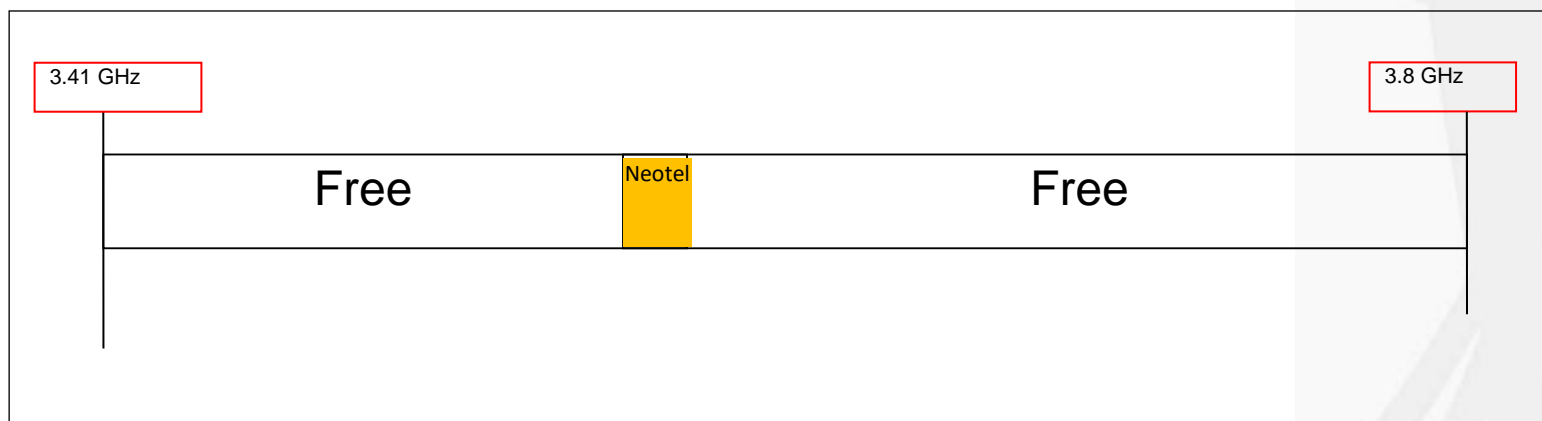
5G in Macedonia: 26 GHz Band

24.25-27.5 GHz band

Currently this band is used for Fixed Service (210 point to point links)

2 PP links EVN and 208 PP links one.Vip

AEC Measures and Tasks

From 11.05.2017 the annual frequency fee for Mobile Service for frequencies above 3 GHz is decreased:
~~21000 EUR/MHz~~ 4000 EUR/MHz for 3.6 GHz

Future tasks:
- To develop national 5G deployment roadmaps as part of the national broadband plans by end 2017 (Ministry)
- Harmonize spectrum within CEPT and implement it into our legislation (AEC)
- Finish the SEDDIF work and free the 700 MHz band (AEC and Ministry)
- Rearrange the PP links in 26 GHz band in order to have more available spectrum (AEC)
- Decision on licensing model for each frequency band (exclusive, shared, license exempt) and update the Electronic Communications Law (AEC and Ministry)

➢ at least one major city to be "5G-enabled" by the end of 2020 and than all urban areas and major terrestrial transport paths have uninterrupted 5G coverage by 2025 (European Action Plan)

QoS Regulation

- AEC adopt a Bylaw for QoS:
- ➢ Implemented the obligations from ECL
- ➢ Implemented ITU Recommendation (ITU P.800)
- ➢ Implemented CEPT Reports (ECC Report 118, ECC Report 103, Draft ECC Report 256)
- ➢ Implemented ETSI Standards (ETSI TS 102 250, ETSI TS 136 104)

- In Macedonia exist four main wireless technologies: GSM, UMTS, LTE and DVB-T (800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 470-790 MHz)

Responsibility of the Control and Monitoring of Radiofrequencies Department

- Network coverage (signal strength on mobile phones independent by technologies/scanner)

- Network availability (network availability during the drive tests)

- Failure calls

- Dropped calls

- Call setup time

- Quality of speech (Calling Voice server)

- SMS send success rate

- Unsuccessful rate for IP connection (failure data attempt)-SAFR
- Dropped data session (SSFR)
- Speed of data transfer via radio communications network independent by technologies (GPRS, EDGE, UMTS and LTE) (Connection to IP server)

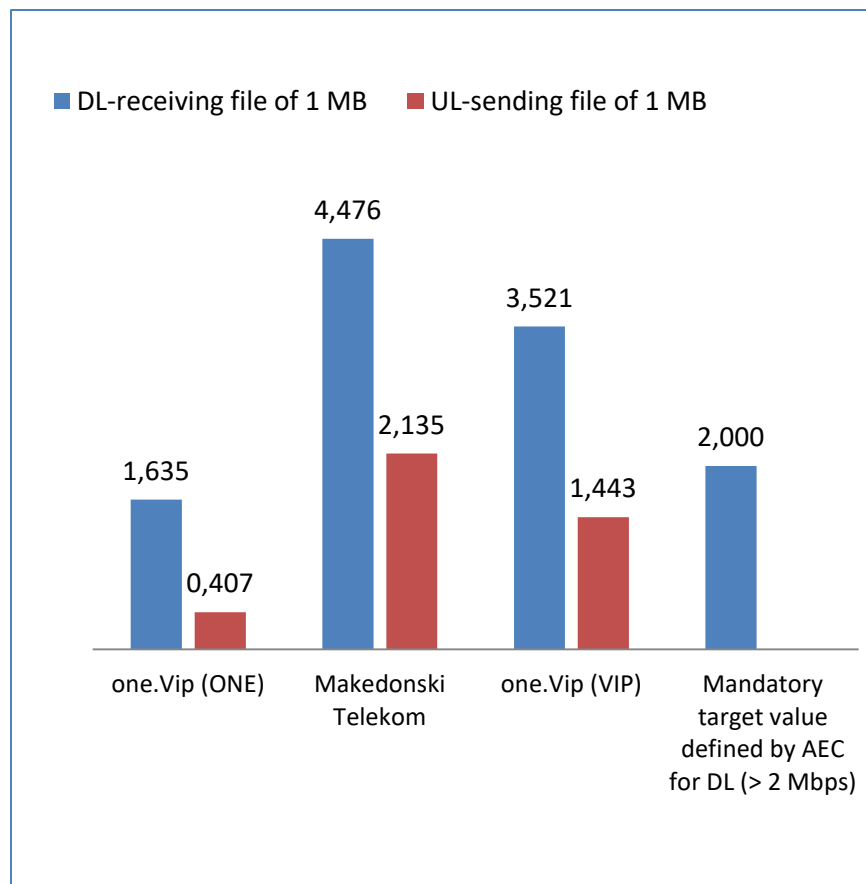# Data Transfer Regardless of Technology (GPRS, EDGE, UMTS и LTE) for Urban Areas in Mbps
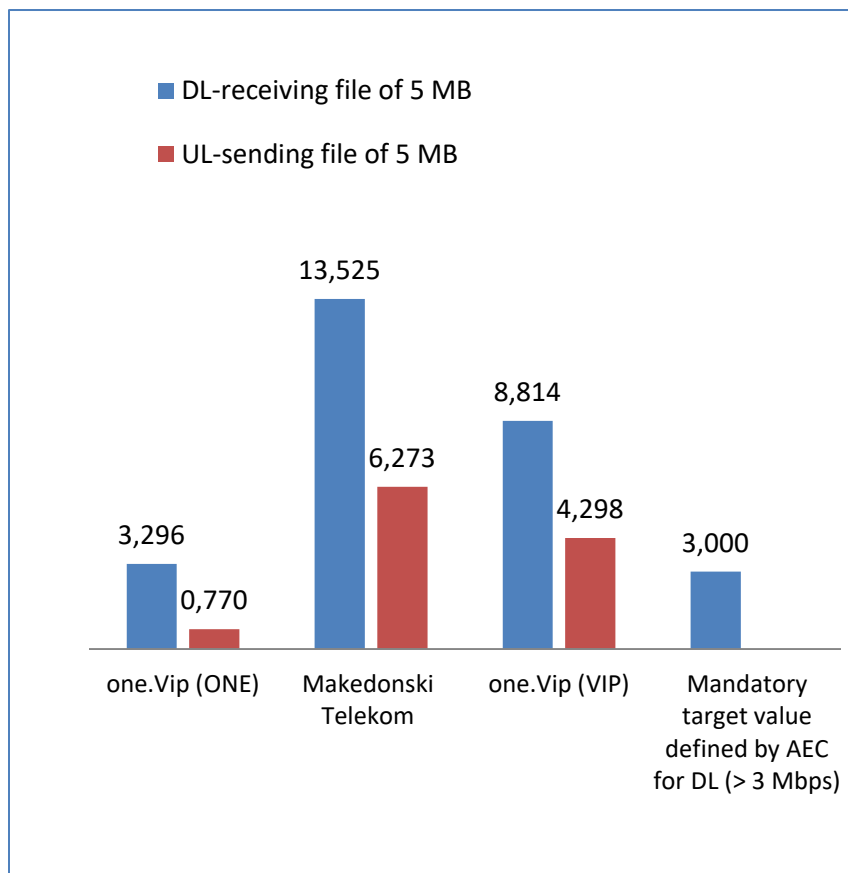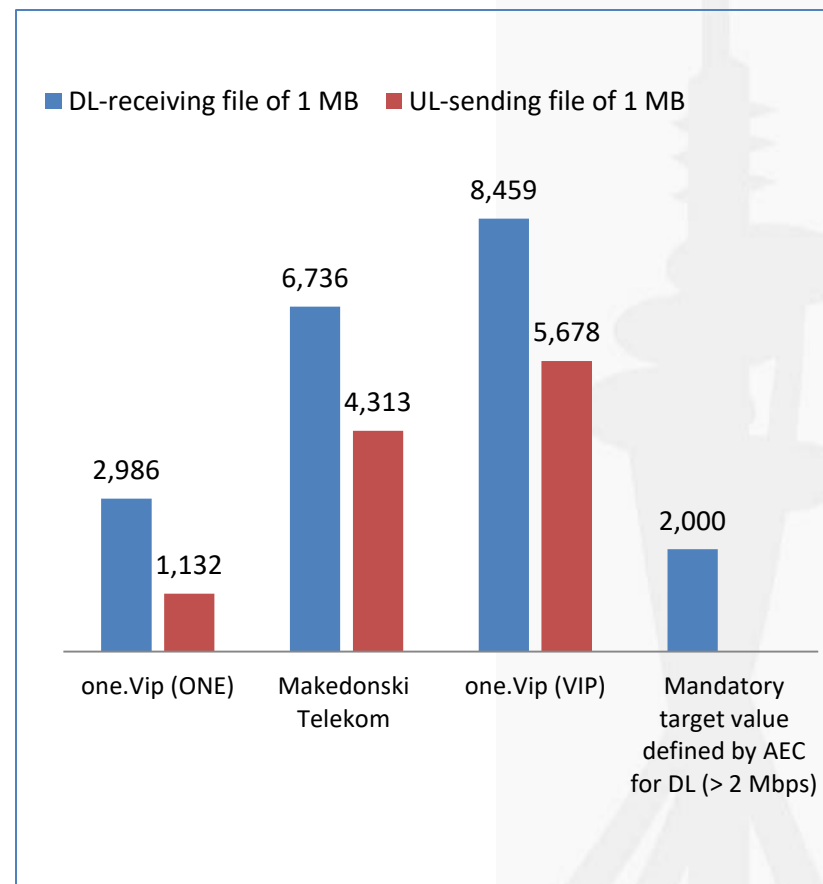

2015 / 2016
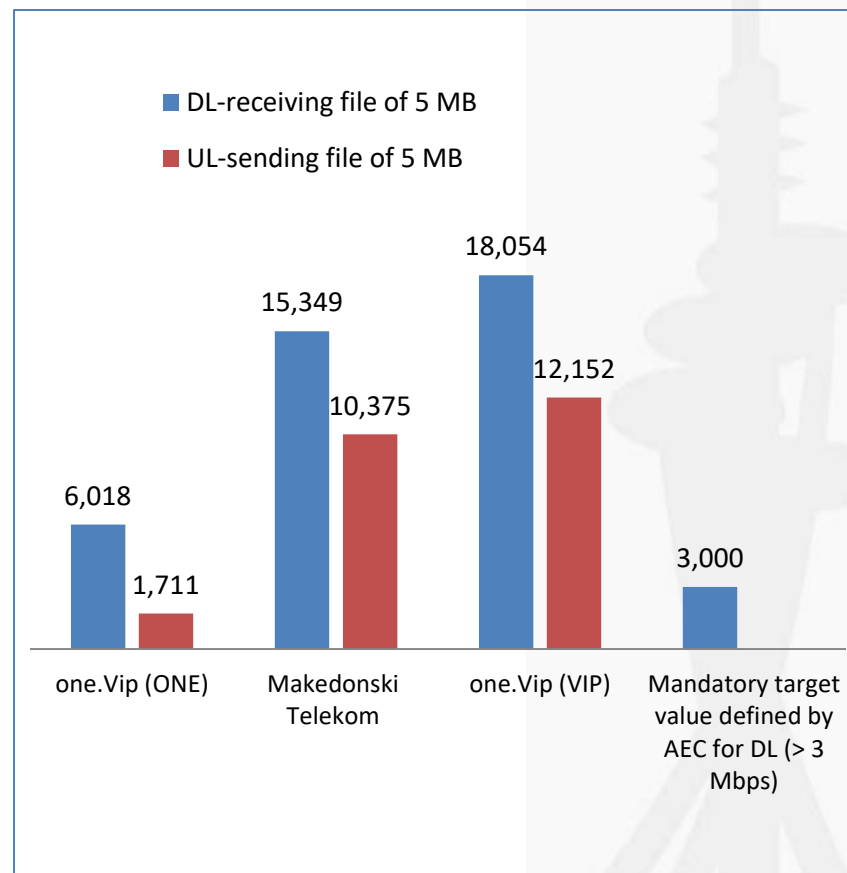
Data Transfer Regardless of Technology (GPRS, EDGE, UMTS и LTE) for Mayor Roads in Mbps

Measurement Scenario

- Script 1 (VIP 1, T-Mobile 1 and ONE 1):

  - call setup (30 s) + call duration (120 s) + pause (10 s) + sending SMS (30 s) + pause (10 s)

- Script 2 (VIP 2, T-Mobile 2 and ONE 2):

  - call setup (30 s) + call duration (120 s)/quality of speech + pause (10 s) + sending file (5 MB/1 MB) + pause (5 s) + receiving file (5 MB/1 MB) + pause (10 s)

Changes in QoS Bylaw

1. File (5 MB/1 MB ⟶ 1GB)

➢ Mobile operators in Macedonia implement 3CA and 4X4 MIMO technologies (> 150 Mbps)

2. Measurement scenario

3. Measuring equipment

4. New Mandatory target value for data speed (20 Mbps or 10 Mbps/1 GB)

New Measurement Scenario

- Script 1 (ONE 1, Makedonski Telekom 1 and VIP 1):

  - call setup (30 s) + call duration (120 s) + pause (10 s)

- Script 2 (ONE 2, Makedonski Telekom 2 and VIP 2):

  - FTP data setup (30 s) + FTP data DL (15 s) + pause (15 s) + FTP data setup (30 s) + FTP data UL (15 s) + HTTP data setup (30 s) + DL/60 s + pause (15 s)

Thank You! ☺
Discussion