



AKOS

**ITU-EKIP Regulatory Forum for Europe
5G implementation: strategies, policies
and regulation accelerating
deployment of mobile connectivity
Slovenian multiband auction**



Draft tender documentation (IM)

Publication of the Draft IM
3.8.2020

Deadline for Comments
2.9.2020

Proposal of the Reserve prices to the Government
11.9.2020

Peer Review
20.10.2020

Presentation to the DG Connect
21.10.2020

Answers to the comments
30.10.2020

**Final IM
30.10.2020**

Tender

Approval of the Reserve prices by the Government
16.12.2020

Publication of the tender
18.12.2020

Deadline for questions
~~8.1.2021~~
18.1.2021

Deadline for answers
~~18.1.2021~~
28.1.2021

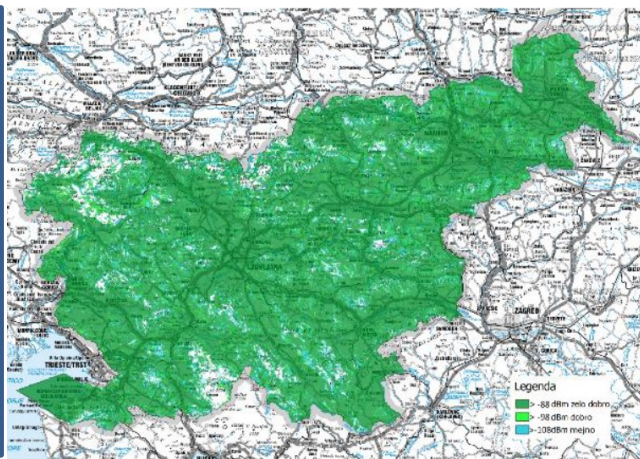
Deadline for applications
~~1.2.2021~~
15.2.2021

Auction
7.4.-
16.4.2021

**Licences
10.6.2021**

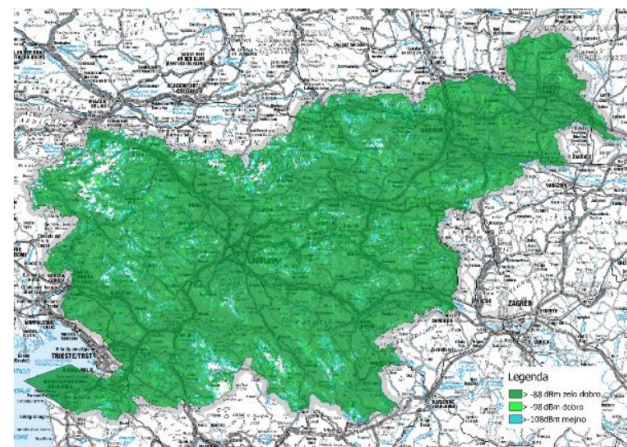
**EECC
21.12.2020**

A1:2020
>99%
population
and 93,1 %
of the
territory of
Slovenia



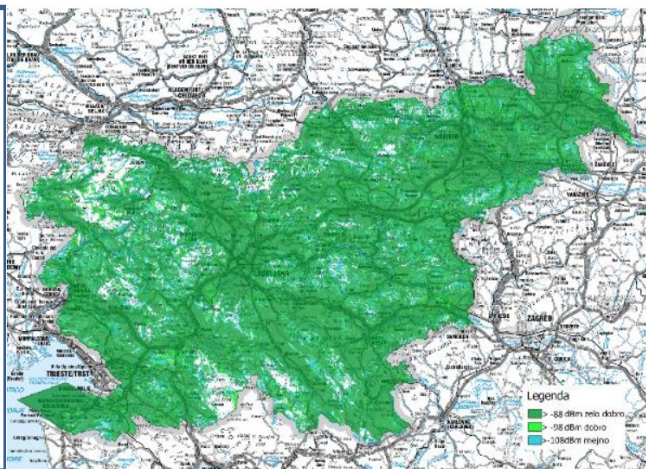
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TS:2020
>99%
population
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TM:2020
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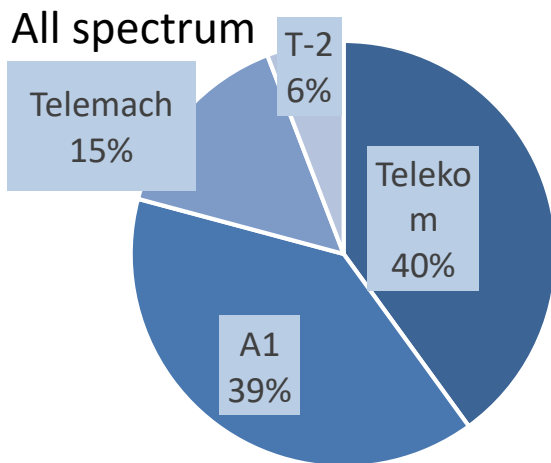
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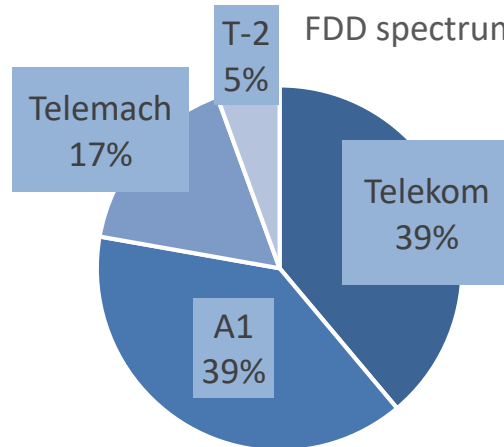
AKOS Spectrum holdings before Auction in 2021

Operator	Amount of spectrum (MHz)	FDD (MHz)	TDD (MHz)
Telekom Slovenije	240	210	30
A1	235	210	30
Telemach	90	90	0
T-2	35	30	5

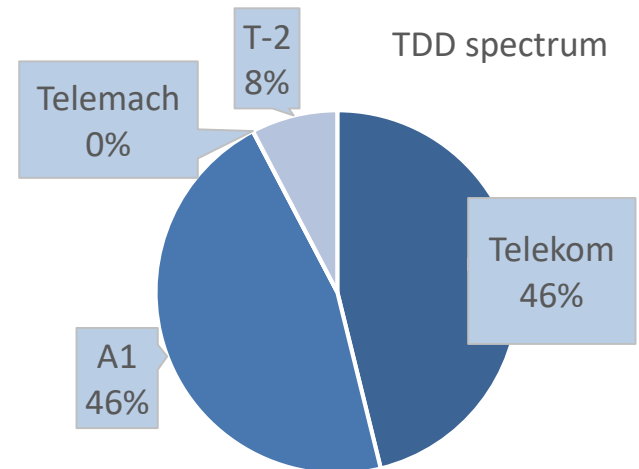
All spectrum



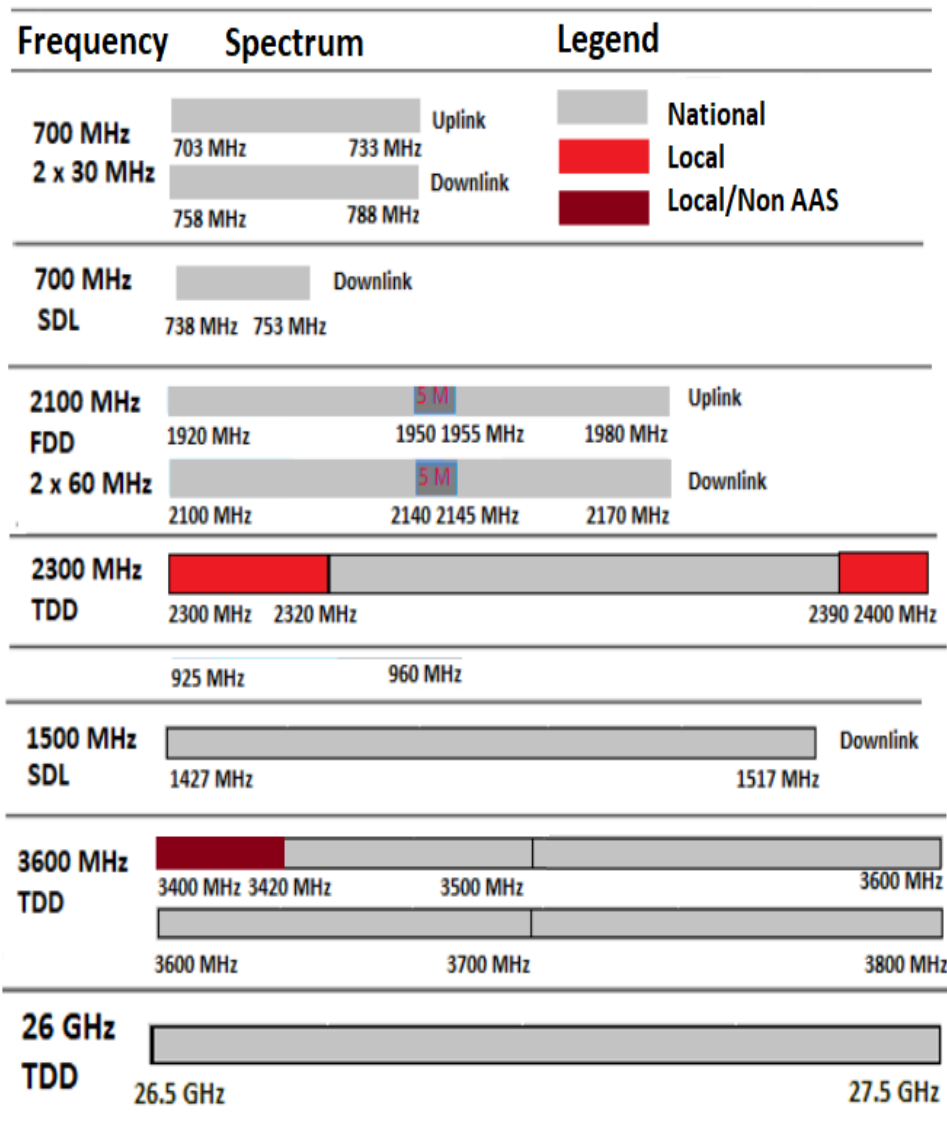
FDD spectrum



TDD spectrum



- ④ 700 MHz,
- ④ 700 MHz SDL
- ④ 1500 MHz
- ④ 2100MHz
- ④ Part of 2300 MHz (2320 -2390 MHz)
- ④ Part of 3600 MHz (3420 – 3800 MHz)
- ④ Part of 26 GHz (26,5-27,5 GHz)



2 x 35 MHz
FDD
<1 GHz

700 MHz

800 MHz

900 MHz

~~190 MHz~~
160 MHz

~~2300 MHz~~

3600 MHz

800 MHz

26 GHz

425 MHz

700 MHz FDD

2100 MHz FDD

2300 MHz

3600 MHz

800 MHz

900 MHz

1800 MHz

2600 MHz FDD in TDD



- ④ In each frequency band commercially offer WBB TRA-ECS:
 - ④ **1Y:** start using frequencies and offering services to end-users in **at least 1 major city**
 - ④ **5Y:** offer services to end users **using all these frequencies** in **all major cities**
 - ④ **5Y:** For 700 MHz, SDL, 1500 MHz SDL and 26 GHz bands: start using frequencies and offering services to end-users in **at least 1 major city**

- ④ 700 MHz FDD licence holders - by using any available frequencies – to provide the coverage:
 - ④ **≥ 31.12.2025:**
 - ④ **99% of inhabitants** of the Republic of Slovenia
 - ④ **99% of motorways and highways**
 - ④ **> 60% of main roads and regional roads I and II**
 - ④ **> 60% of the active railways with passenger traffic**
(NOT in-train coverage)

- ④ Providing 5G technology – support \geq 3GPP Rel. 15**
- ④ 5G coverage - any applicant who wins **700 MHz FDD, 2100 MHz, 2300 MHz or 3600 MHz** needs to:
 - ④ **3M** after licences are issued: **start offering*** commercial 5G services in \geq **1 frequency band, \geq 1 one major city**
 - ④ \geq **31. 12. 2025** provide commercial 5G services **in all major cities**. Applicants winning \geq **70 MHz of contiguous spectrum** - **provide** as well **eMBB** and **support of massive IoT**. Depends on the market availability of required features, based on evidence AKOS will postpone the deadline.

* - Start offering 5G service means – cover at least 1 urban settlement with one base station

** - 3GPP Release 15 or a newer specification (ETSI EN 301 908-x standards)

Promotion of the following sharing options:

- ④ sharing of passive or active infrastructure or spectrum pooling,
- ④ business arrangements on national roaming,
- ④ joint deployment of infrastructure for the provision of networks and services based on the use of radio frequency spectrum.

Active sharing and frequency pooling, are allowed within a framework that does not limit infrastructural competition

Allowance of frequency sharing and sharing of active in challenging areas

- ④ Triglav National Park, Settlements of 2nd priority
- ④ Road and railway tunnels,
- ④ Critical road sections
- ④ Slovene border and Piran bay,
- ④ in parts exceeding 60% of active railways with passenger,
- ④ in parts exceeding 60% of main and regional roads cat. I and II,
- ④ on historical monuments and other buildings under protection of Cultural heritage,
- ④ for small cells if there is a restriction on space building restrictions,
- ④ indoor.

Sharing of passive infrastructure or obligations to conclude localised roaming access agreements

- ④ Sharing 26 GHz
 - ④ In the 26 GHz band, frequency pooling and active sharing is permitted, including dynamic spectrum sharing, with a pre-emptive right in favour of the DARF holder on its assigned sub-band and active sharing between all DARF holders as well as between DARF holders and those leasing capacity.
- ④ Synchronisation for TDD bands: 2300M/3600M/26G*
 - ④ Until 31. 12. 2025 synchronization is required in compliance with the default synchronization scheme – Frame B (»DD DS UU DD DD«) from ECC Recommendation (20)03,
 - ④ >31. 12. 2025 DARF holders in this band may propose a different harmonized synchronisation scheme.
 - ④ When defining a new synchronization scheme, the Agency shall take into account proposals of the bidders who will hold:
 - ④ for 3600 MHz: a total of 80 MHz of more spectrum in this frequency band
 - ④ for 26 GHz: a total of 400 MHz of more spectrum in this frequency band
 - ④ Default common reference phase clock is the GNSS satellite network as defined in the executive summary of ECC Report 216 and ECC Report 296 ECC Report 296
 - ④ If the holders of DARFs agree differently, they may use the parameters different that the default.

*For 26 GHz For indoor use and outside mass events (stadiums, convention centers, concert halls, ...), synchronization is not obligatory. Possible harmful interference may be mitigated using beamforming antennas on transmitter and receiver site.

Bidders who will be awarded any part of the spectrum in this public tender will have to comply with:

- ④ the relevant national and European legislation, and
- ④ internationally recognized standards and best practices in networks and services security and operational continuity, and
- ④ introduce and maintain adequate and proportionate organizational and technical measures for managing risks to the security and safety of information systems, networks and services.

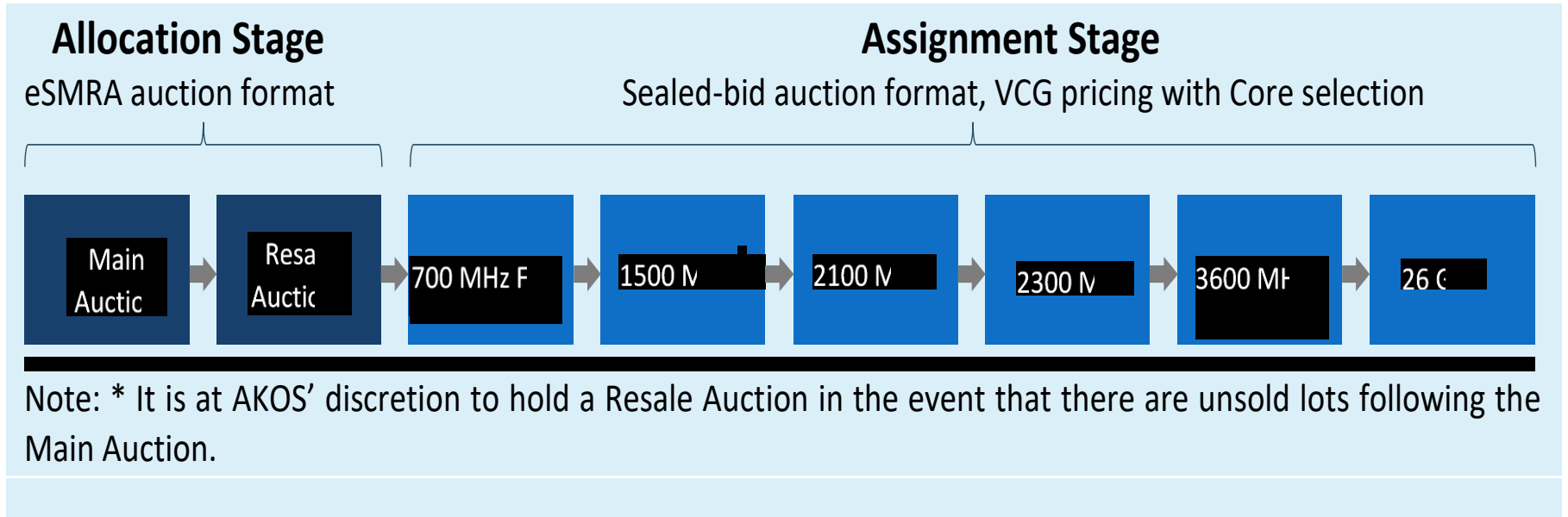
The measures must provide the level of security adequate for the estimated risk, including risks that arise from relationships and agreements of suppliers of information systems, network equipment, and features and services.

When selecting vendors, the bidder will have to carry out a risk assessment that comprises all the relevant risks linked to the ownership, delivery, quality and transparency of engineering practices and security controls, from the aspect of operational continuity, while taking into account any national security guidelines from the Government of the Republic of Slovenia.

- ④ **Enhanced SMRA – eSMRA**
- ④ A simple but effective auction format that allows bidders to choose the optimal set of frequencies from different frequency bands
- ④ Auction mechanism:
 - ④ Bidders in each round determine the demand in each lot category (i.e. the number of lots they would like to acquire at the current price of each round)
 - ④ Bidders can always keep their bid from the previous round - determine that they are still interested in the same number of lots as in the previous round
 - ④ Bidders may also request a change in their bid from the previous round:
 - ④ **Decrease** demand from the previous round – (possible) until aggregate demand falls below supply, or
 - ④ **Increase** demand from previous round – possible if the bidder has enough eligibility points



- ④ Exposure risk within each category:
 - ④ Bidders will be able to select the minimum acceptable amount of lots for each category (*Minimum Viable Quantity – MVQ*)
- ④ Exposure risk between lot categories:
 - ④ The bidder conditions the demand for lots in one category with the acquisition of lots in another category (700 MHz SDL, 1500 MHz SDL)
- ④ Unsold spectrum:
 - ④ Additional auction for unsold spectrum
- ④ Strategic bidding:
 - ④ Difficult to prevent completely – (limited information for bidders during the auction)
- ④ Bidding restrictions:
 - ④ Possible additional bidding restrictions, but always at the cost of the complexity of the auction

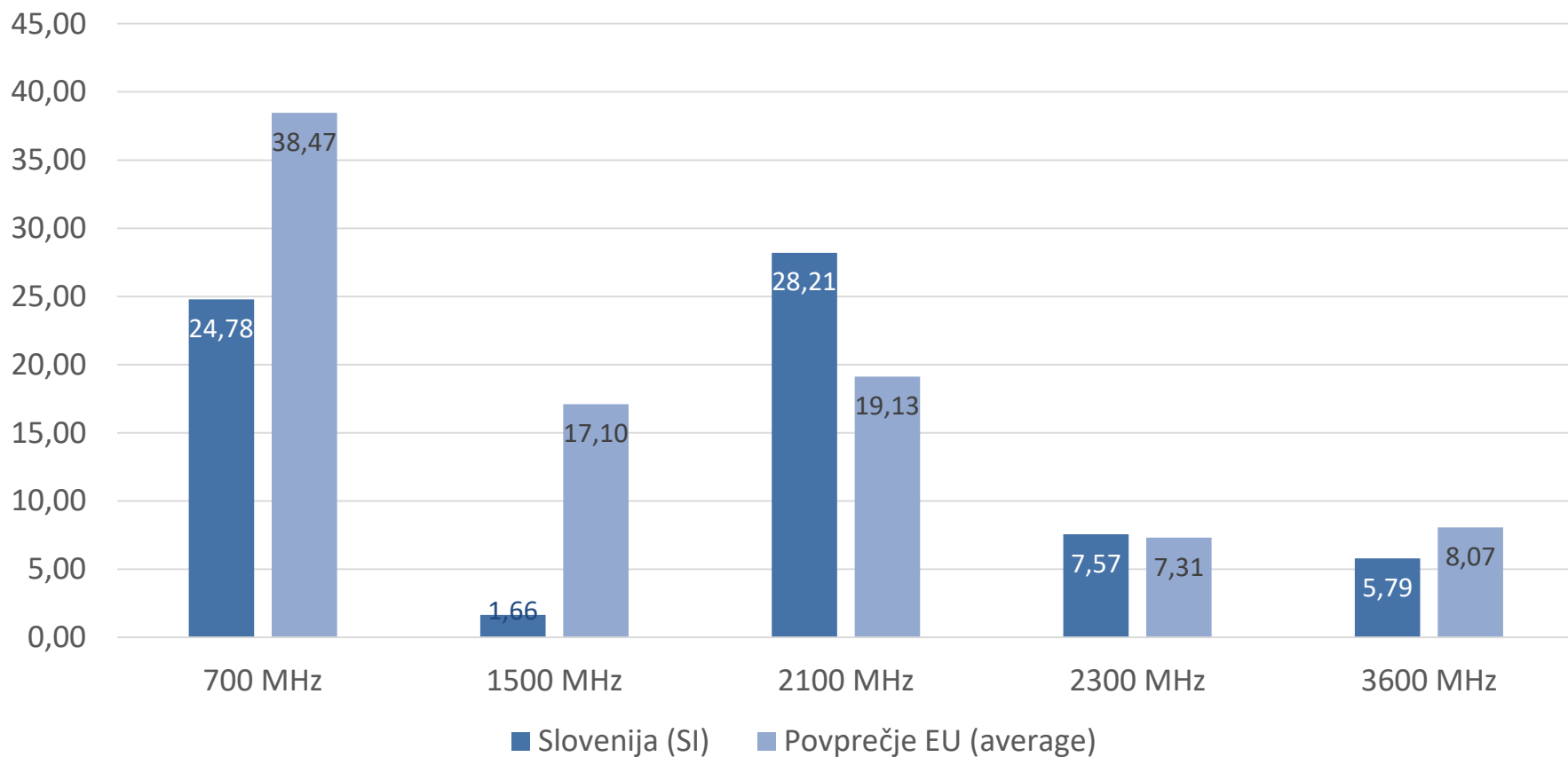


- 7.4. – 16.4.2021
- 4 bidders
- 41 rounds of Main Auction
- no Resale Auction (all spectrum was sold)
- 6 assignment rounds for bands 700 MHz FDD, 1500 MHz, 2100 MHz, 2300 MHz, 3600 MHz in 26 GHz

Spekter	Končna cena
2 x 90 MHz paired spectrum (FDD)	164.236.603,00 EUR
1 x 105 MHz spectrum SDL	
1380 MHz unpaired spectrum (TDD)	

- Administrative costs 678.735,17 EUR

Prices (MHz/pop)



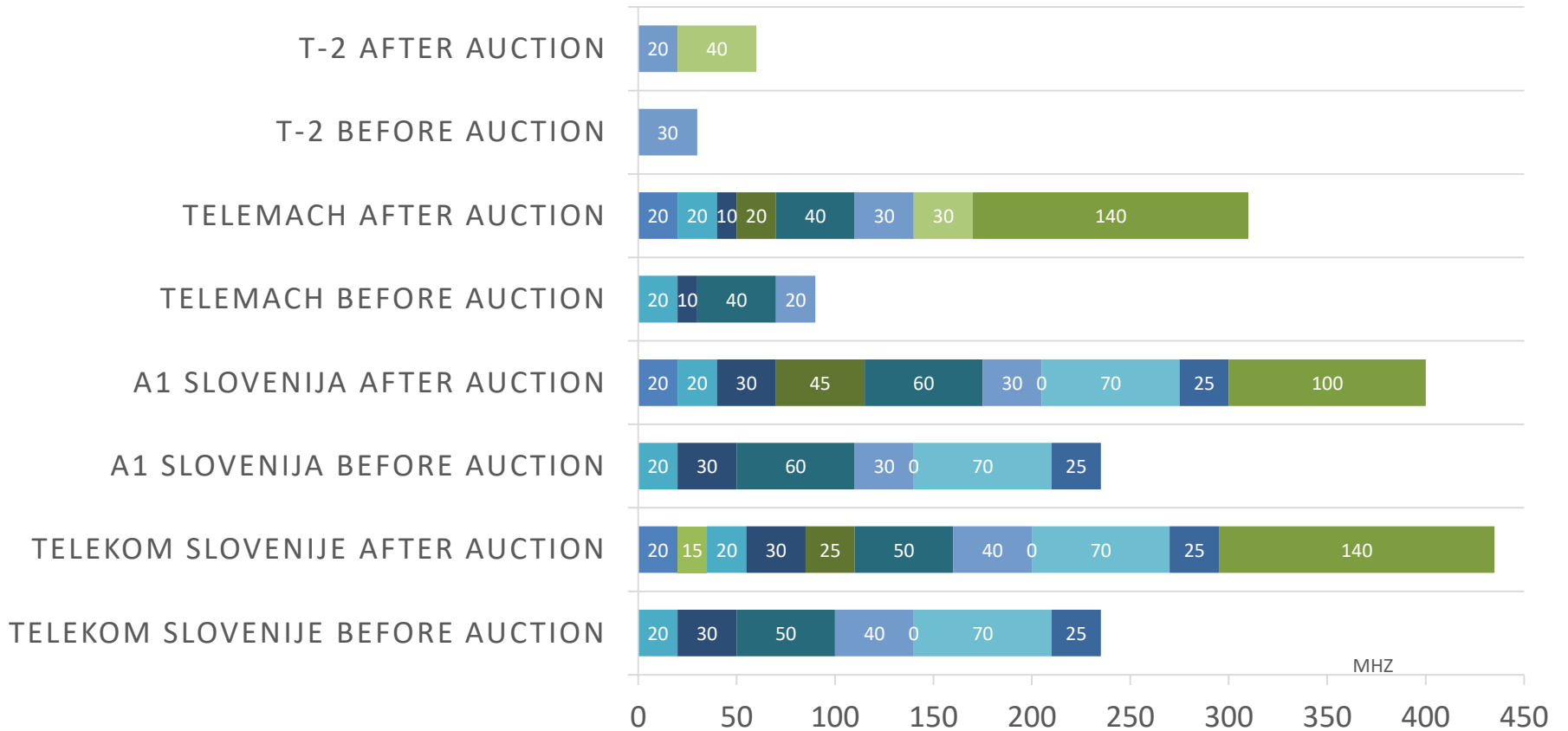
Bidder	Quantity of Spectrum	Frequency range	Base Price	Assignment Price	Final price	Payment
			[EUR]	[EUR]	[EUR]	[EUR]
A1 Slovenija	2x10 MHz	723-733/778-788 MHz	10.462.000	0	10.462.000	42.429.592
	1x45 MHz	1472-1512 MHz	1.404.000	67	1.404.067	
	2x15 MHz	1920-1935/2110-2125 MHz	17.643.000	258	17.643.258	
	1x100 MHz	3700-3800 MHz	12.230.000	0	12.230.000	
	1x400 MHz	26700-27100 MHz	690.000	267	690.267	
T-2	2x10 MHz	1970-1980/2160-2170 MHz	11.762.000	0	11.762.000	18.158.000
	1x40 MHz	2320-2360 MHz	6.396.000	0	6.396.000	
Telekom Slovenije	2x10 MHz	703-713/758-768 MHz	10.462.000	11.400	10.473.400	28.524.434
	1x15 MHz	738-753 MHz	35.000	0	35.000	
	1x25 MHz	1432-1452 MHz	204.000	34	204.034	
	2x20 MHz	1950-1970/2140-2160 MHz*	23.524.000	1.205.943	23.553.743**	
	1x140 MHz	3420-3560 MHz	17.122.000	0	17.122.000	
	1x400 MHz	27100-27500 MHz	690.000	0	690.000	
Telemach	2x10 MHz	713-723/768-778 MHz	10.462.000	0	10.462.000	51.570.834
	1x20 MHz	1452-1472 MHz	1.200.000	0	1.200.000	
	2x15 MHz	1935-1950/2125-2140 MHz	17.643.000	0	17.643.000	
	1x30 MHz	2360-2390 MHz	4.797.000	0	4.797.000	
	1x140 MHz	3560-3700 MHz	17.122.000	0	17.122.000	
	1x100 MHz	26500-26700 MHz	345.000	1.834	346.834	
Total						164.236.603

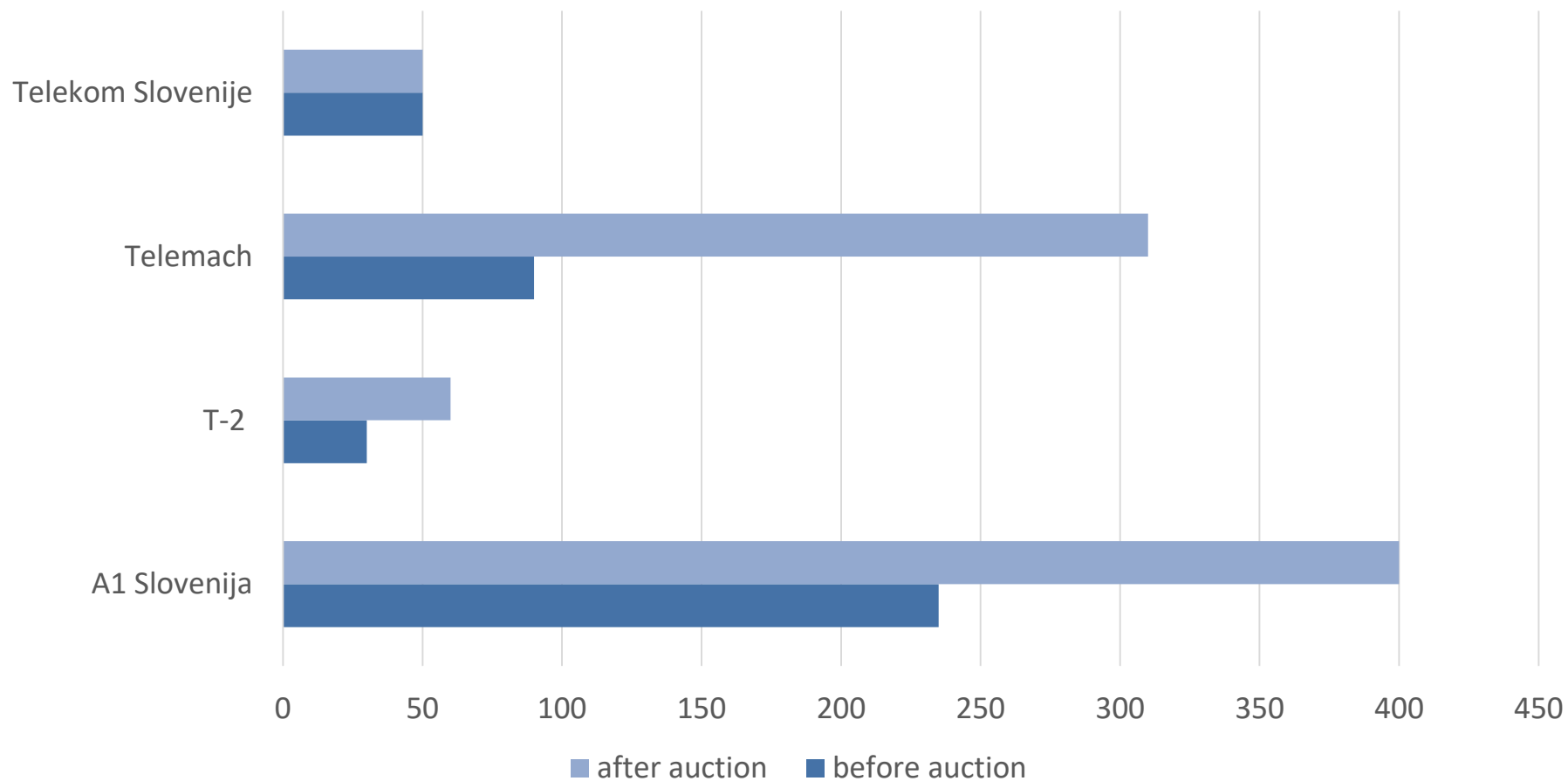
*Delayed block

**Taken into account 20% discount for the delayed block in the amount of EUR 1.176.200

Spectrum before and after Auction

- 700 MHz FDD ■ 700 MHz SDL ■ 800 MHz FDD ■ 900 MHz FDD ■ 1500 MHz TDD ■ 1800 MHz FDD
- 2100 MHz FDD ■ 2300 MHz TDD ■ 2600 MHz FDD ■ 2600 MHz TDD ■ 3600 MHz TDD







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