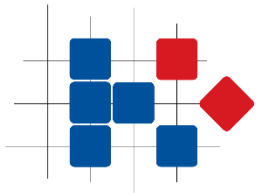


# Assignment of the radio spectrum in the 700 MHz, 3600 MHz and 26 GHz frequency bands

28<sup>th</sup> September 2021



Mobile communication market overview



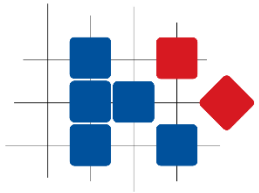
Spectrum assigned



Assigning 5G spectrum



Auction results

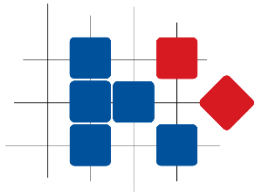


# General introduction

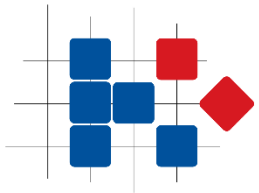


- Republic of Croatia
- GDPpc: 14.944 USD (2019)
- Population: ~ 4.105.267
- Land area: 56.594 sqm
- Croatia has 1246 islands
- DESI 2020: 20<sup>th</sup>





- Market players in mobile network
  - Croatian Telecom (HT)
  - A1 Croatia
  - Telemach (Tele2 until March 2020)
  
- Market players in fixed network
  - Croatian Telecom Group – HT, Iskon, Optima Telekom
  - A1 Croatia
  - Others National (8) – Akton, Terrakom, Total TV, Intersat...
  - Others Regional (32) – O telekomunikacije, Magic NET...
  
- Market share of HT Group & A1 on fixed market (2020):
  - Broadband access services – 96,75%
  - Pay TV services – 93,30%; IPTV 99,56%
  - Fixed telephony services – 98,83%



Mobile communication market overview



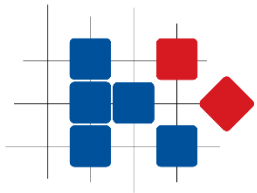
**Spectrum assigned**



Assigning 5G spectrum



Auction results

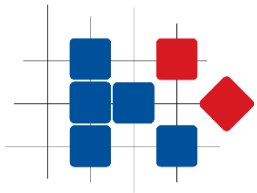


- National licenses valid until 2024

Band/Operator	A1	HT	Telemach
800 MHz	30 MHz	30 MHz	-
900 MHz	28,8 MHz	28,8 MHz	10 MHz
1800 MHz	35,6 MHz	60 MHz	54 MHz
2100 MHz	40 MHz	30 MHz	50 MHz
2600 MHz	40 MHz	40 MHz	40 MHz

- Regional license in Međimurje and Varaždin county valid until 2023

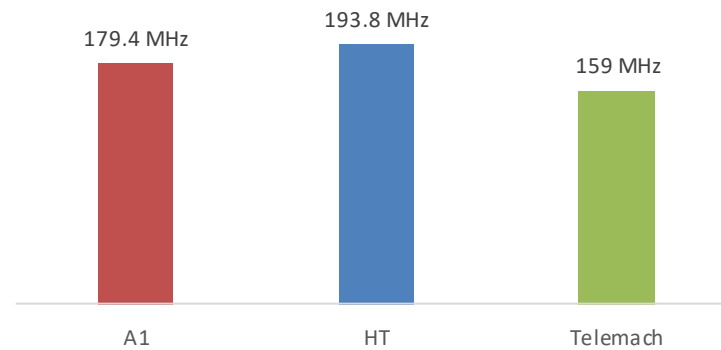
Band/Operator	O-telekomunikacije
3400-3470 MHz	70 MHz



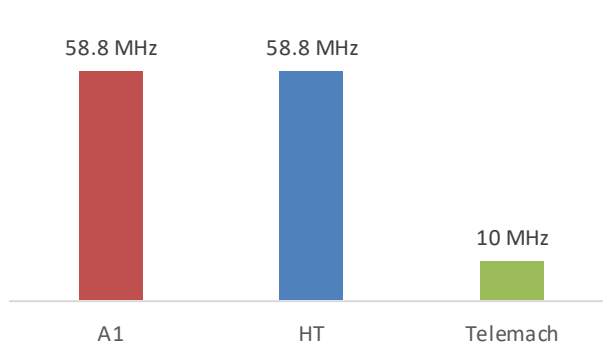
# Spectrum assigned



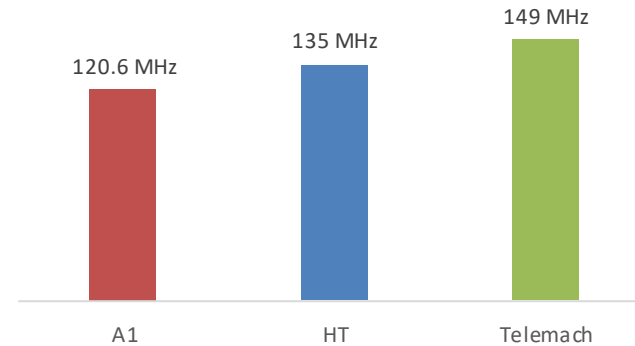
## ● Total spectrum assigned

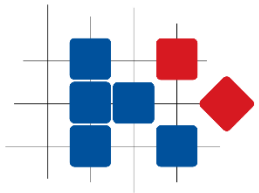


## ● Spectrum assigned below 1 GHz



## ● Spectrum assigned above 1 GHz





Mobile communication market overview



Spectrum assigned

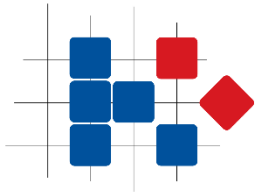


**Assigning 5G spectrum**



Auction results





## ● Four separate SMRA auctions

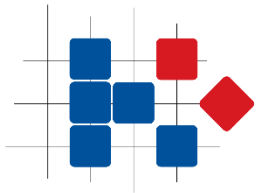
- 700 MHz frequency band (703-733/758-788 MHz)
- 3600 MHz national level (3480-3800 MHz)
- 3600 MHz regional level (3400-3480 MHz)
- 26 GHz (26,5-27,5 GHz)
- National licensees are not allowed to compete for 3600 MHz regional

## ● Qualification for auction

- 10% of reserve price for the maximum amount of RF spectrum for which each applicant plans to bid

## ● Two stage auction process

- Main auction stage – bidders compete for generic blocks
- Allocation stage – single-round sealed bid auction for specific location of the blocks in the band



- 700 MHz frequency band

- 3 blocks of 2x10 MHz

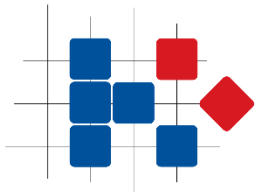
694-703	703-713	713-723	723-733	733-758	758-768	768-778	778-788	788-791
Guard band	Uplink			Gap	Downlink			Guard band
9 MHz	30 MHz (3 x 10 MHz)			25 MHz	30 MHz (3 x 10 MHz)			3 MHz

- Reserve price

- 1 block (2x10 MHz) – 6 million EUR

- Spectrum cap

- 1 block – 2x10 MHz (20 MHz)

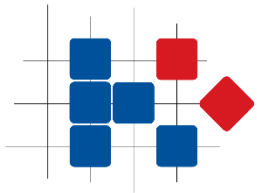


## ● 3600 MHz frequency band

- 32 blocks of 10 MHz on national level
- 8 blocks of 10 MHz on regional (county) level

Regional (county) level								National level													
3400-3410	3410-3420	3420-3430	3430-3440	3440-3450	3450-3460	3460-3470	3470-3480	3480-3490	3490-3500	3500-3510	3510-3520	3520-3530	...	3750-3760	3760-3770	3770-3780	3780-3790	3790-3800			
80 MHz (8 x 10 MHz)								320 MHz (32 x 10 MHz)													
3400 MHz								3480 MHz												3800 MHz	

- Reserve price
  - 1 block (10 MHz) on national level – 700.000 EUR
  - 1block (10 MHz) on regional level – 1.800-37.000 EUR (depending on population)
- Spectrum cap
  - 12 blocks on national level – 12x10 MHz (120 MHz)
  - 8 blocks in each of max 4 counties on regional level – 4x8x10MHz (320 MHz)
- At regional level bidding will conduct for 7 blocks in the band 3410-3480 MHz
  - 3400-3410 MHz block will be awarded to the winner of the 3410-3420 MHz block



- 26 GHz frequency band

- 5 blocks of 200 MHz

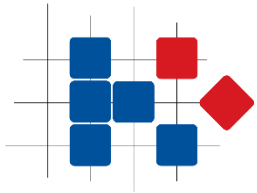
26500- 26700	26700- 26900	26900- 27100	27100- 27300	27300- 27500
1000 MHz (5 x 200 MHz)				
26500 MHz		27500 MHz		

- Reserve price

- 1 block (200 MHz) – 1 million EUR

- Spectrum cap

- 2 blocks – 2x200 MHz (400 MHz)
- “Club use” allowed up to double of awarded spectrum



## ● Obligations for the winners of the spectrum in 700 MHz band

### ● 5G coverage obligations

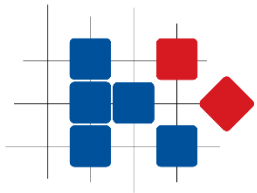
- By 31.12.2025. 95% of the population in urban areas,
- By 31.12.2025. 25 % of the total area of rural areas,
- By 31.12.2027. 50 % of the total area of rural areas,
- By 31.12.2025. 99 % of the total length of the highways,
- By 31.12.2025. 95 % of the total length of the selected railways.

### ● 4G/5G coverage obligations

- By 31.12.2024. 95% of the population in 60 selected underserved settlements,
- In first three years 80% of the total area of 20 selected underserved municipalities of special interest,
- Underserved settlements and municipalities are divided into 3 groups of obligations which are linked to each 2x10 MHz block in 700 MHz

### ● Signal quality requirement

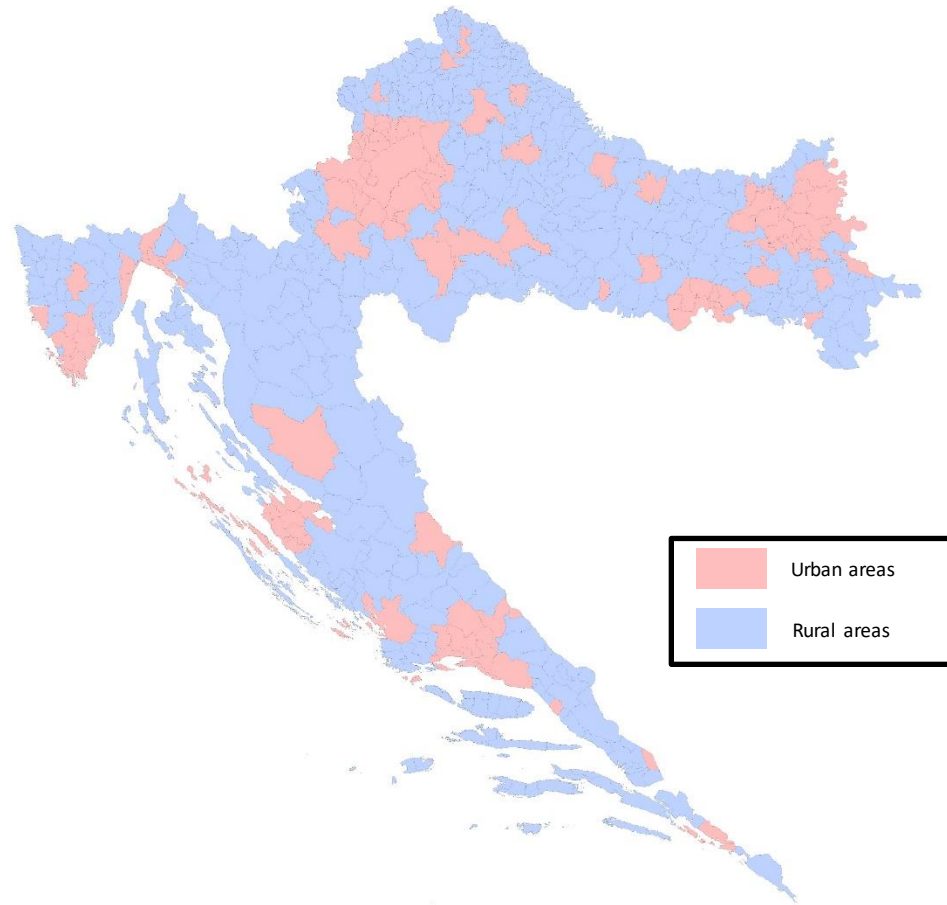
- At least -110 dBm – RSRP (Reference Signal Received Power)

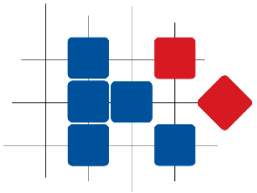


# Assigning 5G spectrum



● — Urban and rural areas

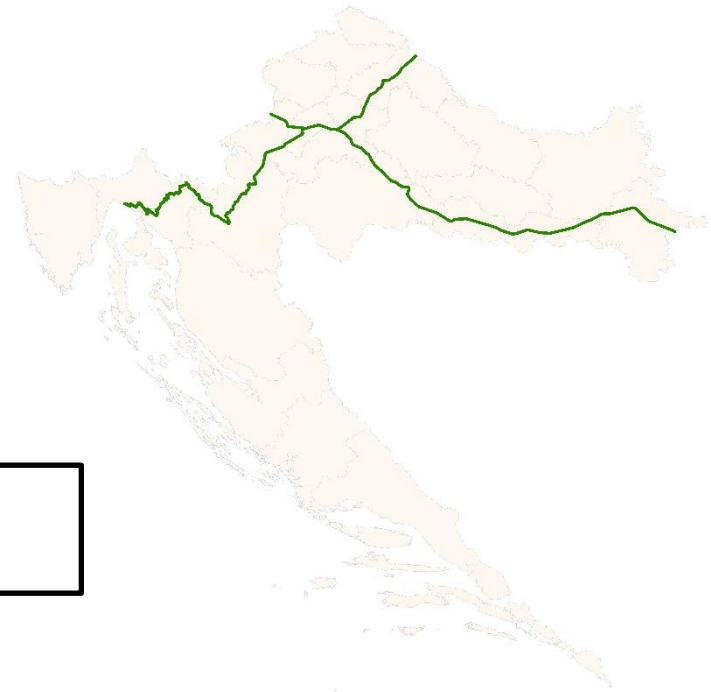


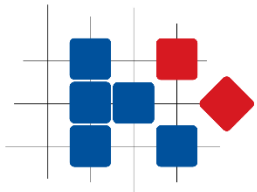


# Assigning 5G spectrum



## ● — Transport routes

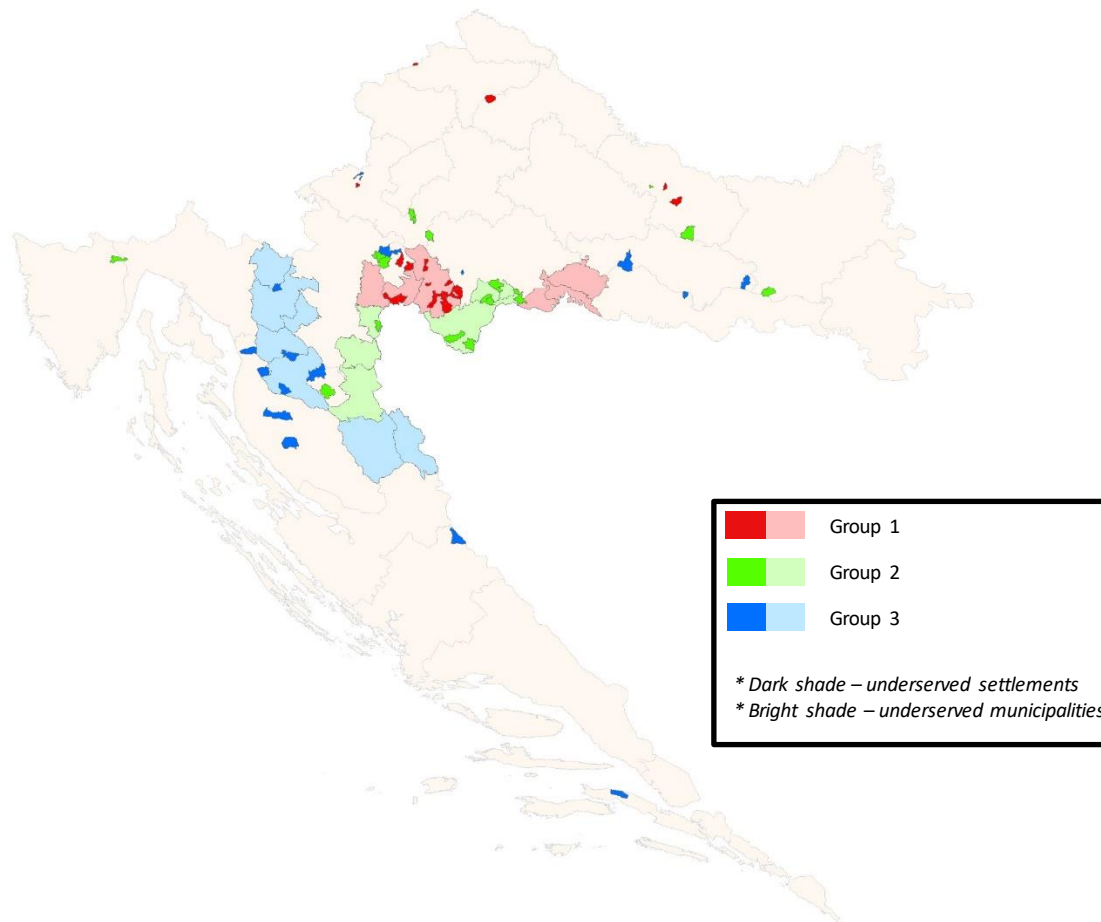




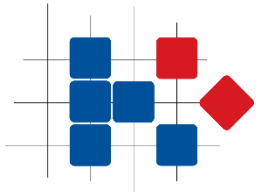
# Assigning 5G spectrum



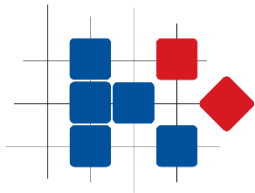
- Three groups of obligations linked to each block in 700 MHz band







- **Obligations for the winners of the spectrum in 3600 MHz band**
  - National licensees obligation
    - By 31.12.2022. put in operation at least 1 BS in each county
    - By 31.12.2025. put in operation at least 200 BS in total
  - Regional licensees obligation
    - By 31.12.2022. put in operation at least 1 BS in each county
    - By 31.12.2024. put in operation at least 1 BS in Varaždin and Međimurje county (spectrum available after November 2023)



## ●— Infrastructure sharing obligations

### ●— Passive infrastructure sharing

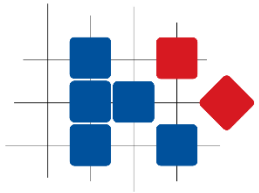
- Already prescribed by applicable regulations and legal acts

### ●— Active infrastructure sharing and national roaming

- non-discriminatory access to the active elements of the network and national roaming in the area of special interest

## ●— MVNO wholesale access

- the obligation to provide wholesale access to MVNOs in order to encourage competitiveness and the provision of innovative services

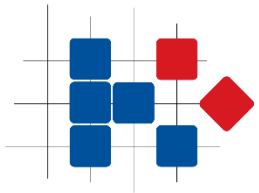


## ● License conditions

- 700 MHz, 3600 MHz and 26 GHz band national licenses duration
  - 15 years with the possibility of extension for a maximum of 5 years
- 3600 MHz band regional licenses duration
  - 15 years with the possibility of extension for a maximum of 5 years
  - 12 years with the possibility of extension for a maximum of 5 years in Varaždin and Međimurje county (aligning with other licenses)

## ● Payment options

- On-off payment
- Payment in maximum 10 instalment increased by annual interest rate of 3-4%
- Payment for possible extension
  - 1/3 of the total amount achieved in the auction



Mobile communication market overview



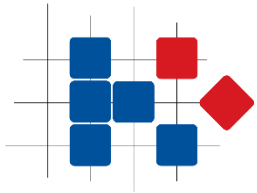
Spectrum assigned



Assigning 5G spectrum



**Auction results**

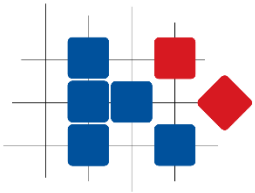


# Results - 700 MHz national

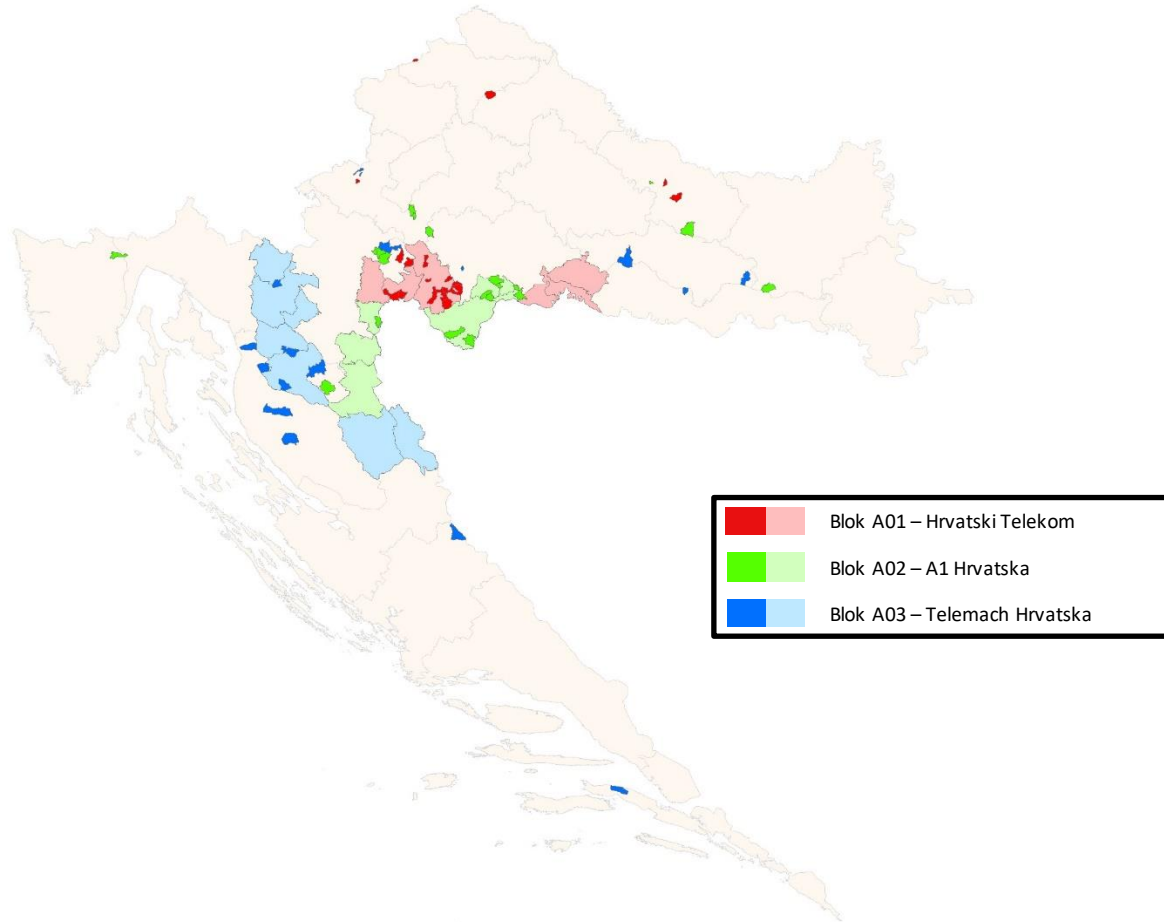


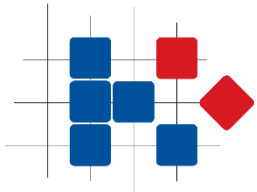
Operator	RF spectrum (MHz)	Block	Reserve price (HRK)	Main phase (HRK)	Allocation phase (HRK)	Total (HRK)
Telemach Hrvatska	20	A03	45.000.000,00	45.000.000,00	1.094.999,00	46.094.999,00
Hrvatski Telekom	20	A01	45.000.000,00	46.800.000,00	2.094.999,00	48.894.999,00
A1 Hrvatska	20	A02	45.000.000,00	45.000.000,00	-	45.000.000,00
<b>TOTAL</b>	<b>60</b>	<b>-</b>	<b>135.000.000,00</b>	<b>136.800.000,00</b>	<b>3.189.998,00</b>	<b>139.989.998,00</b>

- Number of rounds in main phase – 5
- Allocation phase
  - 3.189.998,00 HRK (~ 425,3 tEUR)
- Total fee amount – 139.989.998,00 HRK (~ 18,7 mEUR)
  - 4.989.998,00 HRK (~ 665,3 tEUR - 3,7%) above reserve price in total



# Results - 700 MHz national



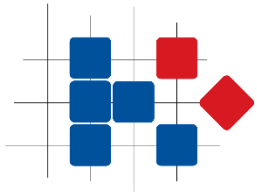


# Results - 3600 MHz national



Operator	RF spectrum (MHz)	Reserve price (HRK)	Main phase (HRK)	Allocation phase (HRK)	Total
Telemach Hrvatska	100	52.500.000,00	52.500.000,00	1.955.750,00	54.455.750,00
Hrvatski Telekom	120	63.000.000,00	63.210.000,00	3.555.750,00	66.765.750,00
A1 Hrvatska	100	52.500.000,00	52.920.000,00	-	52.920.000,00
<b>TOTAL</b>	<b>320</b>	<b>168.000.000,00</b>	<b>168.630.000,00</b>	<b>5.511.500,00</b>	<b>174.141.500,00</b>

- Number of rounds in main phase – 4
- Allocation phase
  - 5.511.500,00 HRK (~ 734,9 tEUR)
- Total fee amount – 174.141.500,00 HRK (~ 23,2 mEUR)
  - 6.141.500,00 HRK (~ 818,9 tEUR - 3,7%) above reserve price in total



# Results - 26 GHz national



Operator	RF spectrum (MHz)	Reserve price (HRK)	Main phase (HRK)	Allocation phase (HRK)	Total
EOLO	200	7.500.000,00	7.500.000,00	-	7.500.000,00
Telemach Hrvatska	200	7.500.000,00	7.500.000,00	188.135,00	7.688.135,00
Hrvatski Telekom	400	15.000.000,00	15.000.000,00	-	15.000.000,00
A1 Hrvatska	200	7.500.000,00	7.500.000,00	-	7.500.000,00
<b>TOTAL</b>	<b>1000</b>	<b>37.500.000,00</b>	<b>37.500.000,00</b>	<b>188.135,00</b>	<b>37.688.135,00</b>

●— **Number of rounds in main phase – 3**

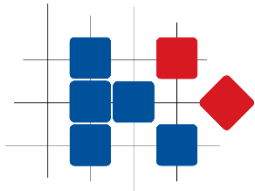
●— **Allocation phase**

●— 188.135,00 HRK (~ 25 tEUR)

●— **Total fee amount – 37.688.135,00 HRK (~ 50,3 mEUR)**

●— 188.135,00 HRK ((~ 25 tEUR - 0,5%) above reserve price in total)

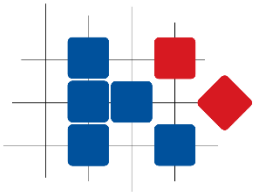




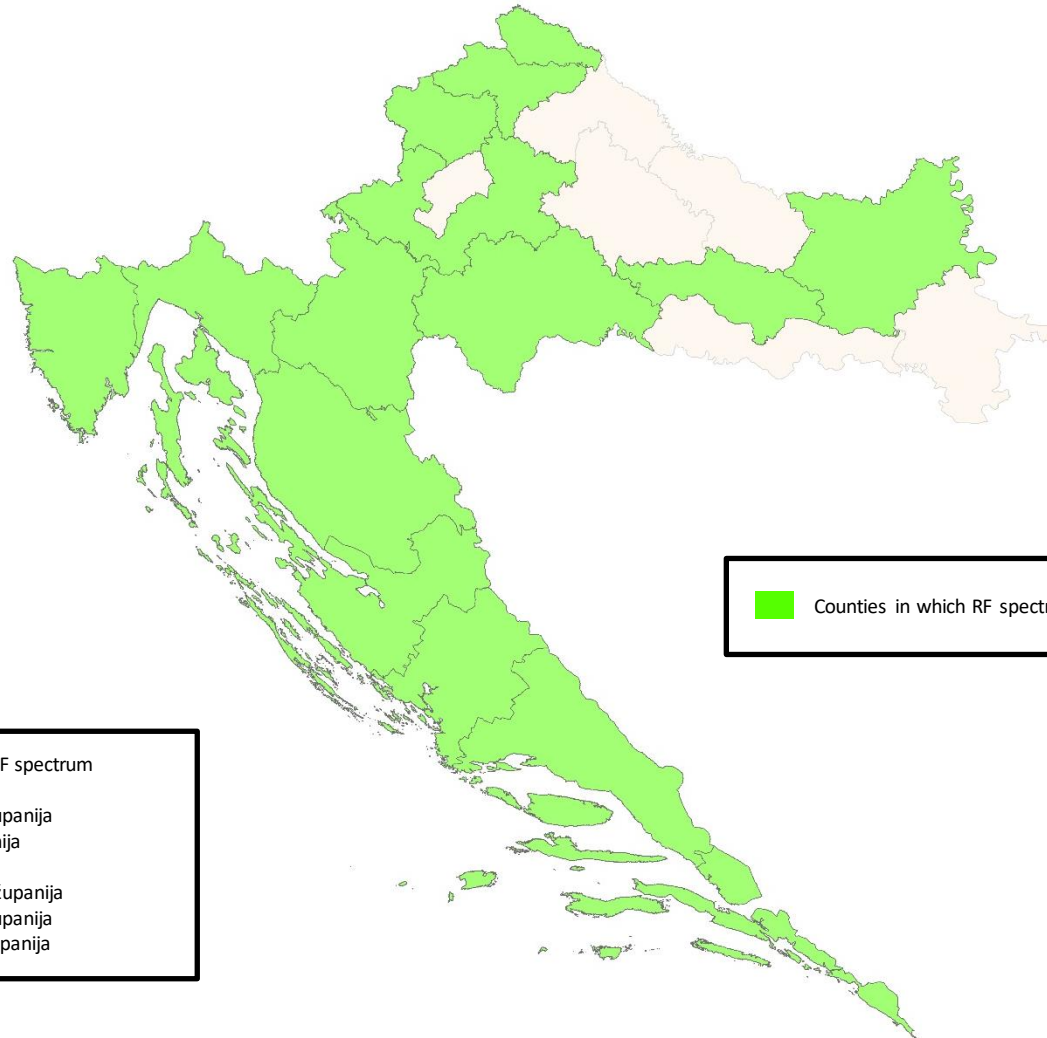
# Results - 3600 MHz regional




Operator	Region/County	RF spectrum (MHz)	Reserve price (HRK)	Main phase (HRK)	Allocation phase (HRK)	Total (HRK)
<b>EOLO</b>	Istarska	70 +10	490.000,00	501.200,00	-	501.200,00
	Primorsko-goranska	70 + 10	490.000,00	579.600,00	-	579.600,00
	Splitsko-dalmatinska	70 +10	980.000,00	1.786.400,00	-	1.786.400,00
	Zadarska	70 +10	490.000,00	490.000,00	-	490.000,00
<b>Eco Net</b>	Krapinsko-zagorska	40 + 10	280.000,00	280.000,00	-	280.000,00
	Međimurska	40 + 10	240.000,00	240.000,00	-	240.000,00
	Varaždinska	40 + 10	240.000,00	240.000,00	-	240.000,00
<b>Terrakom</b>	Karlovačka	40 + 10	280.000,00	280.000,00	-	280.000,00
	Osječko-baranjska	40 + 10	280.000,00	280.000,00	-	280.000,00
	Sisačko-moslavačka	40 + 10	280.000,00	280.000,00	-	280.000,00
	Zagrebačka	40 + 10	560.000,00	758.800,00	1.000,00	759.800,00
<b>BeeIN</b>	Ličko-senjska	60 + 10	84.000,00	84.000,00	-	84.000,00
	Požeško-slavonska	20 + 10	56.000,00	56.000,00	-	56.000,00
<b>Digicom</b>	Krapinsko-zagorska	10	70.000,00	70.000,00	-	70.000,00
<b>Markoja</b>	Dubrovačko-neretvanska	70 + 10	490.000,00	490.000,00	-	490.000,00
	Šibensko-kninska	70 + 10	196.000,00	196.000,00	-	196.000,00
	Zagrebačka	30	420.000,00	562.800,00	-	562.800,00



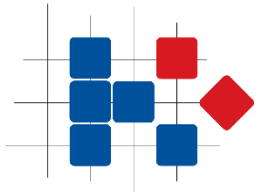
# Results - 3600 MHz regional



 Counties in which RF spectrum is awarded

Counties in which is not RF spectrum awarded:

- Bjelovarko-bilogorska županija
- Brodsko-posavska županija
- Grad Zagreb
- Koprivničko-križevačka županija
- Virovitičko-podravska županija
- Vukovarsko-srijemska županija

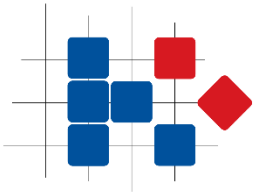


# Results - 3600 MHz regional

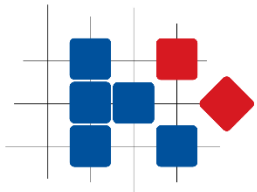


County	Reserve price (HRK)	Main phase (HRK)	Main phase – reserve price (HRK)	Increase (%)
Istarska	490.000,00	501.200,00	11.200,00	2,29
Primorsko-goranska	490.000,00	579.600,00	89.600,00	18,29
Splitsko-dalmatinska	980.000,00	1.786.400,00	806.400,00	82,29
Zagrebačka	980.000,00	1.321.600,00	341.600,00	34,86

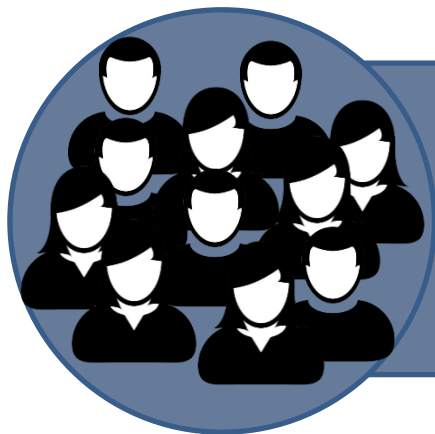
- Number of rounds in main phase – **33**
- Allocation phase
  - 1.000,00 HRK (~ 133 EUR)
- Total fee amount – **7.175.800,00 HRK (~ 956,8 tEUR)**
  - **1.249.800,00 HRK (~ 166,6 tEUR - 21,1%)** above reserve price



- **Total fee amount on national level**
  - 351.819.633,00 HRK (~ 46,9 mEUR)
- **Total fee amount on regional level**
  - 7.175.800,00 HRK (~ 956,8 tEUR)
- **Total fee amount (national + regional)**
  - 358.995.433,00 HRK (~ 47,9 mEUR)



# THANK YOU FOR YOUR ATTENTION!



Krešimir Mazor  
HAKOM