



# 5G Auction in Brazil and the 3.5 GHz band

Agostinho Linhares de Souza Filho, PhD  
Manager of Spectrum, Orbit and Broadcasting

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# AGENDA

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Take-aways



5G

## Anatel aprova o edital do leilão do 5G

Abertura das propostas da maior oferta de espectro da história da Agência ocorrerá no dia 4 de novembro

<https://www.gov.br/anatel/pt-br/assuntos/noticias/anatel-aprova-o-edital-do-leilao-do-5g>

<https://www.gov.br/anatel/pt-br/assuntos/5G/leilao-de-espectro-5g>

## 5G Auction Rules

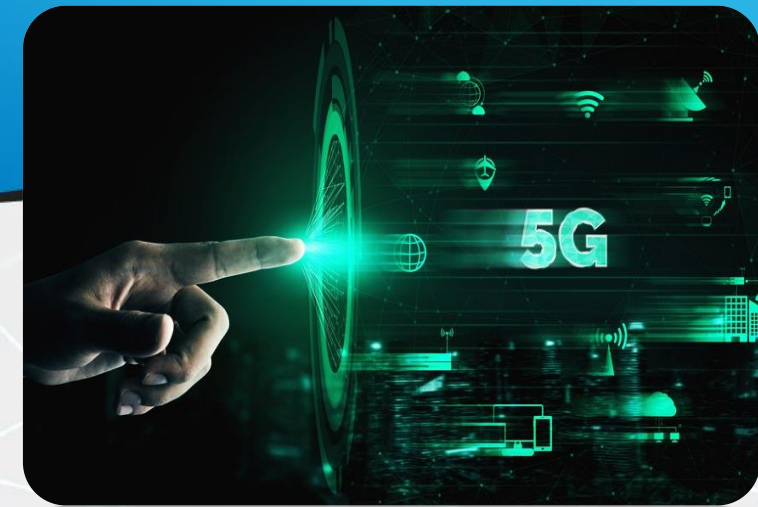
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53500.004083/2018-79

✓ **Auction Nº 1/2021-SOR/SPR/CD-ANATEL**

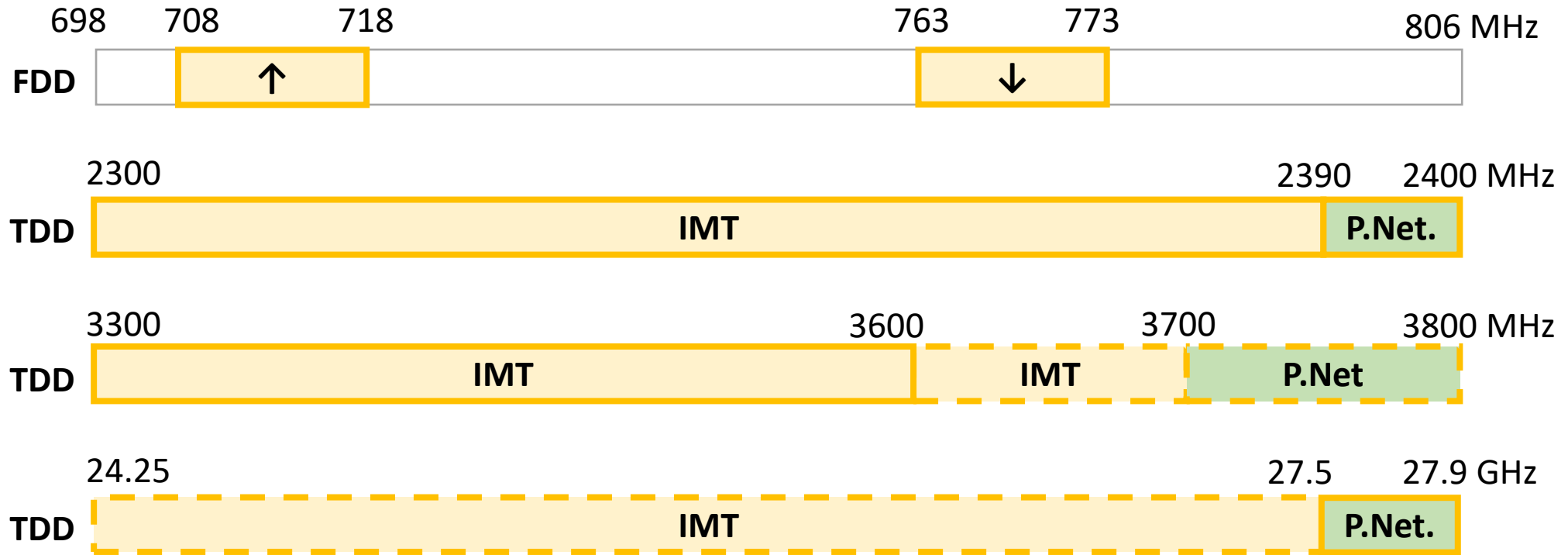
So far, largest spectrum auction in Brazil. Anatel is making available 3710 MHz

- 27/Oct/2021 – Proposals delivery
- 04/Nov/2021 – Auction



# Spectrum Blocks

The purpose of the Auction is granting licenses to use radio frequencies in the following bands:



Legend:

- To be auctioned
- Not to be auctioned (Industry 4.0)
- Allocated before 2021
- Allocated in 2021

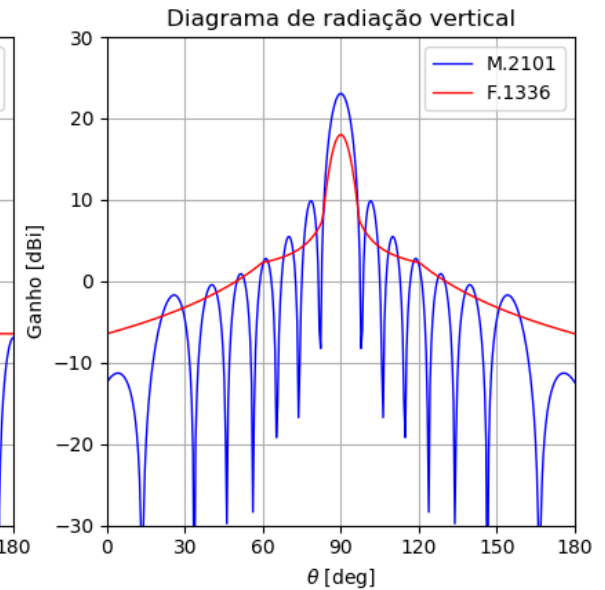
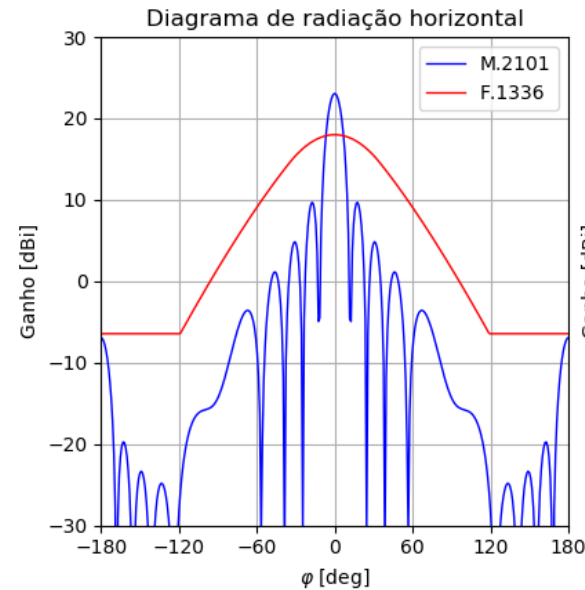
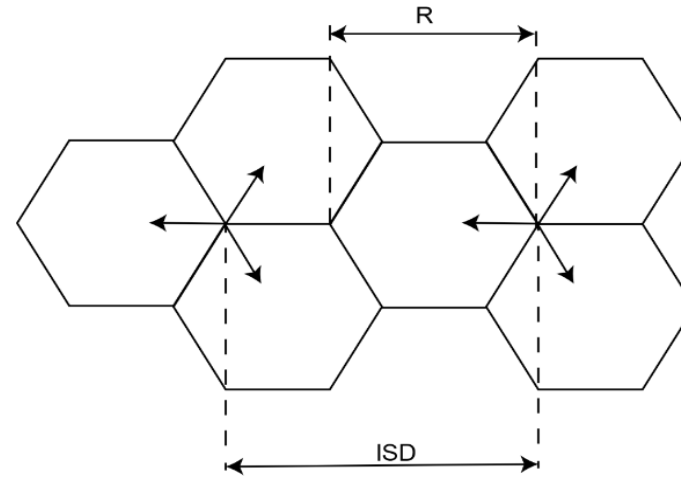
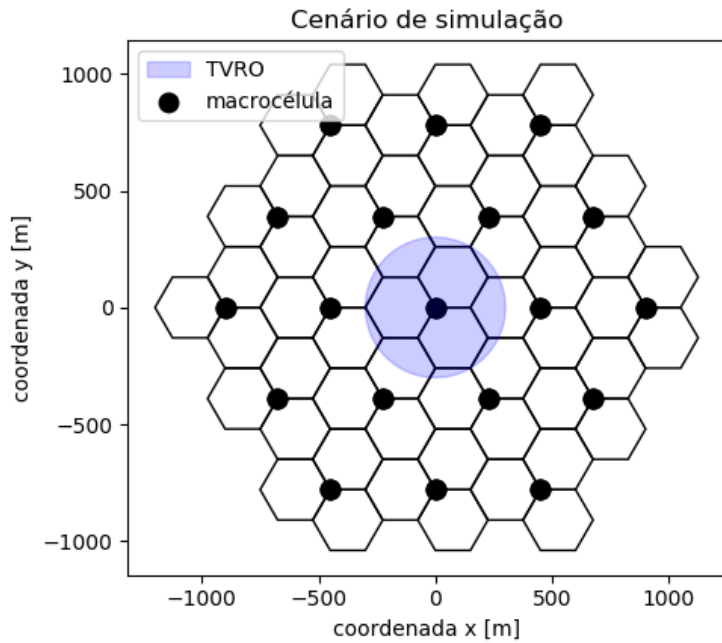
## Economic and social impact

### Estimated spectrum price: R\$ 49.6 Bi

- +90% converted in obligation → coverage in roads, villages, public schools, optical fiber connectivity etc
- 5G deployment: start next year
- Investments of R\$ 160 bi in the next 20 years
- Expectation of new entrants, including regional groups and neutral host operator
- 5G Pioneer bands: 3.5 GHz and 26 GHz

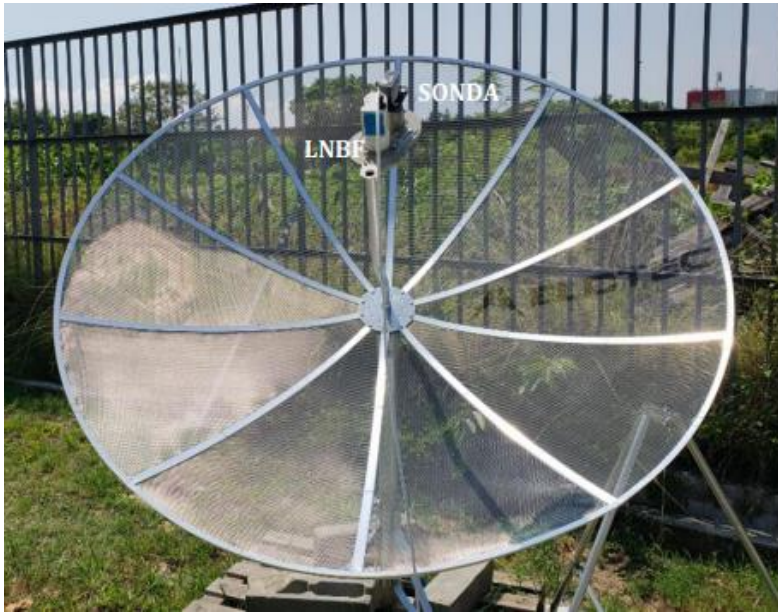


## Monte Carlo Simulations (5G x TVRO)



# 3.5 GHz Studies

## IMT-2020 / TVRO / FSS

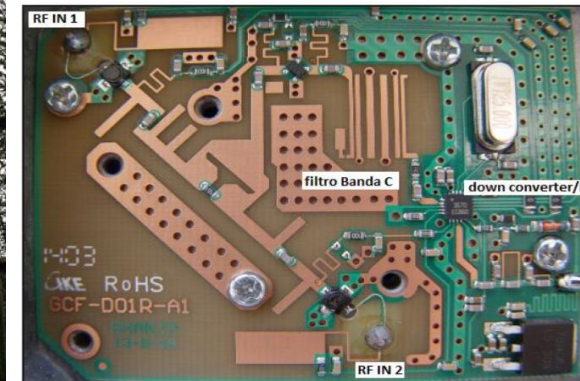
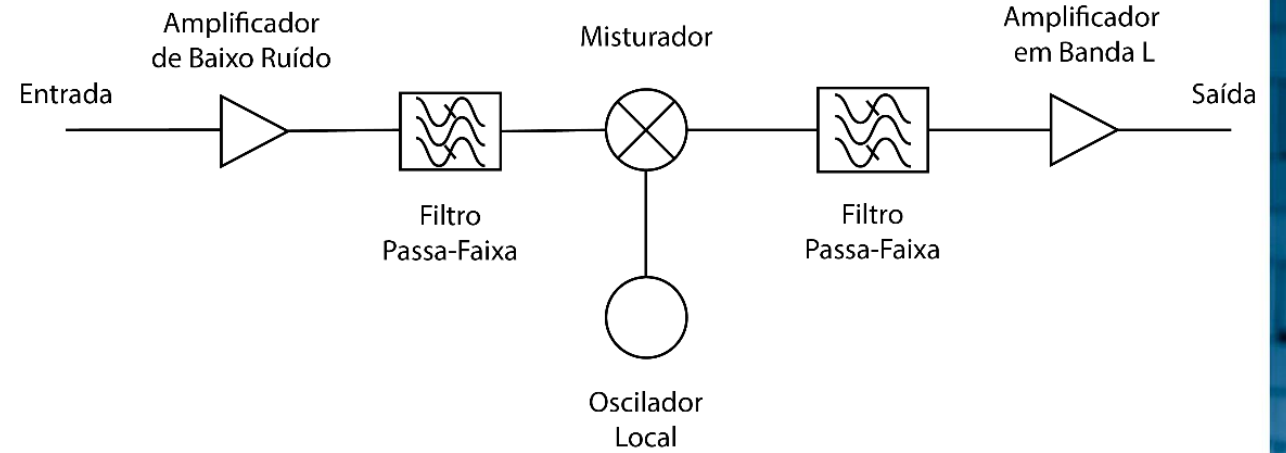


Domestic TVRO

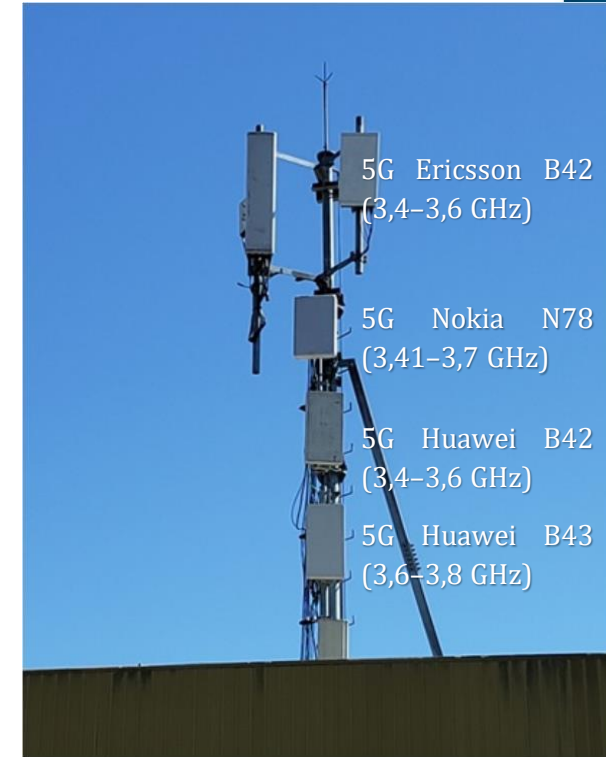


'Professional' Earth Station

### LNBF Típico



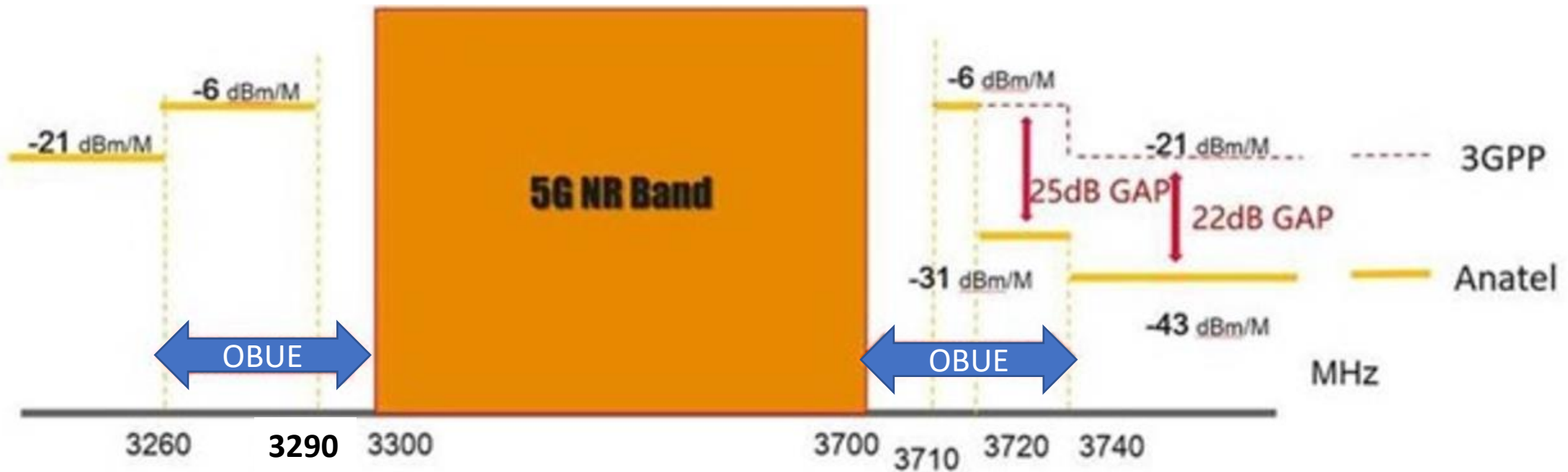
# 3.5 GHz Studies



# 3.5 GHz Emission Limits

EIRPmax = 65 dBm/10MHz per polarization

## Unwanted Emission Limits



Allocation to services		
Region 1	Region 2	Region 3
<b>3 600-4 200</b> FIXED FIXED-SATELLITE (space-to-Earth) Mobile	<b>3 600-3 700</b> FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.434 Radiolocation 5.433	<b>3 600-3 700</b> FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.435
	<b>3 700-4 200</b> FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	
<b>4 200-4 400</b>	AERONAUTICAL MOBILE (R) 5.436 AERONAUTICAL RADIONAVIGATION 5.438 5.437 5.439 5.440	
<b>4 400-4 500</b>	FIXED MOBILE 5.440A	
<b>4 500-4 800</b>	FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE 5.440A	

# 3300 – 3800 MHz Band

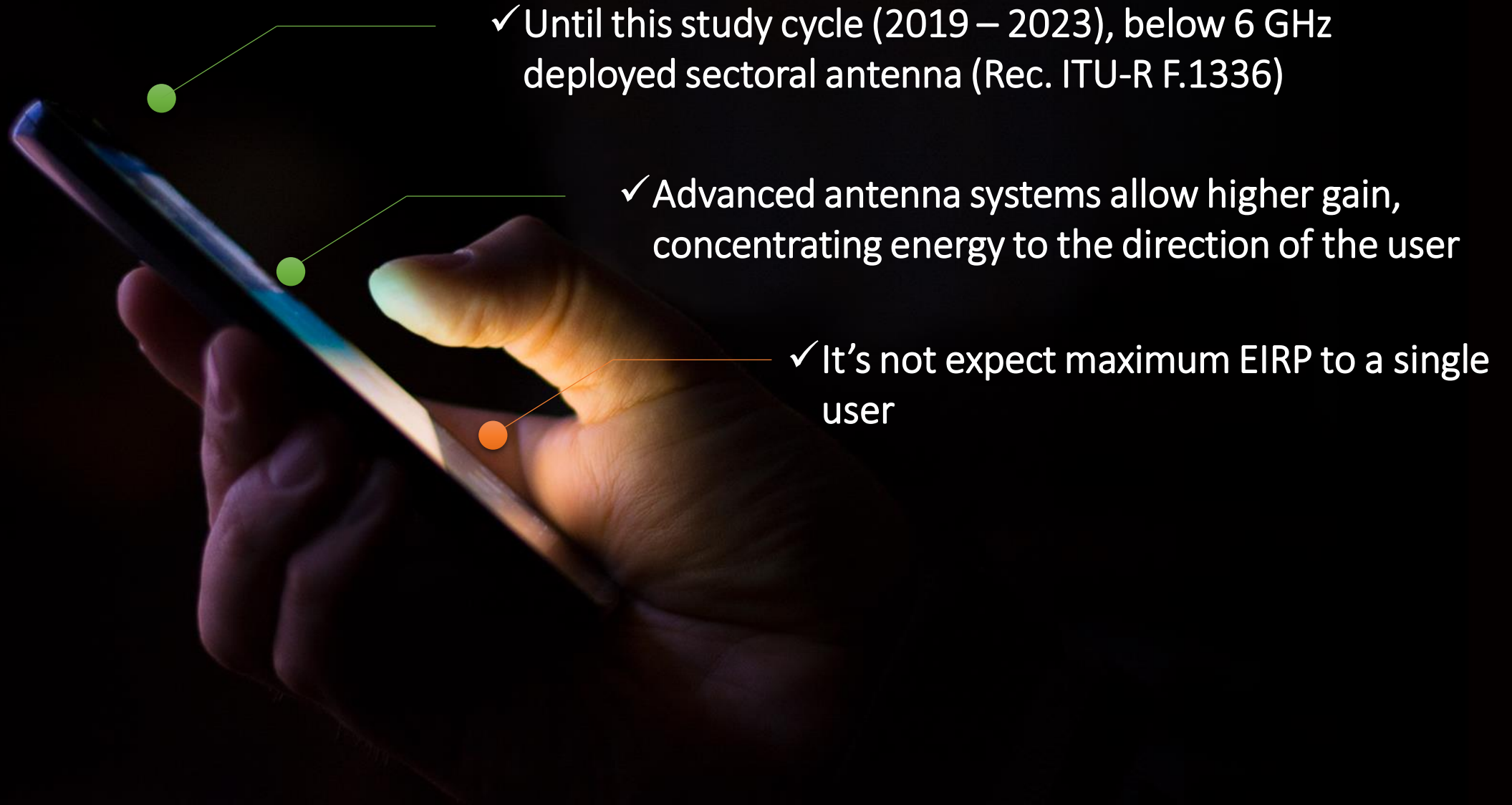
✓ 3.4 – 3.6 GHz identified for IMT in WRC-07

✓ 3.3 – 3.4 GHz and 3.6 – 3.7 GHz identified for IMT in WRC-15

✓ 3.3 – 3.4 GHz and 3.6 – 3.8 GHz under study for WRC-23 (R2)



# 3300 – 3800 MHz Band



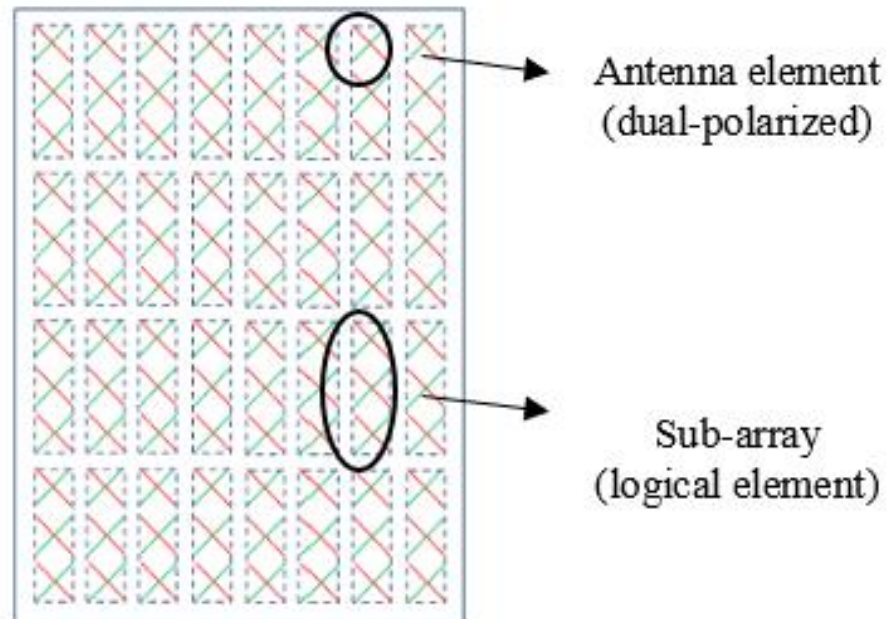
✓ Until this study cycle (2019 – 2023), below 6 GHz deployed sectoral antenna (Rec. ITU-R F.1336)

✓ Advanced antenna systems allow higher gain, concentrating energy to the direction of the user

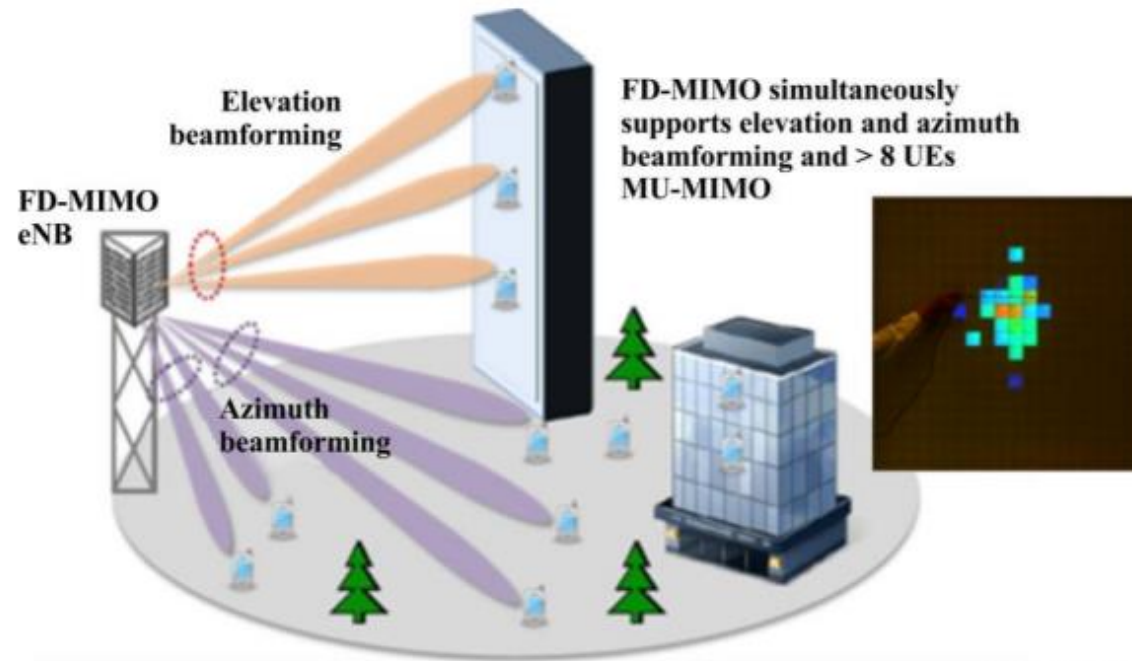
✓ It's not expect maximum EIRP to a single user

# Advanced Antenna System

AAS panel with 4 rows and 8 columns of 3x1 sub-arrays (logical elements).



# Massive MIMO





## Take Aways

-  Aeronautical Radionavigation is safety service
-  Anatel and FAB/DECEA works together
-  We are aware that many Radio altimeters still use 80's technologies
-  April/2021 meeting with one of the largest aviation company: concerns with operation above 3.7 GHz
-  Future 5G in 4.9 GHz in Brazil and future study in the rest of C-band

# Thanks!



<https://www.gov.br/anatel/pt-br>



[linhares@anatel.gov.br](mailto:linhares@anatel.gov.br)



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