

Telecom Relief Package

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Telecom Relief Package

- Major one being providing a 4-year moratorium on the payment of Spectrum Usage Charges (SUC) as percentage of the Adjust Gross Revenue AGR
- The government also has redefined the calculation of AGR to exclude non-telecom revenue which should reduce the regulatory burden substantially for the telcos
- Abolition of 0.5 percent additional annual SUC on shared spectrum which is likely to pave way for more sharing of spectrum between operators
- Allowing telcos to surrender spectrum after 10 years will promote efficient use of spectrum
- Extension of spectrum license period from the current 20 years to 30 years
 - International average is 15 years
 - Longer visibility for the Telcos

Regulatory Levies in India

- Regulatory levy on the sector which is one of the highest in the world. License fees, annual Spectrum Usage Charges, and other fees including Right of Way charges for installing the telecom infrastructure have burdened the telecom sector in our country
 - 3-5% Annual Spectrum Charges; 5% Annual License Fee

Competition in Telecom Market

- The number of telecom service providers in India has dwindled to four (3 private and one state owned) from its height of competition about 6 years ago
 - In 2015, there were about 8–10 service providers in each License Service Areas (LSAs) in the country with a market Herfindahl Hirschman Index (HHI) of 0.18 indicative of near-perfect competition
 - Such a drastic change in market structure has not yet been witnessed in any country in the world. What are the reasons?

Legacy of Telecom Licensing in India

- Tumultuous licensing policy for mobile services
 - Dupoly (1994) -> State Owned Operatos -> 4th Operator License (2001)
 - Post-2007, we witnessed a slew of licenses being issued for mobile services based on the discovered price in 2001 auction with a bundled start-up spectrum
- We indicated the absence of allocative efficiency in the Indian mobile industry
 - due to insufficient spectrum allocation per operator, and underpricing of the spectrum
- 2012: Cancelling of 122 telecom license due to the order of Supreme Court
 - Post 2016 -> Consolidation
- we have gone through the vagaries of policy changes that indicate the regulatory and policy uncertainty in the sector which has taken a toll on the industry

Spectrum Auctions

Spectrum: As a cash cow for the Governments

- **India:** Since 2010, the radio spectrum auction has yielded **Rs. 330,000,00,00,000 (about \$50 Billion)** to the GoI exchequer
 - The recent one being in Feb-Mar 2021 -> Rs. 77,000, 00,00,000 (\$12 Billion)
- **U.S.:** 1994 first SMRA auction -> \$1 Billion
 - 2008: Auction 73 (700 MHz) -> \$17 Billion
 - 2015: Auction 97 (AWS: 1700 & 2100 MHz)-> \$42 billion
 - 2019: Auction 102 (24 GHz) -> \$2 Billion
- **Germany: 2000: €50 Billion**

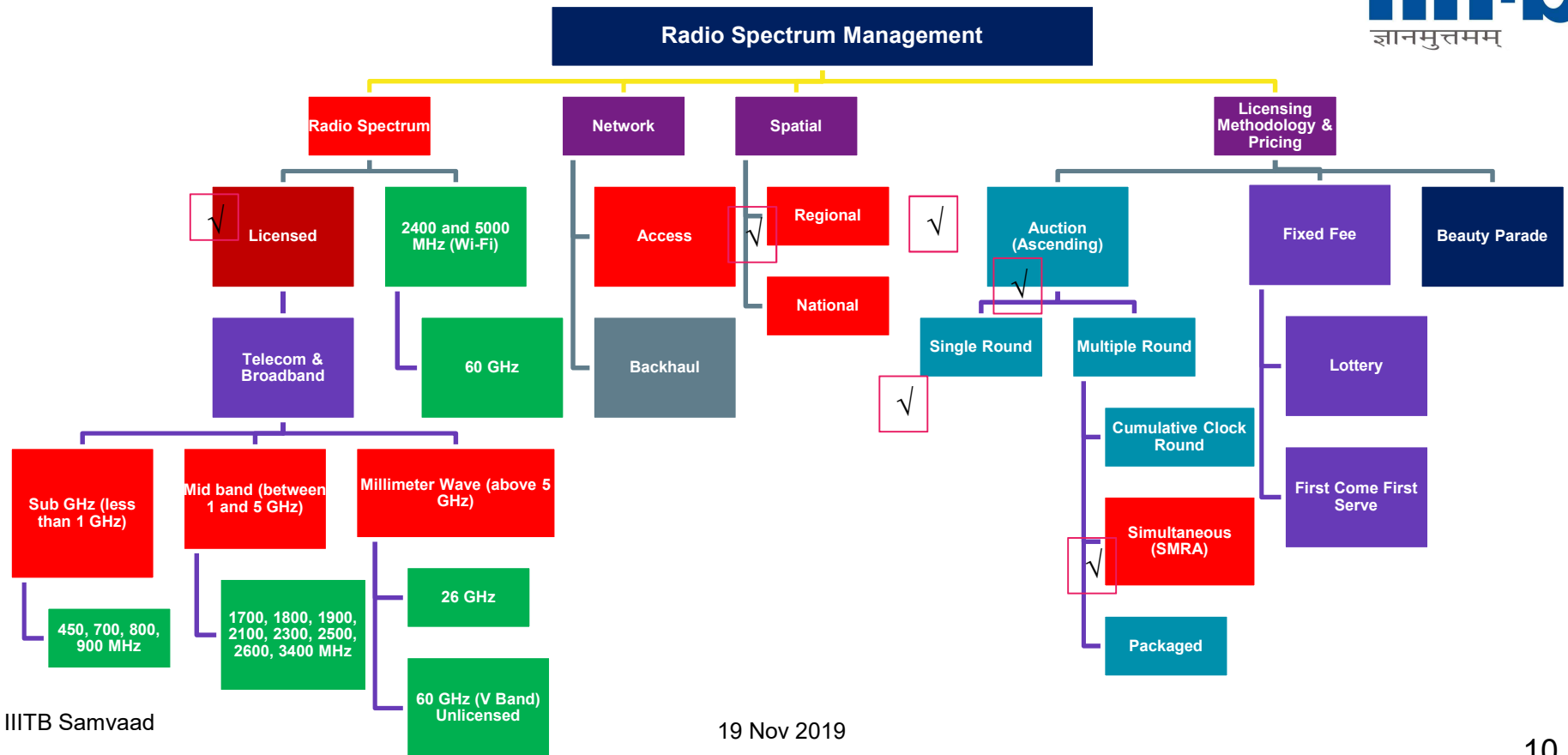
Quirky Auctions

- **2015:** In Poland the auction for allocating 800 MHz and 2600 MHz spectrum bands went on for more than **8 months** with the final round (**Round 513**) yielding a revenue from of about € 2.2 Billion
- **2016, 2021:** In India spectrum of 2 × 35 MHz in the 700 MHz **went unsold**



Robert Wilson and Paul Milgrom received the 2020 Nobel Memorial Prize in Economic Sciences for their contribution to Auction Design

Taxonomy of radio spectrum, allocation and pricing

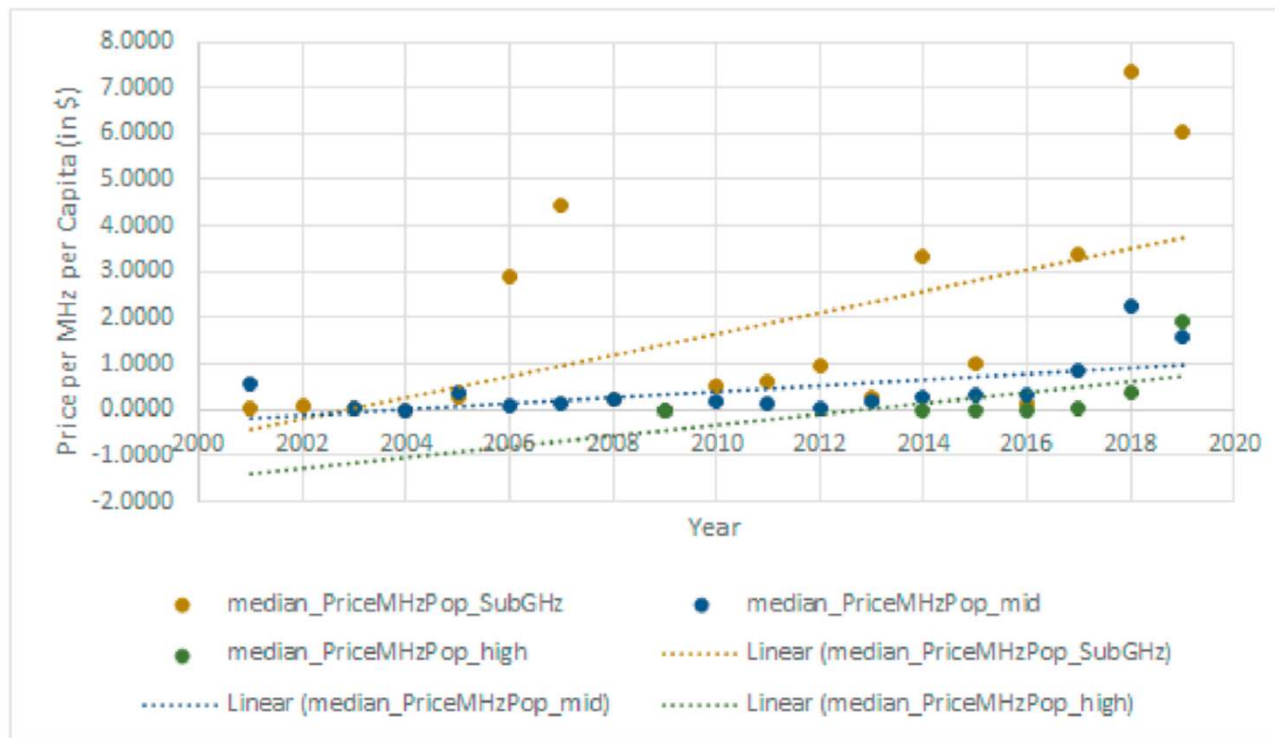


Simultaneous Multiple Round Ascending Auction (SMRA)



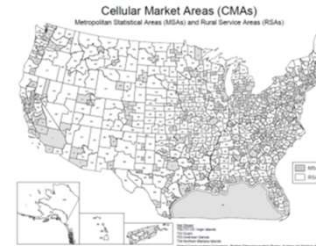
- Multiple items (across spectrum bands and license service areas)
Auctioned simultaneously
 - Minimum price for each item (aka Reserve Price) is set at the starting clock round
 - Bidders simultaneously submit bids for each auctioned items
 - Auctioneer discloses the provisional willing bidder at each clock round
 - The auction moves to next clock round until no bids are received
- Winner -> at the last clock round pays their bid price and is allocated the items bid for

Movement of Spectrum Prices in the World

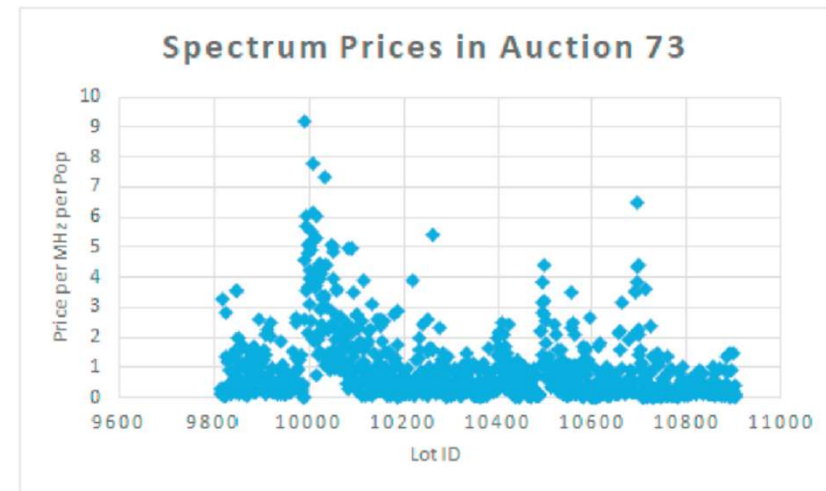


Country Snapshots

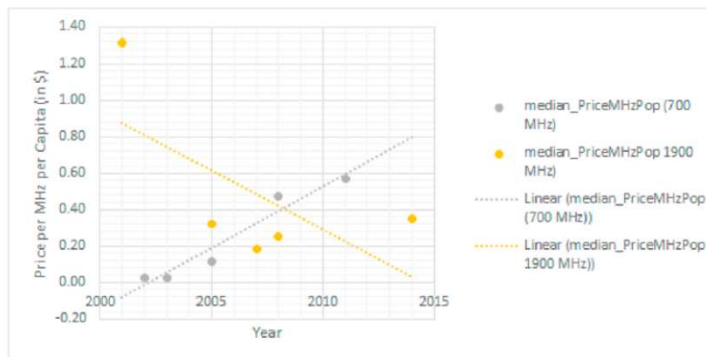
The U.S. Spectrum Auctions



- 1994: The first US Auction for 900 MHz PCS band
 - Block size of 50 KHz; Price/ MHz: \$27 Million
- 700 MHz (2000, 01-03, 05, 08, 11); 900 MHz (2001, 03); 1700 MHz (2015); 1900 MHz (1995-97, 99, 2001, 05, 07, 08 and 14); 2100 MHz (2006, 08); 24 GHz (2004, 2019); 28 and 31 GHz (1998,99)

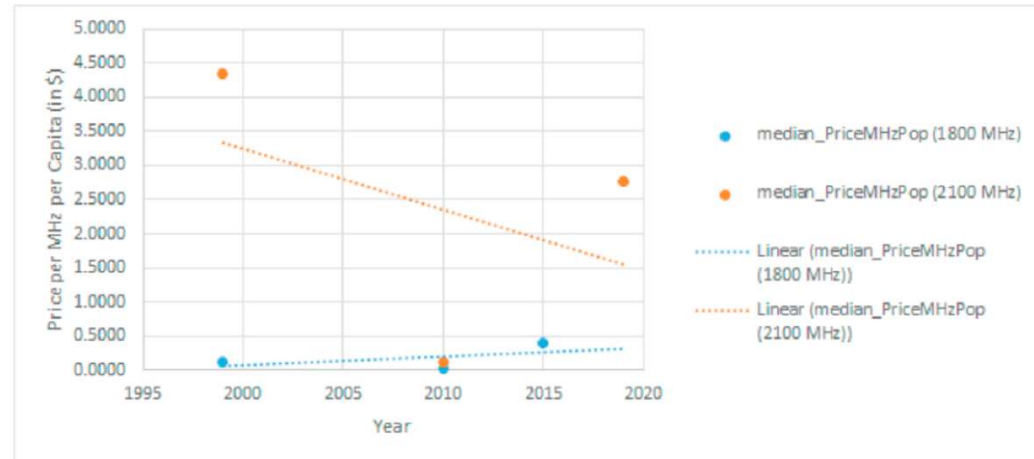


700 MHz



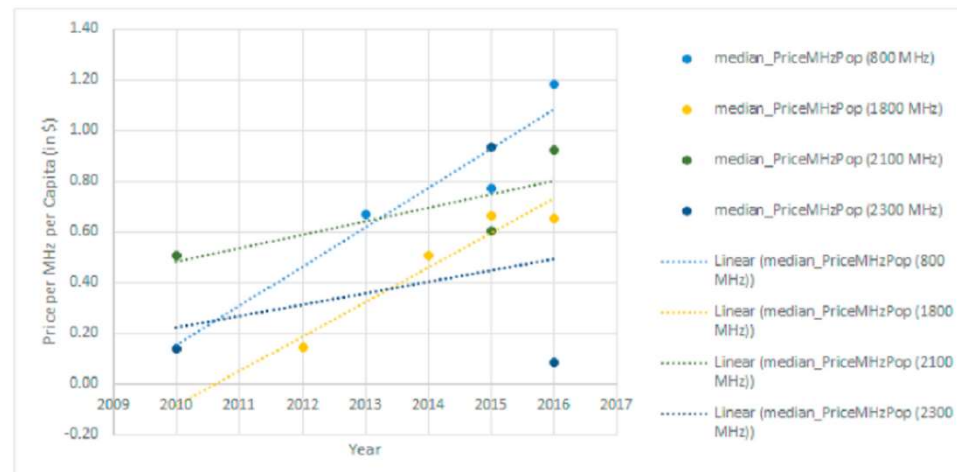
In Europe

- 2000: UK, Germany, Netherlands, Italy, and Switzerland auctioned spectrum for 3G mobile telecommunications
- 5G Auctions: 3.3 GHz, 26 GHz

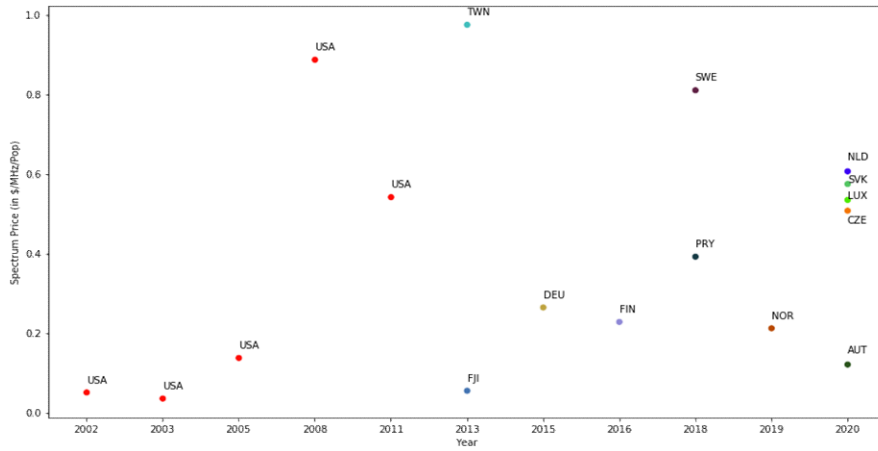


In India

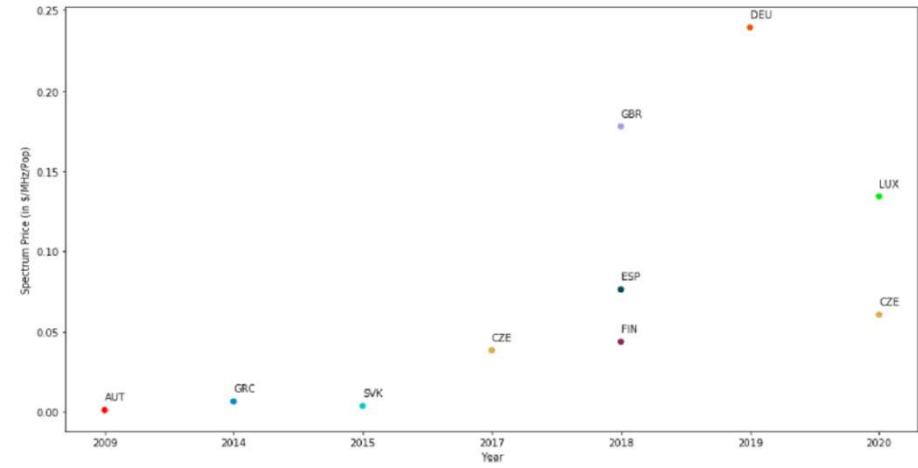
- In 2010, the first SMRA auction took place for the allocation of 2100 MHz and 2300 MHz spectrum bands
 - 183 rounds, 34 days -> \$16 Billion
- Thereafter SMRA for different bands took place 2012-2016 every year and then in Feb 2021



5G Auctions

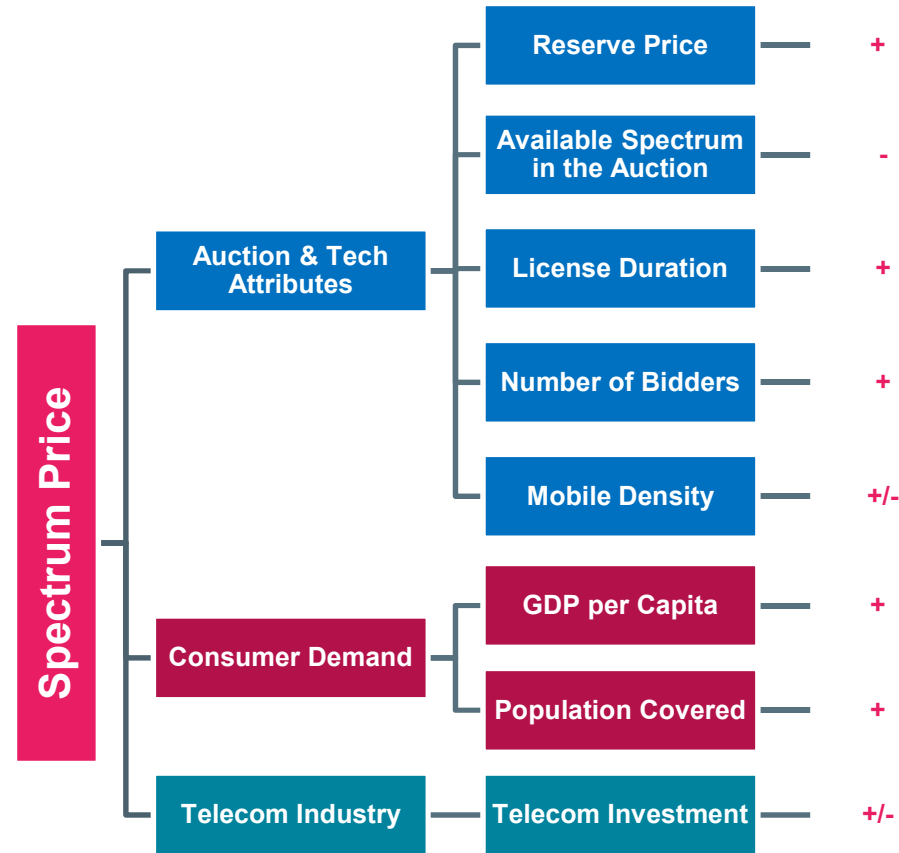


700 MHz



3.3 GHz

The Model



$$Price_{ijt} = \alpha_{ijt} + GDP_{it} + Pop_{it} + AvailSpectrum_{it} + Duration_{ijt} + NoBidders_{ijt} + ReservePrice_{ijt} + MobileDensity_{it} + TelecomInvestment_{it} + \varepsilon_{ijt}$$

Summary of Results

- **Reserve price** is one of the important factors affecting *positively* the winning bid prices in spectrum auctions
- Regulators and policymakers need to **shift usage of spectrum from unused or underused areas** to one that yields maximal societal benefits
- **Adequate competition** in the spectrum market is required for appropriate realization of spectrum value

Reserve Price

- **Reserve Price**
 - Minimum price to be paid by the bidder for the item and set at the first clock round
 - How to set? Policy Dilemma
 - Too high a reserve price -> items remain unsold (India: 2016, 2021, 700 MHz)
 - If sold, higher revenue for the auctioneer
 - Too low -> might reduce revenue of the auctioneer
- Set based on historical data
- How to set the reserve price **haunts regulators worldwide**

Reserve Prices in India

- Average reserve price fixed by the GoI for 700 MHz in Feb 2021 auction
 - is about \$1.89 per MHz per pop (adjusted for PPP)
 - several times higher than that set Internationally (\$0.05) and is also higher than the mean winning bid price witnessed worldwide (\$0.54)
 - The reserve price in metros is about \$8.72, several times higher than mean winning bid prices in other country
 - Only the category C circles had the reserve price set at \$0.53, a bit closer to winning prices in other countries
- The Telecom Regulatory Authority of India (TRAI, 2018) has recommended a mean reserve price for the mid-band at \$0.28 which is 14 times more than the mean reserve price worldwide of \$0.02
 - At metros, the reserve price, much similar to the 700 MHz, is very high at \$1.3
 - Only in category C circles the reserve price is low at \$0.073 And is comparable to world reserve prices

Government Spectrum

- In most countries the **government holds a major portion** of the radio spectrum
 - In the UK, for instance, the defense ministry accounts for 75 percent of the **public sector spectrum**
- In India: The 3.3–3.6 GHz spectrum that is being used by many countries is not available in India as it interferes with satellite downlink frequencies of the Department of Space (DoS), Government of India
 - Only recently the 1800 MHz spectrum band was refarmed from Defense use to **commercial mobile services**
- In the US., The 600–700 MHz interfere with traditional TV broadcasting, being provided by public broadcasting firms
 - Recently released for **commercial mobile services using**

India: In adequate Spectrum

- U.S. auction 96 in 2014, a total of 1760 MHz of the 1900 MHz spectrum band were put on the block across service areas
 - However, in the same year, India put on auction only a total of 862.40 MHz in the 1800 MHz band.
- Remarkably so, while the US made available about 15,000 MHz spectrum across bands during the period 2010–2016,
 - India auctioned a minuscule 1500 MHz per auction across different bands.

The 60 GHz Band: Licensed -> Unlicensed

- Complement Unlicensed bands with Licensed bands
- V-Band (57-71 GHz) provides high capacity point-to-point and point-to-multipoint connectivity
 - Can be used for Fixed Wireless as well as for Backhaul
 - IEEE 802.11 ad and ay -> unlicensed Giga Wi-Fi
- Austria, Belgium, Poland, Slovakia, Spain, UK along with China, Korea, Malaysia, Australia and New Zealand have **unlicensed the V-band**
 - The United States Federal Communication Commission, through a number of regulatory directives has released spectrum in 57-71 GHz for license exempt use
- India: V-band 64-71 GHz is used for backhaul
 - TRAI recommended in 2015 for delicensing 57-64 GHz

Spectrum Audit

- Spectrum audit needs to be conducted by TRAI on spectrum holdings by the government agencies, including defense, space, railways, and public utilities so that the precious scarce spectrum can be put to efficient use.
 - The refarming of spectrum in 1800 MHz held by the defense for commercial mobile services in recent years has helped improve spectrum utilization in this band
 - Similar exercise is needed in other bands as well, especially in 26 GHz held by the Department of Space that is critical for roll out of 5G network services.

Publication

- Sridhar, V., Prasad, Rohit. (2021). Analysis of Spectrum Pricing for Commercial Mobile Services: A Cross Country Study. *Telecommunications Policy*.
<https://doi.org/10.1016/j.telpol.2021.102221> (can be viewed for limited time at:
<https://authors.elsevier.com/a/1dRnJ16AgYAzqf>)
- **The Parliamentary Standing Committee on Information Technology (PSCIT) in its 21st report dated 8th Feb 2021 recommended that DoT/TRAI to look into high spectrum prices and come out with a spectrum pricing policy that is *sustainable, affordable and acceptable to all***

Q&A