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Subject: Consultation Paper on Auction of Spectrum in 700 MHz, 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300-3400 MHz and 3400-3600 MHz bands

Dear Sir,

The GSMA welcomes the opportunity to respond to the TRAI consultation paper on the next round of spectrum auctions in India and herein shares its views on the proposals.

By 2020 an estimated 50% of total mobile connections in India will be running on mobile broadband (3G and 4G) networks, according to GSMA Intelligence. Achieving this figure, and ensuring further growth in future, will depend on mobile operators gaining access to additional spectrum at affordable rates. The GSMA believes that with the increase in spectrum needed to support high data traffic in a 4G world, the pricing of access to this critical resource must be done in a manner that will deliver long-term social and economic benefits of broadband, rather than maximize short-term state revenue goals. In fact, unsustainable fees could ultimately lower state revenue and GDP impact as they hamper the expansion of 4G services and the associated benefit to society and the economy.

GSMA conducted an in-depth study of pricing in spectrum auctions¹ and found evidence that the way in which regulators and governments price mobile spectrum has an impact on the cost and quality of mobile services. High prices (reserve prices and associated spectrum fees) negatively affect investment decisions, which may be manifested in slower data speeds and reduced network capacity. In contrast, if prices are fair and reasonable, they can help ensure that spectrum use generates maximum benefits for society while also raising revenues for the state, directly through spectrum fees but, more importantly, indirectly through accelerated GDP growth and tax revenues². Many regulators are adopting policies that reflect a concern for increasing the welfare of consumers rather than extracting short-term income from the industry.

¹ GSMA report: Effective spectrum pricing,2017- Nera economic consulting

² GSMA report: Mobile Economy 2016: In 2015, the mobile industry was responsible for 6.5% of India's GDP and contributed approx. INR 1.4 lakh crore to the public funding



The GSMA offers more detailed responses below, with reference to specific issues raised in the paper, based on our global experience in spectrum management best practice. We thank you in advance for your consideration and support on our submission, and stand ready to assist you further.

Yours Sincerely

A handwritten signature in black ink, which appears to read "Brett Tarnutzer".

Brett Tarnutzer
Head of Spectrum, GSMA

Cc: Shri R S Sharma, TRAI chairman





ISSUE-WISE SUBMISSION

I. Timing of auctions

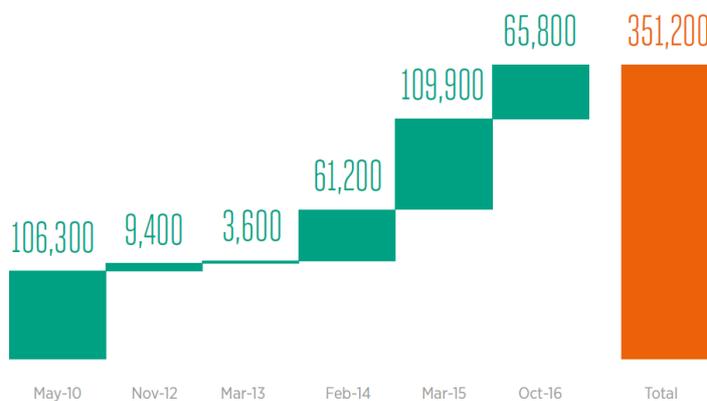
The Government's spectrum auction revenue expectations must take into account the economic reality of the mobile business in India today. Mobile operators in India have faced significant financial burdens which, in turn, impact their ability to make the investment required to upgrade consumer services, meet demand in highly populated urban areas and expand networks to provide coverage to people living in rural areas. Having a successful mobile industry is a prerequisite to securing investment. It make sense to also wait for the consolidation phase to be completed.

Based on this reality, TRAI must first assess the current market circumstances and consider the objectives they wish to achieve before moving forward with the proposed auctions. Highlighted below are certain factors that need to be incorporated while discussing the timing of the auctions:

- A. **TOTAL AMOUNT RAISED THROUGH SPECTRUM AUCTIONS:** Between 2010 and 2016 the Indian government raised a total of over INR 350,000 crore across six different spectrum auctions. The high cost of spectrum in India affects the ability of operators to fund network investments, and indeed, to acquire the rights for much needed additional access to spectrum.

Total amount raised through spectrum auctions

INR crore

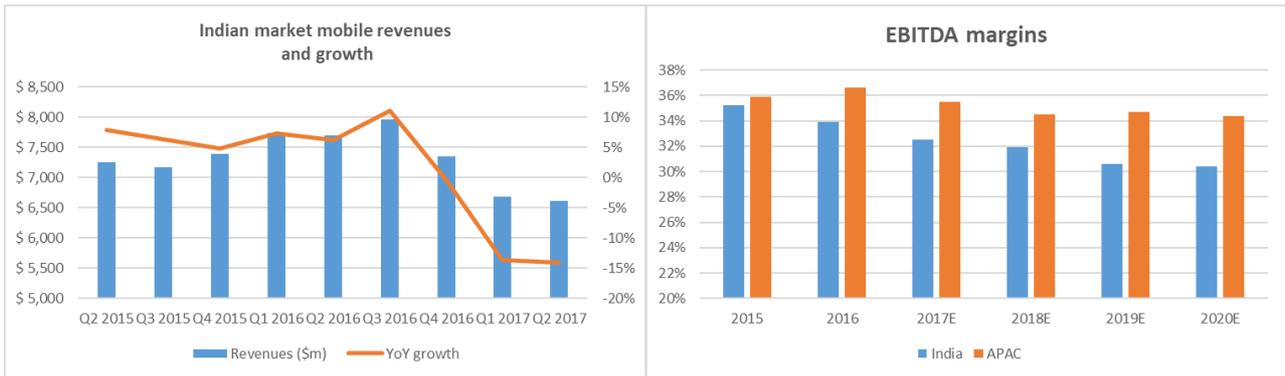


Source: GSMA report-The Mobile Economy India 2016

- B. **DECLINING PROFITABILITY AND HIGH DEBT:** Recurring revenue growth has seen a significant decline in recent quarters, as shown in the graph below, and is driven by a combination of intense price competition and the increasing cannibalisation of operators' traditional services by online communications services. Moreover, EBITDA margins have also come under pressure and they remain below the regional average.

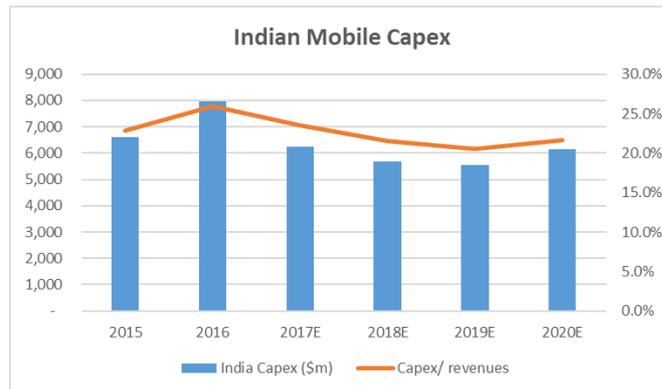


Indian operators are also facing very high debt, which can be explained by the need to borrow significant capital to acquire spectrum, intense market competition that has driven down prices and the burden of high sector-specific regulatory charges that ultimately hamper the sector's profitability.



Source: GSMA Intelligence

C. MOBILE INFRASTRUCTURE REQUIRES SIGNIFICANT INVESTMENT: There is clear evidence linking lower spectrum prices to greater investment in mobile networks. In a recent study, Nera Consulting and the GSMA developed a “wireless score” to measure the quality and uptake of next-generation data services in many countries using actual user data (3G/4G subscriber, coverage, average speed). For countries holding spectrum awards from 2008-2016, the study found that countries with lower spectrum costs have higher wireless scores than those with higher costs.



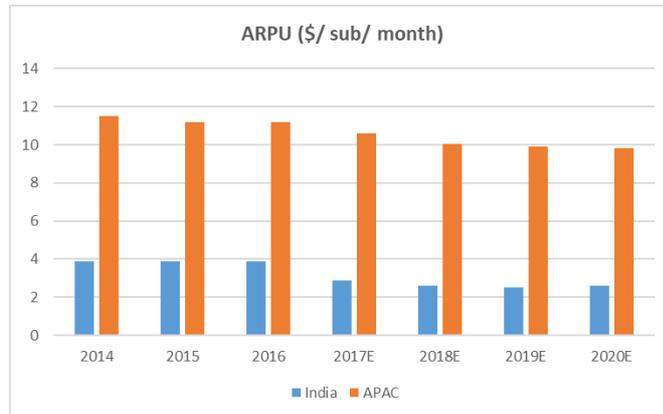
Source: GSMA Intelligence

As can be seen from the GSMA analysis above, the amount spent on capex by mobile industry have reduced this year mainly because of the market competition and increase spectrum costs.

D. LOW AVERAGE REVENUE PER USER: India has one of the lowest ARPU levels in the world, and the numbers continue to trend downward. Although the uptake of smartphones may appear to provide an opportunity for data revenue growth, mobile operators in India have so far reported limited



revenue contribution from data services³. Given low revenue, operators face a significant challenge in recovering the high costs of access to spectrum.



Source: GSMA Intelligence (APAC means average of countries in APAC region)

II. Pricing of Spectrum

India has set out its vision to transform into a digitally empowered society and knowledge economy by launching 'Digital India' initiative. The goals are grand, but they are achievable given the right regulatory and business environment. India faces unique challenges in providing connectivity to all of its citizens due to its geography and vast rural areas. We believe high-speed mobile broadband offers a unique opportunity to bridge this digital divide, and operators need spectrum to support these networks.

The government has already taken a critical step toward addressing the need for spectrum suitable for rural coverage in making spectrum available in the important 700 MHz band. A full allocation of APT700 band plan to mobile makes it possible to assign the spectrum in large enough blocks (of size of 5 MHz) to enable the industry to deliver widespread high-speed mobile broadband services. However, the spectrum must be made available on terms that are affordable, especially when faced with the high cost of deploying infrastructure to make use the spectrum.

Unfortunately, historical reserve prices in India have been extremely high. As described in the GSMA report on effective spectrum pricing, reserve prices for new spectrum should be set at a conservative level and allow the market to determine the price.⁴ As the digital economy becomes increasingly

³ Source: GSMA report-The Mobile Economy India 2016

⁴ "In the context of a primary award, this requires that initial prices be set below a conservative estimate of market value, so there is scope for competition and price discovery in auctions; and no lower than the costs of managing the spectrum." GSMA Effective Spectrum Pricing report (2017).

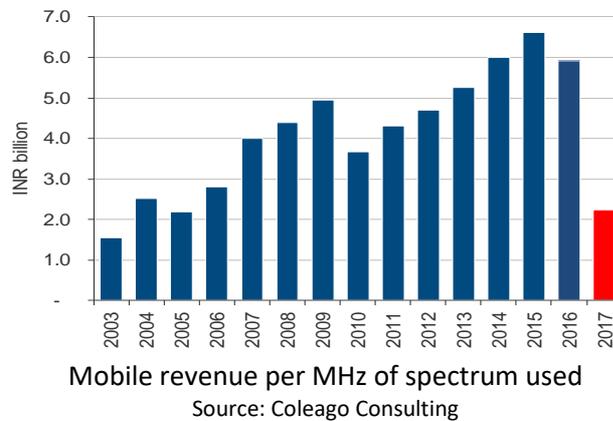


important to India's future prosperity (the mobile sector was responsible for 6.5% of India's GDP⁵ in 2015), the government needs to focus its attention on policies that foster the rollout of broadband over plugging short-term gaps in the fiscal deficit.

We want to present constructive suggestions for the pricing of the 700 MHz licenses to get the licenses into use for the benefit of a Digital India. Our analysis below shows there is a need for serious reductions in reserve prices, especially in 700 MHz:

- A. **DECLINING REVENUE PER MHZ:** In order to meet the huge growth in traffic, the mobile industry is using ever more spectrum. However, due to the sharp decline in retail prices, revenue growth has failed (as seen above) to keep up with the increased use of spectrum, putting operators in a difficult position.

As per the analysis from Coleago (see chart below), mobile service revenue per MHz of spectrum employed declined sharply with the introduction of 3G. If operators were to acquire all of the spectrum up for auction in next round, the pattern of 2010 would be repeated in a much more pronounced fashion and the revenue per MHz of spectrum would decline sharply. This means that the cost per MHz of spectrum would increase dramatically if spectrum is sold at anything close to the reserve prices from last year.



- B. **RESERVE PRICE OF 700 MHZ COMPARED TO INDUSTRY REVENUE AND OPERATING FREE CASH FLOW:** While spectrum pricing is a challenge faced by many governments, it is particularly a concern for the mobile industry in India. Coleago consulting has conducted analysis on the proposed prices for the 700MHz auction and found that the reserve price equated to approximately 2.1 times annual industry revenue and 19 years of operating free cash flow of the mobile industry. Even with

⁵ Source: GSMA report-The Mobile Economy India 2016



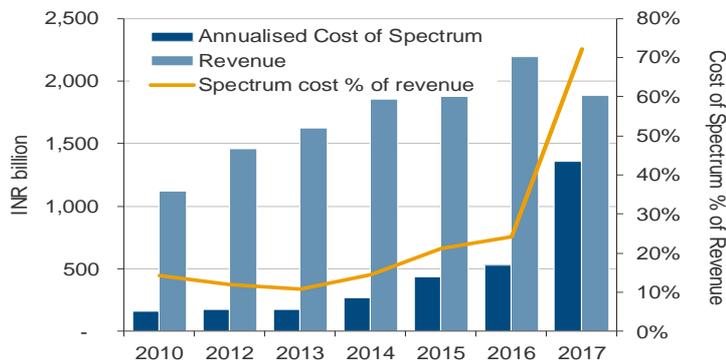
extremely optimistic revenue growth assumptions, Indian mobile operators will not generate sufficient operating free cash flow to justify the business case for purchasing the 700MHz spectrum at those prices. As necessary as spectrum is for thriving mobile businesses, prices must be based on economic realities.



Reserve prices for 700MHz spectrum vs. revenue and free cash flow
Source: Coleago Consulting

Investment in spectrum could however pay off if the annualised cost of spectrum is proportionate to revenue. In India, spectrum licences have a 20-year term. Businesses must generate sufficient operating free cash flow over this period to justify the investment. We can examine the relationship between the cost of spectrum and revenue by annualising the one-off spectrum licence fees. Annualisation spreads the cost of the spectrum licence fee over the asset life, taking account of the cost of capital.

If all the spectrum on offer for next round is sold at the reserve, the annualised cost of spectrum would increase to INR 1,361 billion as per Coleago. This is equivalent to 72% of the estimated 2017 mobile operator revenue. This is a wholly unrealistic percentage. Even if we assume fairly good revenue growth, there is no business case for acquiring the 700MHz spectrum at reserve prices from last round.



Annualised cost of spectrum as a % of operator revenue
Source: Coleago Consulting



Summary of Coleago Analysis:

Assuming that the reserve prices are kept similar to previous round of auctions; the reserve prices for the totality of spectrum of INR 5,488 billion⁶ would be equivalent to 2.9 times the annual mobile industry revenue of the entire Indian mobile Industry.

The reserve prices would also amount to 2641% (26 times) estimated 2017 annual pre-tax operating cash flow (EBITDA minus capital expenditure) generated by the Indian mobile industry. Coleago research shows that in contrast, spectrum auctions in other markets generated auction proceeds of around 60% of annual industry operating free cash flow. This means relative to operating free cash flow generated, the reserve prices in India are 26 times higher than in other countries⁷. Therefore the prospect of selling all spectrum, particularly the 700MHz spectrum is very small.



Figure: Reserve prices and risk of auction failure: Coleago Recommendations

Coleago consulting recommends that if overall the reserve prices are reduced to 5% of their proposed level, then they would be equivalent to 132% of annual operating free cash flow. This is still significantly higher than the 60% (typical for other markets) and hence there is still some risk that not all spectrum will be sold. However it is likely that most of the spectrum would be sold and this is shown as the “zone of success” in the chart above.

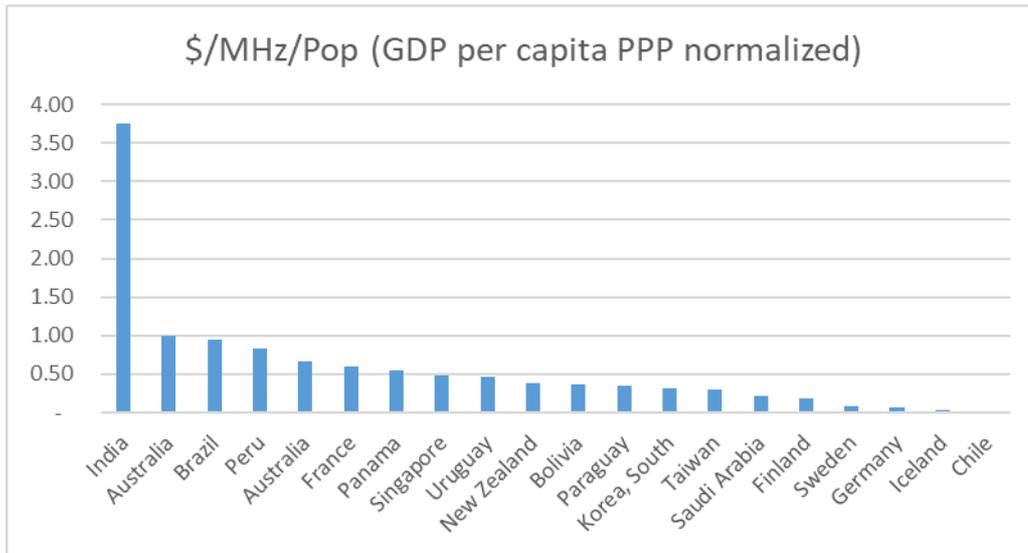
Of course the 700MHz accounts for the lion’s share of the total reserve prices. Setting 700MHz reserve prices at 5% of the previous reserve prices is likely to result in a successful auction, with the maximum number of bidders participating in a competitive auction and most of the 700MHz spectrum being sold.

⁶ Assuming reserve price for 3.3GHz and 3.4GHz spectrum is set at 20% of the 2.5GHz spectrum

⁷ Assuming other countries pay less than 100% (1 time) of operating free cash flow



C. INTERNATIONAL BENCHMARKING: Benchmarking spectrum reserve prices after accounting for local market conditions has proved a reasonable first step in examining the proposed prices. The figure below shows how the proposal stacks up against other countries in terms of MHz per country population - adjusted for GDP per capita based on purchasing power parity (PPP):⁸

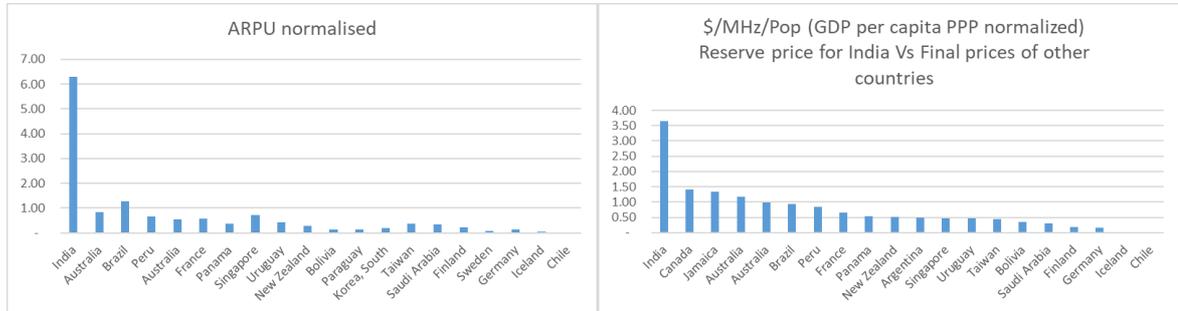


Source: GSMA Intelligence

We can make the following observations from the chart above:

- For the 700 MHz band, the reserve prices used in 2016 auctions are by far the HIGHEST IN THE WORLD. (The comparison includes many developed markets from Asia Pacific, European and Latin America region that have auctioned the band in recent times and are also adjusted for GDP per capita based on PPP for equivalent comparison.)
- We find the same result when we normalise the prices using ARPU for each of the countries- This would effectively mean that mobile operators would have to pay far more per MHz of spectrum in India with the low ARPU of the market and thus the rate of return of investments is lower.
- Further, and more important, we have determined that these reserve prices are EVEN HIGHER THAN THE FINAL AUCTION-DETERMINED PRICES from these countries (adjusted for GDP per capita based on PPP).

⁸ GDPPC PPP means the normalization of auction prices in the sample, using the GDP per capita indicator based on Purchasing Power Parity as reported by World Bank. We believe this is the most common method to adjust the price differences between countries and a useful measure to compare countries in terms of wealth and economic development, as it eliminates potential discrepancies that could originate from factors like foreign exchange rates.



Based on international benchmarking, the prices previously proposed are so far beyond that of other countries that it raises substantial doubt about their appropriateness.

- D. EXISTING CIRCUMSTANCES: While recognising the benefits of auctioning 700 MHz spectrum and determining the price based on other bands, it is useful to examine circumstances in cases where other bands like 1800 MHz/900 MHz were auctioned in the past and the final prices were reached. Operators would not have been able to continue in business without retaining existing spectrum and hence the value of spectrum to operators was close to entire enterprise value of their businesses. Therefore the reserve price of one band cannot be related to other band when the market circumstances were different and hence no true value was found. Even if it is to be considered, it can be 850 MHz price which has comparable propagation characteristics with 700 MHz.
- E. LOWER PRICES FOR OTHER BANDS: During the last round of spectrum auctions, most of the spectrum was either sold at reserve price (e.g. 2100 MHz) or was completely unsold (e.g. 700 MHz). GSMA report titled 'Effective spectrum pricing' highlighted that this is a likely occurrence when reserve prices are set above the true market value. The prices for other bands for unsold spectrum should therefore be relooked so that the additional spectrum can be put to use.

In summary, the GSMA believes that by embracing policies that focus on fair and reasonable spectrum prices, India has the opportunity to realise more rapid adoption of next generation network services than would otherwise be the case. This would lead to an even greater impact on the country's economy in the long term than the revenue collected through mobile licenses. The evidence provided above reinforces the case that there is a strong need to reduce the spectrum prices to avoid any spectrum remaining unsold.

III. 3.3-3.6 GHz band

5G is expected to support significantly faster mobile broadband speeds and increasingly extensive mobile data usage as well as enable the full potential of the Internet of Things. Significant new widely harmonised mobile spectrum is needed to ensure 5G services meet future expectations and deliver the full range of potential capabilities.



Spectrum in the bands between 1-6 GHz offers a good mixture of coverage and capacity characteristics for 5G services. The 3.5 GHz IMT range between 3.3 GHz and 3.8 GHz offers an ideal opportunity to meet this demand. The band is already championed by the US and Europe and is likely to be one of the first to carry 5G traffic. The 3.4-3.6 GHz range is almost globally harmonised which can drive the economies of scale needed for low-cost devices. A number of countries are exploring whether a portion of other bands can be used like 3.8-4.2 GHz, 4.8-4.99 GHz.

These bands are very important for delivering mobile broadband service, including new applications of 5G / IMT-2020, given the available wide contiguous bandwidth. With global momentum on the bands, there will be significant economies of scale, even if national assignments vary. With the use of TDD technology, a single device will be able to operate in the entire range (3.3-3.8 GHz) and adjust to portions of the band released in any given country. That enables not only regional flexibility, but seamless roaming and the economies of scale necessary to drive down the cost of equipment. All this makes for an excellent match.

Global TDD standards and equipment already exist to support operation in the 3.4-3.8 GHz range and equipment that supports a broader range is expected soon. Therefore, countries will soon benefit from the adoption of a TDD band plan. GSMA supports DoT in its proposal for this band for 5G as it will be an increasingly important band for mobile broadband use in the coming years.
