2. Telecom services
The Indian telecom industry is deemed to be a remarkable growth story for Indian industries and is recognized in the global arena for its contribution in development of the country’s economy. The telecom sector is the third-highest FDI contributor (after services and construction) over the period FY2000-till date, attracting INR837 billion of investment. It has also played a significant role in the socio-economic development of the country by connecting the masses.

However, in the recent years, the sector has witnessed a difficult business environment. During 2008-2013, the recessionary global environment, coupled with the regulatory overhang witnessed by the sector, dampened investors’ sentiments and its growth potential.

Figure 7: Overall subscriber base and teledensity

The growth of Indian telecoms can be attributed to several enabling factors. Foremost, liberalization of telecommunications in 1991, which opened up the sector to private participation, was a key game changer. Subsequently, regulatory and policy reforms such as the implementation of the National Telecom Policy 1994, award of cellular licenses and establishment of the Telecom Regulatory Authority of India (TRAI) in 1997 were some of the important milestones in the 1990s, which propelled the sector to a high-growth trajectory.

The launch of wireless services was an important landmark and one of the most important drivers of overall industry growth during the past two decades. Additionally, factors such as India’s large population, high economic growth in the country, intense competition in the sector, low tariffs, infrastructure sharing and the introduction of enabling regulatory reforms have played a notable role in the industry’s growth.

2.1 Telecom growth and current market landscape

The growth of Indian telecoms can be attributed to several enabling factors. Foremost, liberalization of telecommunications in 1991, which opened up the sector to private participation, was a key game changer. Subsequently, regulatory and policy reforms such as the implementation of the National Telecom Policy 1994, award of cellular licenses and establishment of the Telecom Regulatory Authority of India (TRAI) in 1997 were some of the important milestones in the 1990s, which propelled the sector to a high-growth trajectory.

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The telecom revolution has benefitted rural as well as urban segments, and has become both a necessity and a development enabler. Currently, telecom connects the remotest of Indian regions, which remain unpenetrated by road or the railways.

Despite its growth in rural regions, its overall growth remains skewed toward urban subscribers, which account for around 58.6% of the overall subscriber base. The urban-rural digital divide is significant, with a teledensity of 149.3% in urban areas and as low as 47.2% in rural areas at the end of February 2015.

Wireless dominated the overall subscriber growth, accounting for 97.3% of the overall subscriber base as of February 2015. The high capex requirement for laying wireline networks, coupled with inexpensive availability of wireless handsets, has led to a decline in wireline growth.

Figure 8: Urban and rural subscriber base, FY15* (100% = 987.3 million)

Source: TRAI

India’s telecom sector is a voice-centric market, characterized by high volumes and low average revenue per user (ARPU). Price-sensitivity of telecom products in India has resulted in low airtime tariffs — average tariff per outgoing minute being INR0.5 per minute. Unsustainable tariffs and competition to add new subscribers has also impacted operator margins.

Figure 9: Gross revenue from telecom services in India

Source: TRAI

*til September 2014
2.1.1 Market landscape

**Wireless**

Wireless services have been at the helm of the Indian telecom growth story. With 960.6 million subscribers at the end of February 2015, India is the second-largest wireless market in terms of subscribers after China. The country’s wireless market has been dominated by volume-based growth. Furthermore, affordability of wireless services, with one of the lowest mobile tariffs in the world, has led to an aggressive growth of mobile telephony. India’s urban wireless teledensity stood at 143.7%, while its rural teledensity remained low at 46.6%, at the end of February 2015.7

**Figure 10: Wireless subscribers in India**

<table>
<thead>
<tr>
<th>Subscribers (million)</th>
<th>Y-o-Y growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY09</td>
<td>33.7%</td>
</tr>
<tr>
<td>FY10</td>
<td>49.6%</td>
</tr>
<tr>
<td>FY11</td>
<td>68.0%</td>
</tr>
<tr>
<td>FY12</td>
<td>76.0%</td>
</tr>
<tr>
<td>FY13</td>
<td>70.9%</td>
</tr>
<tr>
<td>FY14</td>
<td>72.9%</td>
</tr>
<tr>
<td>Feb-15</td>
<td>76.6%</td>
</tr>
</tbody>
</table>

Source: TRAI

India’s wireless market began to record a systematic shift with the launch of 3G services in 2010. Operators began moving away from focusing on voice services and began to capitalize on the growth and revenue potential of data. Wireless broadband services — 3G and 4G — are likely to replicate the growth of voice telephony in the growth of internet and broadband, and will account for largest share of incremental revenues for the sector.

**Wireline**

India’s wireline market has been reporting a constant decline for more than a decade now. The growth in the demand for wireless services, coupled with low-cost access to wireless devices and affordable tariffs, have significantly reduced the attractiveness of wireline services for consumers. Wireline teledensity stood at a low 2.1% at the end of February 2015.8

However, demand for wireline services has witnessed renewal of some interest in the recent past given its importance in broadband delivery. Some of the private players have reported healthy addition of wireline subscribers, along with an uptick in APRU, led by a demand for high speed broadband.

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7Ibid
8Telecom Regulatory Authority of India
2.2 Overview of internet and broadband market

Broadband infrastructure plays a critical role in an economy and contributes significantly to the social progress and development of a country. It connects consumers, businesses, governments; facilitates social interaction and presents attractive opportunities for education, governance and entrepreneurship.

Countries across the world are looking to increase broadband access and view it as the next phase of growth in telecommunications services. Broadband offers extensive benefits to emerging markets. According to the World Bank’s estimates, a 10% increase in broadband penetration accelerates economic growth by 1.38% in low and middle income countries as compared to an increase of 1.21% in high-income countries.  

Till recently, India was primarily dependent on wireline infrastructure for delivery of internet services. Due to the deficient nature of the fixed infrastructure, the internet penetration has remained low and India ranks a lowly 125th in terms of fixed broadband penetration globally. However, the last couple of years have witnessed significant uptake of wireless internet services, led by operator initiatives to invest in spectrum acquisition and network upgrades. As of September 2014, wireless accounted for ~92.6% of the country’s total internet subscribers.  

Figure 11: Wireline subscriber numbers and growth rate

Figure 12: Internet subscribers (million)

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9Speed greater than 512 Kbps
10World bank analysis
11Telecom Regulatory Authority of India
12Ibid.
Future investment in wireless and fixed infrastructure

The growth trend in broadband is changing, and wireless broadband is expected to drive mass adoption. Due to relatively low capex, availability of affordable customer premise equipment and reduced time for roll-out, wireless broadband is expected to increase proliferation of broadband services.

Governments around the world are encouraging investment to boost the proliferation and availability of high speed broadband. The Government of India has envisaged driving broadband demand by advocating provision and support of easy, affordable and reliable broadband access to the masses. The NTP 2012 envisages 600 million broadband subscribers by 2020.

High-quality broadband will also require the substantial growth of fixed infrastructure for backhaul of wireless access and high speeds in dense urban areas through fiber (fiber to the x (FTTx)) and cable broadband. Developed economies have seen extensive deployment of FTTx and the technology has served as a platform for data growth, despite the presence of mature mobile broadband platforms in the countries. Moreover, developments in VDSL2 such as vectoring and the new G.fast standards are further changing the landscape of fixed broadband globally.

Worldwide, cable broadband caters to 20% of the demand for broadband, while in India, only 5% of broadband connections are provided via cable. In contrast, cable TV connections in India, as last mile infrastructure, reach more people than the telephone copper infrastructure. With mandatory conversion of cable to digital networks in major cities, the freed up capacity can serve as last mile for metro connectivity.

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13 Telecom Regulatory Authority of India
3G and 4G

The Government of India has recognized the importance of wireless broadband and the 3G/BWA auction in 2010 was a significant step for the Indian telecom sector. 3G services, which were launched in 2010, were slow to gain traction in initial years. However, the past two years have seen strong upswing in demand for 3G, with all operators reporting strong growth both in terms of subscriber addition and data usage.

Given the demand, the Government had taken the decision of releasing additional spectrum in the 2100MHz band in the recently concluded auction (March 2015). Moreover, the spectrum swap agreement signed between Department of Telecom and the Ministry of Defence, which will bring 15MHz of additional 2100MHz spectrum into commercial use is a noteworthy achievement. Furthermore, operators have started evaluating the use of their liberalized spectrum holdings in the 900MHz band for the launch of 3G services. 900MHz band can be instrumental in expanding the 3G services to the hinterland, given its superior propagation characteristics.

4G services in India were launched in 2012, and the current year is likely to witness large scale 4G roll-out from some key players, with the momentum expected to build in the coming years. Earlier, only operators that won spectrum in 2300MHz in 2010 could launch 4G services. However, the auction of technology neutral spectrum in February 2014 and March 2015 is likely to change the landscape of 4G in India. These auctions saw operators winning spectrum in 800MHz and 1800MHz bands, two amongst the most developed bands for launch of long-term evolution (LTE) services.

Furthermore, the auction of 700MHz digital dividend band in the next couple of years will also boost availability of 4G services in the market. However, the ability of 4G services to disrupt the existing market dynamics will hinge on several factors including price sensitivity of services, strength of the supporting ecosystem and the capability to deliver voice services.

On the demand side, affordability of services and availability of relevant local content are expected to generate a significant pull. India, with its young and increasingly urban population base, has huge potential for growth. Moreover, growing usage of smartphones, especially in urban areas, is driving usage of internet on hand-held devices.

2.3 Challenges in the current scenario and the way forward

2.3.1 Financial issues: an overview

The Indian telecom industry is currently facing a challenging financial environment. Its burgeoning industry debt is a rising concern. In FY14, the sector’s total sector debt stood at INR2,500 billion – higher than the industry’s gross revenue of INR2,338.5 billion.15 The sector’s rising debt-equity ratio is also a key concern. Furthermore, financial over-leveraging, largely on account of the high costs of spectrum pay-outs, exerted a downward pressure on revenues and earning capacities in the industry.

Figure 15: High debt-equity ratio in telecom sector a key concern

In times

0 0.5 1 1.5 2
FY11 FY12 FY13 FY14

In addition, multiple taxes and levies have added to the financial woes of operators. Currently, levies account for around 30% of revenue earned by telecom companies in India, as compared to around 5% in other APAC countries.16

High price-related competition and low tariffs have also led to low ARPs exerting pressure on margins. These issues are likely to further decelerate operators’ investments and put a brake on their plans to expand their networks and provide new services.

15“Telecom industry cracking under financial pressure,” The Hindu, 11 July 2013; Telecom Regulatory Authority of India; EY Analysis
16Cellular Operators Association of India
2.3.1.1 Taxes and levies

India's telecom sector is subject to one of the world's highest net outlays in the form of regulatory costs including, but not limited to, Service Tax, state-level VAT, spectrum charges and license fees as well as other charges including Additional Duty of Customs (ADC), Central Sales Tax (CST), municipal charges, right of way, etc.). In FY13, spectrum and license fees (two of the largest regulatory pay-outs) together amounted to INR171.4 billion, while for FY14 the figure rose to INR214.4 billion.\(^{17}\) This highlights the substantial burden on the sector due to these levies.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>License fees</td>
<td>117.9</td>
<td>114.6</td>
<td>146.3</td>
</tr>
<tr>
<td>Spectrum fees</td>
<td>51.9</td>
<td>56.8</td>
<td>68.1</td>
</tr>
<tr>
<td>Total license and spectrum fee pay-outs</td>
<td>169.8</td>
<td>171.4</td>
<td>214.4</td>
</tr>
<tr>
<td>AGR</td>
<td>1,345.90</td>
<td>1,407.80</td>
<td>1580.4</td>
</tr>
<tr>
<td>License and spectrum fees as a percentage of AGR (%)</td>
<td>12.6</td>
<td>12.2</td>
<td>13.6</td>
</tr>
</tbody>
</table>

*Anticipated

Source: DoT, TRAI

Moreover, Indian taxes are much higher in comparison to its global peers. Spectrum usage charges (SUC) in most countries recover spectrum charges through an up-front payment in auctions and do not levy any supplementary charge. Even in cases where a fee is levied, it only covers the administrative cost of managing the spectrum.

In the case of license fees, India outstrips its global counterparts. For instance, China does not levy any license fees; in Singapore, it varies between 0.8%-1% of the annual turnover.\(^ {18}\) Similarly, license fees are negligible in South Africa (0.15%-0.35% as a percentage of revenue from licensed services)\(^ {19}\) and Thailand (a maximum 1.5% of annual revenue)\(^ {20}\).

There is a need for the Government to revisit and revise these levies, since they adversely affect the sector's growth. Research indicates that a one percentage point reduction in taxes on mobile broadband is likely to result in up to 1.8 percentage point increase in penetration, and up to 0.7 percentage point increase in GDP over five years in emerging markets.\(^ {21}\) Specifically for wireless broadband, every dollar reduced in taxes for emerging markets, will generate GDP ranging between US$1.4 and US$12.6.\(^ {22}\)

Key recommendations

- Taxes and levies should be rationalized to ensure the overall growth and financial viability of the sector.
- License fees should be reduced to nominal rates.
- SUC should be revised and reduced to 1%, given that spectrum is allocated at market-determined prices.

2.3.1.2 Retrospective taxation

Retrospective amendments of tax norms are among the biggest challenges faced by companies in India’s telecom sector. Two significant changes were introduced in the Finance Act 2012. These have dented investors’ confidence in India as an investment destination. These changes include the following:

- Retrospective taxation of deals between two overseas parties of an entity based in India with effect from 1 April 1962.
- Expansion of the definition of “royalty” retroactively from 1976 to include any consideration received for computer software and transmission by satellite, cable, optic fiber or similar technology.

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\(^{17}\)Telecom Regulatory Authority of India

\(^{18}\)“Guidelines on submission of application for facilities-based operator licence,” IDA, March 2013.

\(^{19}\)TRAI


\(^{21}\)“The Impact of Taxation on the Development of the Mobile Broadband Sector,” GSMA, March 2012.

\(^{22}\)Ibid.
Retrospective laws have proved to be a disincentive for existing and new companies that wish to do business in India. Such changes in laws create an environment of mistrust, unreliability and instability. They also lead to deterioration in investors’ confidence and unpredictability in the business environment. Some key ICT players in the country are involved in prolonged litigation due to retrospective taxation assessments.

Retrospective amendments made in laws need to be discouraged, and all changes should be forward-looking as a principle. It is important to improve the regulatory setup, drive enhanced transparency in communication between government agencies and regulatory authorities, and discontinue retrospective amendments in tax laws in the country.

**Key recommendations**

- Retrospective taxation issues need to be resolved, since they hurt investors’ confidence.

### 2.3.1.3 Contribution to USOF fund

Another area of concern constitutes high charges levied in the form of the Universal Service Obligation Fund (USOF). NTP 1999 had envisaged access to basic telecom services for all Indians at affordable prices, especially in rural and remote areas. In 2002, the Universal Service Support policy came into effect, with a universal service levy of 5% on the AGR, which forms a part of the license fee. Over the past few years, the high quantum of this levy and its suboptimal utilization has been a major concern.

Although the USOF was created with the aim of promoting rural telephony, the fund’s rules are too cumbersome and lack focus. They do not reflect the fact that USOF subsidies are perhaps most urgently required to defray the cost of infrastructure creation in rural areas. Moreover, the high levy of 5% (one of the highest among India’s peers) continues to be imposed in the country, even though the fund contains INR356.1 billion of unutilized accumulated funds.

**USOF fund’s contribution for select Asian countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>USOF fund contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>5% of Adjusted Gross Revenue</td>
</tr>
<tr>
<td>Nepal</td>
<td>2% levy on revenues of incumbent operators, ISPs and mobile operators</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1.5% levy on revenues of all operators</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1% of audited gross revenues</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>2.5% of net revenues of all licensed service providers</td>
</tr>
</tbody>
</table>

Operators have already met their original roll-out obligations for rural areas. However, the Government has unilaterally mandated additional roll-out obligations that require the coverage of block headquarters (BHQs). Failure to meet these roll-out obligations has financial implications for operators in the form of penalties. The USOF fund’s contribution, along with the penalties, is equivalent to a “double levy” on operators. It should be noted that the USOF fund in India is among the highest in the world. India had the second-highest accumulated USO fund level in the world (next only to Brazil) and the highest among its APAC peers.

### Figure 17: Status of disbursement of USO levy on operators in India

<table>
<thead>
<tr>
<th>FY08</th>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
<th>FY14</th>
<th>FY15*</th>
</tr>
</thead>
<tbody>
<tr>
<td>54.1</td>
<td>55.2</td>
<td>57.8</td>
<td>61.1</td>
<td>67.2</td>
<td>67.4</td>
<td>79.0</td>
<td>37.0</td>
</tr>
</tbody>
</table>

*Source: GSMA

Funds collected
Funds disbursed

*Source: USOF website

*Figure 17: Status of disbursement of USO levy on operators in India

**Notes:**
- FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15*
- Funds collected
- Funds disbursed
- *till 31 December 2014
- Source: USOF website
TRAI, in its recent recommendations on definition of AGR, has highlighted the inefficiencies in utilization of USO funds, and stated that the fund is being used to provide budgetary support and bridge the fiscal gap. The regulator also stated that the USO levy needs to be reduced to 3% of AGR for all licenses.

### Key recommendations

- USOF needs to be eliminated or reduced to 1%-3%.
- Funds collected under USOF need to be utilized efficiently.
- Unilateral application of additional requirement of BHQ coverage needs to be revisited.

23"Enabling the next wave of telecom growth in India,” EY, 2011.
24"Collection of Universal Access Levy vis-a-vis Allocation and Disbursement of Funds from USOF,” USOF website, accessed 6 May 2014.

### Case study: Best practices in USOF fund management

<table>
<thead>
<tr>
<th>Best practices</th>
<th>Country</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation with stakeholders</td>
<td>Ghana</td>
<td>Board of trustees for fund includes a representative from each major telecom operator.</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
<td>Operators have representation in and their input is sought by the fund oversight committee. Detailed public consultations are conducted.</td>
</tr>
<tr>
<td>Autonomous/ Independent fund structure</td>
<td>Nigeria</td>
<td>There is a separate entity (USPF); board of directors comprises representatives from private and public sectors.</td>
</tr>
<tr>
<td>Clearly specified and measurable objectives including coverage and service delivery targets</td>
<td>Columbia</td>
<td>The country has in place a four-year plan with detailed project descriptions, targets and associated costs.</td>
</tr>
<tr>
<td></td>
<td>Peru</td>
<td>Annual report is generated on fund’s performance with respect to allocation and performance of projects versus targets.</td>
</tr>
<tr>
<td>Fair project allocation process - competitive bidding</td>
<td>Columbia</td>
<td>Names and details of successful bidders are posted on the website.</td>
</tr>
<tr>
<td></td>
<td>Nigeria</td>
<td></td>
</tr>
</tbody>
</table>

Source: GSMA
activities, accounting credits that strictly do not fall under the definition of revenue or income, dual charge of the same revenues twice in the hands of different operators, etc. Given the contentious nature of the dispute, it is imperative that such inconsistencies in the AGR definition are removed.

### Figure 18: Inconsistences in the current definition of AGR

- Includes several revenues unrelated to licensed activities under the licence
- Includes service items that do not strictly come under the definition of revenue
- Results in dual charge of the same revenue twice in the hands of different operators
- Includes notional income that is unrealized/remains uncollected by licensee
- Includes item on accrual/billed basis, but allows deduction on collected/paid basis

**Source:** TRAI, EY analysis

### Key recommendations

- AGR should only include revenues from services under license for respective service areas.
- A simple, non-ambiguous definition of AGR should be in place for the future.

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2.3.1.5 Need for finance in telecom sector

The financing needs of the telecom sector are increasing rapidly with the rising cost of input required. India has been witnessing high payouts for acquisition of spectrum at all the airwave auctions since 2010. Moreover, with debts mounting on operators’ balance sheets, Indian banks have also been reluctant to lend money to the sector.

The Twelfth Five Year Plan projected investments of around INR94 billion in the telecom sector.\(^{26}\) However, it is envisaged that more than 90% of these investments will be from the private sector.\(^{27}\) This is a difficult proposition, given that operators’ balance sheets are already stretched.

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\(^{27}\)Ibid.
This is cause for a major concern, since telecom is a capital intensive sector. The need for financing is bound to rise, given the massive outlay required to acquire spectrum. It is estimated that the recently concluded round of spectrum auctions (March’15) will add an additional debt of ~INR1,000 billion on the industry. Moreover, rollout of next generation 4G services and expansion of 3G services will require additional investment by operators.

In this scenario, it is essential for the Government to support the financing needs of the sector, which has played an important role as an essential infrastructure, and contributed significantly to the growth of India’s economy.
### Setting up of Telecom Finance Corporation

The sector should be allowed to access funding on a preferential basis from government-promoted institutions financing the infrastructure sector. The Government should consider the creation of a Telecom Finance Corporation (TFC) as a vehicle to enable the sector to access funds on a preferential basis. TFC can be structured and serve the same purpose as the Power Finance Corporation. It should extend credit to the sector at competitive rates to facilitate its funding needs.

### Increase in ECB limit

- **For high capex requirements:** Significant capex investment is required to achieve targets envisaged in NTP 2012. Enabling players to fund this capex through ECB rather than through high-cost rupee loans will ensure that the targets envisaged under NTP 2012 are reached.

- **For working capital requirements:** Telecom operators make sizeable investments in franchisee networking, expansion of distribution channels, manpower, marketing, brand promotion, network running costs, power and fuel costs, etc. Return on this investment has as long a gestation period as that of return on capex or spectrum investment. Since funding this working capital requirement through high-cost rupee loans increases input costs further, funding through ECB will help the industry reduce its input costs.

- **For prepayment of debt and working capital finance:** Recently, certain sectors in the infrastructure industry, such as roads and airlines, were permitted to use ECB to prepay their rupee-denominated debt and working capital loans. Similar benefits should be provided to the telecom and tower sector.

### Key recommendations

- Telecom should be considered a critical infrastructure sector and its financing needs should be addressed accordingly.
- A Telecom Finance Corporation should be set up on the same principle as that of the Power Finance Corporation.

### 2.3.1.6 Entry of OTT services providers

The telecom value chain is undergoing a transition. Another layer of service providers are now a part of the value chain and are providing standalone application services to end users through the telecom network. These applications are being delivered in an over-the-top (OTT) model.

Deemed as OTT content providers, these players facilitate online delivery of content and applications without the telecom operator being involved in controlling or distributing the content.
and applications. The services are delivered directly by the OTT provider to the end-user, independent of the latter’s telecom operator and without the need for carriage negotiations agreement with the operator.

With the entry of new players in the telecom ecosystem and the advent of new service delivery models, there is the need to understand the effect of these changes on legacy networks and benefits of users.

2.3.2 Spectrum-related issues

Spectrum is a scarce and critical resource and its efficient allocation and usage is critical for successful delivery of telecom services in the country. However, several spectrum-related issues such as high pricing, unavailability of optimum quantum of spectrum and lack of a spectrum roadmap are factors that continue to affect the sector adversely.

![Figure 22: Spectrum-related factors crucial for service delivery](image)

Source: GSMA, EY analysis

2.3.2.1 High price of spectrum

Spectrum-related policies, especially those pertaining to its optimum pricing, are critical for the growth of telecom services. Alignment of spectrum prices with international benchmarks, keeping in mind local market conditions such as tariff levels, ARPU and purchasing power is important for optimally defining the spectrum pricing.

However, in India, pricing of spectrum has continued to be a critical issue, especially after the country moved to an auction-based pricing mechanism for allocation of spectrum. A high reserve price has been one of the key issues in disbursement of spectrum.

Key recommendations

- There is a need for the Government to support a collaborative environment where all stakeholders will understand the impact of new services such as OTT services on traditional telecom networks, and how these services can benefit users.
Short-term goals of maximizing revenue by governments seeking to reduce budget deficits are actually harmful to the development of the mobile sector and the socio-economic benefits it brings. Public discourse related to maximizing public good from spectrum should therefore not be focused on how much money can be generated for public funds. Instead, it should be focused on how to maximize the overall economic and social returns from spectrum.

Furthermore, excessive bidding for a critical resource in the absence of a clear roadmap for future allocations has led to high spectrum payouts. This has burdened operators' balance sheets. Lack of clarity on the future course and timelines for distribution of spectrum, results in artificial scarcity, which leads to operators bidding excessively. This was noticed in the 3G and BWA auctions in 2010 where operators bid aggressively in order to safeguard their future service launches of next generation services. 3G payouts (INR677.1 billion) were almost 20 times the reserve price (INR35 billion) set for the auctions. A similar bidding pattern was also witnessed in the recently concluded auctions (March 2015) where the 900MHz clearing price in nine circles was more than twice that of the reserve price.

**Figure 23: Spectrum auction timeline**

**Auctions: 2100MHz**
Pan-India reserve price (per MHz): INR7 billion
Auction highlights: Scarcity-driven participation; strong bidding to ensure 3G footprint
Auction result: 100% spectrum sold; high resultant debt on operators' balance sheets

**Auctions: 800MHz, 1800MHz**
Pan-India reserve price (per MHz): 800MHz - INR36.4b, 1800MHz - INR28 billion
Auction highlights: High reserve price; limited participation driven by need to ensure business continuity
Auction result: Unsuccessful outcome with no bids in 800MHz and only 47.2% spectrum sold in 1800MHz

**Auctions: 800MHz, 900MHz, 1800MHz**
Pan-India reserve price (per MHz): 800MHz - INR18.2b, 900MHz* - (Delhi (INR7.8 billion), Mumbai (INR7.6 billion), Kolkata (INR1.8 billion)), 1800MHz - INR23.6 billion
Auction highlights: Participation from just one operator (despite cut in reserve price); no bidding in 900MHz and 1800MHz bands
Auction result: Second successive failed auction: 800MHz - 31.6%, 900MHz - No bids, 1800MHz - No bids

**Auctions: 900MHz, 1800MHz**
Pan India reserve price (per MHz): 900MHz* - (Delhi (INR3.6 billion), Mumbai (INR3.3 billion), Kolkata (INR1.3 billion)), 1800MHz - INR17.6 billion
Auction highlights: Rationalization of prices; strong bidding in Delhi, Mumbai and Kolkata; focus on future-proofing investments
Auction result: Bulk of spectrum sold — 100% in 900MHz and 79.8% in 1800MHz

**Auctions: 800MHz, 900MHz, 1800MHz and 2100MHz**
Pan India reserve price (per MHz): 800MHz (20 circles) - INR34.2 billion, 900MHz (17 circles) - INR34 billion, 1800MHz (15 circles) - INR14.3 billion, 2100MHz (17 circles) - INR35.1 billion
Auction highlights: Operator focus on safeguarding business continuity resulting in excessive bidding in 900MHz band; muted participation in 2100MHz; bidding in 800MHz led by superior LTE ecosystem in the band
Auction result: Bulk of spectrum sold — 83.1% in 800MHz, 94.5% in 900MHz, 94.6% in 1800MHz, 82.3% in 2100MHz

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*Source: EY analysis, DoT

*Spectrum was up for auction in three circles only

28Department of Telecommunications
• Reasonable spectrum reserve prices should be set that take into account the broader benefits accruing to society and the country due to expanding mobile services at affordable rates.

2.3.2.2 Availability of spectrum

Availability of spectrum continues to be low in India and poses a challenge for most operators. The current quantum of spectrum is insufficient to meet broadband penetration goals envisaged by NTP 2012 and to ensure affordability. India is a spectrum-crunch nation and lags behind its global peers in terms of its distribution of spectrum.

Figure 24: International comparison — quantum of spectrum distributed within bands (MHz)

<table>
<thead>
<tr>
<th></th>
<th>800MHz</th>
<th>900MHz</th>
<th>1800MHz</th>
<th>2100MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>2 x 45MHz</td>
<td></td>
<td>2 x 60MHz</td>
<td>2 x 60MHz, 20MHz unpaired</td>
</tr>
<tr>
<td>Germany</td>
<td>2 x 30MHz</td>
<td>2 x 34.8MHz</td>
<td>2 x 70.2MHz</td>
<td>2 x 59.4MHz, 34.2MHz unpaired</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2 x 35MHz</td>
<td></td>
<td>2 x 75MHz</td>
<td>2 x 60MHz, 20MHz unpaired</td>
</tr>
<tr>
<td>Singapore</td>
<td>2 x 30MHz</td>
<td></td>
<td>2 x 75MHz</td>
<td>2 x 59.4MHz, 15.1MHz unpaired</td>
</tr>
<tr>
<td>UK</td>
<td>2 x 30MHz</td>
<td>2 x 34.8MHz</td>
<td>2 x 71.6MHz</td>
<td>2 x 60MHz, 20MHz unpaired</td>
</tr>
<tr>
<td>India*</td>
<td>2 x 12.5MHz</td>
<td>2 x 22.2MHz</td>
<td>2 x 40MHz</td>
<td>2 x 20MHz</td>
</tr>
</tbody>
</table>

* The spectrum holding for Delhi circle have been considered as on 31st January 2015
# E-GSM has been deployed
Source: Wireless Planning Commission, EY analysis

Figure 25: Global average of spectrum (in MHz) per operator

It is essential for the Government to allocate additional spectrum. The unutilized spectrum lying with defence services, the police, broadcasting and ISRO should be re-farmed and considered for allocation to telecom services. Moreover, the Government should make available the entire unsold spectrum.

Furthermore, licensing authorities should develop a clear roadmap that identifies the frequency bands that will be made available and the proposed timing of these. It is important that spectrum allocation-related decisions are made part of a long-term plan because once spectrum has been allocated, it can be difficult to re-assign. A clear roadmap for the auctions will help operators plan their acquisition strategies better. Lack of clarity on future availability of spectrum and the timelines of auctions lead to artificial scarcity in the market.

Source: TRAI
Mechanisms need to be put in place to ensure efficient utilization of allocated spectrum. In the event spectrum is unutilized, provisions need to be made to safeguard the valuable resource.

**Global initiatives for safeguarding efficient utilization of spectrum**

- In Bangladesh, some of the available spectrum that could have been used for GSM was left idle because it had been allocated to wireless local loop operators that had not established their businesses. This was despite limited spectrum being available for mobile operators.
- Bangladesh’s regulator has subsequently cancelled some of the wireless local loop operators’ licences.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Service area</th>
<th>Availability status of MW access carriers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>13/15/18/21 GHz Bands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total number of carriers available</td>
</tr>
<tr>
<td>1</td>
<td>Delhi</td>
<td>95</td>
</tr>
<tr>
<td>2</td>
<td>Mumbai</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>Kolkata</td>
<td>95</td>
</tr>
<tr>
<td>4</td>
<td>Maharashtra</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>Gujarat</td>
<td>95</td>
</tr>
<tr>
<td>6</td>
<td>A.P.</td>
<td>95</td>
</tr>
<tr>
<td>7</td>
<td>Karnataka</td>
<td>95</td>
</tr>
<tr>
<td>8</td>
<td>Tamil Nadu</td>
<td>95</td>
</tr>
<tr>
<td>9</td>
<td>Kerala</td>
<td>95</td>
</tr>
<tr>
<td>10</td>
<td>Punjab</td>
<td>95</td>
</tr>
<tr>
<td>11</td>
<td>Haryana</td>
<td>95</td>
</tr>
<tr>
<td>12</td>
<td>UP (West)</td>
<td>95</td>
</tr>
<tr>
<td>13</td>
<td>UP (East)</td>
<td>95</td>
</tr>
<tr>
<td>14</td>
<td>Rajasthan</td>
<td>95</td>
</tr>
<tr>
<td>15</td>
<td>Madhya Pradesh</td>
<td>95</td>
</tr>
<tr>
<td>16</td>
<td>West Bengal</td>
<td>95</td>
</tr>
<tr>
<td>17</td>
<td>Himachal Pradesh</td>
<td>95</td>
</tr>
<tr>
<td>18</td>
<td>Bihar</td>
<td>95</td>
</tr>
<tr>
<td>19</td>
<td>Orissa</td>
<td>95</td>
</tr>
<tr>
<td>20</td>
<td>Assam</td>
<td>95</td>
</tr>
<tr>
<td>21</td>
<td>North East</td>
<td>95</td>
</tr>
<tr>
<td>22</td>
<td>J&amp;K</td>
<td>95</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2090</td>
<td><strong>810</strong></td>
</tr>
</tbody>
</table>

Source: TRAI

**Key recommendations**

- A clear road-map of availability of spectrum should be provided in the future.
- All spectrum currently lying unutilized with various government agencies should be made available on priority in conformity with globally harmonized bands.

2.3.2.3 Backhaul spectrum

Backhaul links and systems are as essential as access links for mobile services. With anticipated data growth in the country, a large number of channels/RF carriers will be needed along with increased RF carrier bandwidths. It is imperative that high frequency bands – of up to 100GHz – are allowed for backhaul network usage. It is also imperative to adopt global best practices for utilization of these bands – light licensing and nominal or token spectrum charges.
Key recommendations

- Additional spectrum in increased bands should be available for the backhaul network, with a light licensing approach and nominal charges.

2.3.2.4 Spectrum trading and sharing

Spectrum trading and sharing is likely to provide a viable route for efficient utilization of spectrum that remains unutilized or underutilized with an operator. Spectrum trading and sharing promotes efficient spectrum usage by enabling it to be acquired by operators that can generate the maximum value from its use.

At the same time, the ability to share or trade spectrum provides an incentive for licensees that have unused or underutilized spectrum in order to generate revenue by offering it to others that can make better use of it. Trading and sharing can also help in overcoming inefficiencies during the initial allocation and help operators obtain contiguous bands.

Key recommendations

- Spectrum trading and sharing should be allowed at the earliest to encourage its efficient use.

2.3.2.5 Lack of contiguous spectrum bands

The spectrum allocation in India is highly fragmented due to a large number of operators in the market and lack of sufficient spectrum. This has led to unavailability of contiguous spectrum. Fragmentation of spectrum leads to its inefficient usage. Small holdings are a challenge when guard bands are needed to avoid interference at boundaries between frequency blocks for different applications (e.g., between broadcasting and mobile services and between different countries).

Assignment of continuous blocks of spectrum leads to increased efficiency. Contiguous blocks of spectrum can easily accommodate the varying throughput or bandwidths of user traffic. A widened channel can also absorb large and small user data transfers efficiently.

Furthermore, allocation of large blocks reduces the challenge of implementing multiple spectrum bands, especially in users’ equipment, since contiguous spectrum assignments are preferred to reduce the complexity of RF front-end designs. Wide spectrum blocks permit network operators to deliver high-speed services to users in a single band, and also simplify roaming for users with operators within the same band.

Therefore, contiguity is likely to enable significantly improved throughput and provide a consistent quality of experience for end users. It will also facilitate efficient and cost-effective rollout of new networks and device-related technologies.

Key recommendations

- Contiguous spectrum should be allocated for efficient provision of services.
Case study: Importance of contiguous spectrum for high-speed data services

As the demand for data services increases, deployment of LTE is expected to be critical in fulfilling the need for anytime, anywhere access to broadband. LTE will significantly increase data capacity and effectively augment existing 3G networks. It functions best with wide blocks of spectrum. This makes the need for contiguous spectrum imperative.

Wide channels provide optimum mobile broadband performance

- LTE uses an Orthogonal Frequency Division Multiple Access (OFDMA) radio interface that requires large and contiguous blocks of spectrum to operate efficiently.
- OFDMA technology leverages wider bandwidths to enable high data rates and thereby provide an excellent user experience. A bandwidth of 10MHz or more is best suited for deployment of LTE services.
- A wide channel allows licensees to take full advantage of future enhancements to LTE, while increasing their spectral efficiency.

Cost of deployment under different spectrum allocations

- The cost of deploying LTE services increases with the declining block size of contiguous spectrum. For instance, LTE networks in 2x10MHz spectrum channels cost twice as much to deploy as services in 2x20MHz channels.
3. Telecom infrastructure
The telecom infrastructure industry has acted as a backbone for the development of telecom services and played a prominent role in the growth story of the Indian telecom sector. Telecom infrastructure primarily includes the underlying network, such as fiber/cell sites over which wireline and wireless telecom services are provided.

3.1. Telecom towers

3.1.1. Introduction

Worldwide, ownership and management of telecom towers has largely been in the hands of telecom operators. However, in countries such as India and the US, towers have gained significance as a separate industry with operators outsourcing tower infrastructure to independent players. Separate tower companies with a considerable number of towers offer advantages such as rapid rollout over a large area, sharing of towers and tenancy-driven discounts, as compared to towers managed by operators.

India’s telecom infrastructure industry is one of the pioneers in passive infrastructure sharing. The tower infrastructure companies provide an integrated neutral host platform that is used by diverse and often competing operators. The growth of these independent tower companies, along with infrastructure sharing, has resulted in rapid rollout of services, fast go-to-market time for new entrants and savings in capex and opex. This has led to affordable services for end users and improved accessibility to the hinterland.

Industry size and growth

The country’s tower industry has grown significantly over the past few years. The number of telecom towers grew from around 250,000 in FY08 to 421,000 in FY14.29 Furthermore, the tenancy ratio has increased significantly from 0.9 to 1.9 during this period.20

Figure 27: Telecom towers installed and tenancy in India

Despite the substantial increase in the reach of telecom services, around 30% of the Indian population, mainly in far-flung rural and tribal areas, are still deprived of basic mobile services.31 Geographically, 15% of the country’s area remains to be covered by the telecom service providers.32 Furthermore, broadband coverage is still low in the country. It is estimated that more than 150,000 towers will be required on a pan-India level and a minimum of 50,000 towers in rural India to cater to these requirements.33

The telecom infrastructure segment is also expected to play a vital role to help realize the Digital India vision and facilitate inclusive growth. In particular, tower infrastructure will provide the foundation to achieve the objectives of broadband highway covering both rural and urban areas, universal access to mobile connectivity, public internet access, e-governance, e-Kranti and to develop smart cities in the country.

Figure 28: Key trends and drivers

Key trends

- Focus on optimization of energy
- Shift to fixed energy models
- Continued sharing of passive infrastructure
- Focus on operational improvements

Growth drivers

- Expansion of networks in rural areas
- Rollout of new technologies (3G/4G)
- Demand for data services
- Demand for in-building solutions and Wi-Fi
- Refarming of spectrum

Source: TAIPA and EY analysis

29 Tower and Infrastructure Providers Association
30 Ibid.
31 Ibid.
32 Ibid.
33 Ibid.
3.1.2. Challenges in the current scenario and the way forward

The tower industry continues to face multiple challenges, despite the significant role played by the infrastructure segment in the overall growth and delivery of telecom services. Foremost, challenges around obtaining RoW and site acquisition continue and have slowed down deployment of towers. Furthermore, the non-uniform policies adopted by different states raise impediments in obtaining RoW.

Another significant area of concern that is inhibiting the growth of the sector is that benefits to be provided under infrastructure status have not yet been extended to the industry. Consequently, economic benefits envisaged by the Government for the development of the industry have not trickled down to the implementation level.

An added challenge faced by the tower industry is on the green energy solutions front. Given that the ecosystem for renewable energy is at a nascent stage in the country, it is difficult to achieve the stringent green energy targets that have been set.

3.1.2.1 RoW and other impediments in installation of telecom towers

RoW impediments continue to hamper installation of towers and constitute a key challenge faced by the tower infrastructure industry. High costs, lack of uniformity in RoW guidelines and the absence of a single window clearance process act as barriers for timely roll-out of towers. Despite a set of guidelines rolled out by the DoT to accelerate tower deployment, support and alignment from state governments is yet to materialize. Moreover, multiple levies such as permission fee, sharing fee and renewal fee are also being charged non-uniformly across states, further burdening the tower industry.

Acquisition of sites and their deployment is emerging as a major operational challenge due to people becoming apprehensive about location of cell towers in the vicinity of their households. Additionally, municipal bodies and local governments are limiting the number tower installations. There have also been instances of sealing or disconnection of electricity at towers without the consent of the appropriate regulatory body. Such actions have severe consequences on provision of quality services to customers and result in additional cost implications for tower companies.

Issues pertaining to further approvals, such as from the Standing Advisory Committee on Radio Frequency Allocation (SACFA) clearances, are also leading to delays and sub-optimal coverage of infrastructure.

► **Requirement for multiple documentation**

Infrastructure providers need to submit several documents according to requirements of various state governments, municipalities or concerned authorities. These include those pertaining to site and location plans, elevation plans, drawings of towers, capacity of towers, occupancy certificates and affidavits from the owners or association of owners of commercial buildings, etc.

This extensive documentation increases administrative work and causes a significant delay in processing of applications. Often time-consuming, these processes slow down rollout of telecom networks.

► **Delay in applications processing and requirement of multiple approvals**

Considerable time is taken in provisioning permission for installation of tower, and can range from 45–75 days. States have different requirements for approvals and no objection certificates (NOC) being obtained from the various departments.

For instance, in Haryana, the entire process of grant of license takes around 90–105 days. Goa is asking for an undertaking that the telecom service provider or infrastructure provider will enter an agreement with the Competent Authority prior to getting any permission. All these processes are time-consuming and adversely affect the pace of network rollouts.

The practice currently adopted by state governments deviates from the DoT’s guidelines, which mandate a single window clearance system and approvals to be provided within a specified time (30 days for faster processing of applications and granting permission/approvals). State governments should require only the specific and relevant documentation as stipulated by the DoT guidelines to accompany the applications.

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34Tower and Infrastructure Providers Association
35Ibid.
Multiple fees and levies

The industry is levied high fees under the guise of permission fees, renewal fees, sharing fees, compounding fees, development charges and lump sum deposits for demolition. Furthermore, some state governments have divided their territories into various categories such as corporations, municipalities and Nagar Panchayats or high, medium or low potential zones to levy different fees.

Few states such as Goa ask for performance bank guarantees of an amount equal to the fees or levy over and above the fee payable. Chandigarh has a non-refundable license fee of INR 0.5 million for seven years, which doubles after expiry of every seven years.

These multiple levies are against the DoT’s guidelines, which stipulate only a nominal “one time administrative fee” to recover administrative expenses to be charged for processing of all applications.

Restrictions on installation of towers

States have imposed varying restrictions on installation of towers, despite no such mandate from the DoT. For instance, various state governments and municipalities have restricted installation of towers in and around water bodies, hospitals, airports, defence establishments, etc. Some policies also restrict the number of towers on buildings or wings of buildings, to one or two, making deployment of towers a challenging prospect.

Sealing of towers and disconnection of electricity at tower sites

According to the DoT’s guidelines, no coercive action can be taken on telecom towers without the consent of state Telecom Enforcement, Resource and Monitoring (TERM) cells. However, there have been instances of demolition or temporary sealing of towers without the consent of local TERM cells as well as cases of disconnection of electricity on account of complaints arising out of misplaced public apprehension.\(^ {36}\) Such instances disrupt the operations of towers and hamper provisioning of communications services.

Non-uniformity in local-level clearances

Currently, different municipal corporations and local bodies within states have issued varying tower-installation policies. Such a plethora of policies creates a challenging operational environment and leads to difficulty in compliance with norms.

Some state governments are gradually adopting measures to boost telecom services. For instance, the Kerala Government has accepted all the DoT’s guidelines on installation of towers. Additionally, seven state governments in North-East India have agreed to help the DoT acquire land for establishment of towers. These include the state governments of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. Such developments are steps in the right direction and should be promoted in other states as well.

Issues related to SACFA approvals

One of the primary functions of SACFA is to provide siting clearance for all wireless installations in the country. The site clearance requires examination of antenna structures to ensure that the antenna heights do not obstruct aircraft navigations or interfere with other existing wireless networks. Of late, there have been delays in provision of SACFA clearances to tower companies and mobile operators. This impacts the rollout of networks and the expansion plans of operators, especially in areas where telecom services are still at a nascent stage. In light of these challenges, it is important that the pending SACFA applications of tower companies and mobile operators are processed on priority.

Another area of concern is state governments mandating SACFA clearance prior to approvals from the respective authorities or municipal corporations. This is contrary to the DoT’s guidelines, according to which a copy of the SACFA clearance/application/ID, submitted to the Wireless Planning and Coordination (WPC) wing, should be acceptable by state governments.

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\(^ {36}\)Tower and Infrastructure Providers Association
Indian Government emphasizes the need to address issues related to installation of telecom towers and provision of uniform RoW guidelines

- **Group on Telecom and Information Technology Convergence (GOT-IT):** In 2000, the Government formed this committee for guidelines on RoW. It promulgated an RoW regime which is free from all possible obstacles.

- **NTP-2012:** The policy recognizes the need to provide uniform RoW guidelines across states and union territories. It voices the need to review and simplify sectorial policy for RoW for laying cable network and installation of towers, etc. to facilitate smooth coordination between service providers and state governments or local bodies.

- **53rd Report of the Standing Committee on Information Technology:** This parliamentary committee report on “norms for setting up of telecom towers, its harmful effects and setting up of security standards in expansion of telecom facilities”, notes that a national policy should be evolved to streamline the procedural issues to ensure fast and smooth growth of telecom services in the country. It also notes that implementation of DoT’s revised guidelines issued in August 2013 should be made mandatory across the country by giving them a statutory backing.

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**Key recommendations**

- The DoT guidelines should be incorporated in the statutory framework and rules in line with the 53rd parliamentary committee report. State governments should be mandated to follow the guidelines through suitable legislation or direction.

- Adopt uniform RoW across all states at a uniform and reasonable cost
  - Adopt single window mechanism on priority basis for granting RoW permission
  - Levy only admissible charges for reinstatement or restoration; take up the matter with state governments on priority to align these with the DoT’s uniform tower installation guidelines across states
  - Consult concerned departments (e.g. urban development/IT), advise state representatives to follow DoT guidelines for formulation of respective tower installation policies
  - Seek a status update on the state tower policies from states
  - Provide fiscal incentives to players for laying optical fiber cables in smart cities.
  - Ensure availability of sufficient access and microwave spectrum.
  - Frame strong laws including compensation for cable cut or damages due to digging.
  - Process on priority all pending SACFA applications.

Source: TAIPA
3.1.2.2 Lack of extension of infrastructure status benefits

Given the significance of the telecom sector in the development of our country, telecom towers as well as overall telecom services have already been included in the harmonized master list of infrastructure sub-sectors. This was aimed at providing a multitude of economic benefits to infrastructure providers. For instance, infrastructure providers were to be eligible for increased limits of funds at soft lending rates, viability gap funding, tax holidays as well as reduced import duty, and exception from excise duty, etc.

However, mere inclusion under the definition of infrastructure has not yet given any economic benefit to the sector. Preferential benefits applicable to infrastructure status grantees have not yet been extended to the tower industry. As compared to this, other sectors such as highways and ports have been extended various benefits under infrastructure status. It is now essential that the Government and the RBI consider providing these benefits to the telecom and telecom services infrastructure sub-sector.

• **Funds at concessional rates**
  Telecom and telecom services projects have long gestation periods and require large capex and opex. Therefore, domestic loans should be granted at concessional interest rates to this sub-sector by including it in the list of “Priority Sector” of the RBI. The tenure of loans should also be extended to 12–15 years on a case-to-case basis. This will enable operators to spread their loan tenures over most of the entire useful lives of assets, which is around 15 years.

• **Viability Gap Funding (VGF)**
  VGF is meant to reduce the capital cost of projects by enhancing credit, and making it viable and attractive for private investments through supplementary grant funding. VGF can take various forms, e.g., capital grants, subordinated loans, operation and maintenance support grants, and interest subsidies. The Government may appoint nodal agencies such as the IFCL or IDFC, through which VGF can be provided to telecom tower companies. VGF may also be provided to tower companies to subsidize capex and recurring cost of green initiatives, to help the government initiatives on green energy and reduce pollution. The current VGF scheme only recognizes public private partnership (PPP) projects as being eligible for grants. However, not all telecom projects meet the PPP criteria; therefore, this condition needs to be reviewed.

• **Funding for renewable energy**
  Currently, high RET targets have been set for the industry, which require considerable investments. Given that the industry is already under significant debt, arranging finance for RET is extremely difficult. According to the DoT’s estimates, the total investment required for implementation of RET in three years (2013–2015) is around INR337.5 billion, and in eight years (2013–2020) is around INR576.0 billion. To achieve this, the industry will need financing and funding options through various sources.

• **Accelerated depreciation**
  The sub-sector is highly capital-intensive and the benefits of accelerated depreciation will encourage further investments in expanding telecom infrastructure to rural areas. Currently, tax laws only allow 15% depreciation on most items used in the telecom sector – and it takes eight to nine years to claim tax deduction for the cost of capital goods. In comparison, items such as batteries have an economic life of only three years, and DG sets and air-conditioners of five to seven years. Given this situation, the general depreciation rate for capital goods used in the telecom business should be increased to 25% and in the case of batteries, to 60%, so that the total capital cost of equipment is depreciated within its economic life.

Key recommendations

Implement the benefits of “infrastructure” status to the industry by making funds available to it at softer lending rates, extending VGF facility and providing accelerated depreciation as well as tax holidays.

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37Tower and Infrastructure Providers Association
38Ibid.
39Ibid.
40Ibid.
41Ibid.
42Ibid.
3.1.2.3 High targets for green telecom

Another area of concern for the tower industry is the stringent green telecoms targets set by the Government. The Government has issued directives that require at least 50% of all cell towers in rural areas and 20% in urban areas to be powered by hybrid power, (which is defined as a combination of renewable energy technologies (RET) and grid power, by 2015. These targets increase to 75% and 33% for rural and urban areas, respectively, by 2020.

Meeting these high targets is not feasible, given the poor eco-system of RETs in the country. For instance, the technical and operational challenges associated with deployments have made the business case unviable. Specifically, lack of large scale deployments and supporting ecosystem led to high costs of installation and operations for renewable energy plants. As a way out, the renewable energy service company (RESCO) model was also examined by the industry, but it has also not proved successful.

Moreover, RET targets were set by the Government, based on the recommendations of TRAI, in 2011. Significant improvements have taken place in energy efficiency technologies, e.g., advancement in battery technology, reduction in power consumption due to improved BTS efficiencies, use of free cooling units (FCUs), indoor to outdoor BTS (which do not require air-conditioning), etc. These developments have negatively affected the business case for use of RET devices for carbon footprint reduction. The industry has therefore, requested the Government that the TRAI should be requested to revisit its recommendations on green telecom. Moreover, during this period, the DoT’s communication on green telecom targets should be stayed.

### Unrealistic targets for green telecommunications

<table>
<thead>
<tr>
<th>RET</th>
<th>0.3 million towers to be powered by RET by 2020 (totaling to approximately 3GW capacity)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This is thrice the current installed solar power in India; current installed solar capacity is 1GW.</td>
</tr>
<tr>
<td></td>
<td>This is more than India’s cumulative off grid solar application target under the Jawaharal Nehru National Solar Mission (which is of 2GW).</td>
</tr>
<tr>
<td></td>
<td>Monthly run rate to achieve a target of 0.2 million towers powered by RET by December 2015 will require thousands of RET installations per month.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CO2</th>
<th>Carbon footprint reduction targets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17% by 2018-19 (direct reduction)</td>
</tr>
<tr>
<td></td>
<td>50% in rural areas and 34% in urban areas by 2020 (through carbon credit policy)</td>
</tr>
</tbody>
</table>

Source: TAIPA

The DoT plans to make available overseas borrowings, subsidies and grants to telcos to stimulate investments in green energy technologies. If these materialize, they will provide companies commercially viable options for deploying green solutions. The financing options being considered include:

- External commercial borrowings (ECB) from the World Bank and the Asian Development Bank
- Subsidies from the Ministry of New and Renewable Energy (MNRE) and the National Clean Energy Fund (NCEF)
- Easy bank financing for tower companies (soft interest rates; increased loan tenures)
- Increased overseas borrowing limits, reduced import duties and excise exemptions on telecom infrastructure equipment

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44 Ibid.
It should be noted that the ICT sector's contribution to carbon emissions is miniscule – only around 2% of global CO2 emissions are contributed by ICT. Furthermore, the primary cause of CO2 emissions from this sector is the consumption of diesel, which is used to power tower sites. As compared to other sectors such as transportation, railways and agriculture, the diesel consumption by telecoms is low – mobile towers are the second-lowest consumers of diesel, consuming only 1.54% of diesel, among the 12 identified sectors in India.

Furthermore, the primary reason for diesel consumption by the telecom infrastructure industry is the absence of reliable grid power. Infrastructure providers are compelled to use diesel to keep the towers up and running in order to comply with the mandatory quality of service requirements. Therefore, availability of reliable power supply can lead to significant reduction in diesel consumption as well as CO2 emissions.

### 3.2. National broadband plan

Broadband connectivity is gaining significant importance with the role of the digital economy becoming more important for the progress of a country. Countries worldwide have adopted national broadband plans (NBPs) with the aim to extend their broadband network footprint and increase the usage of broadband-enabled services.

These NBPs have helped to drive broadband penetration in both fixed and mobile broadband connections. It is estimated that countries with an NBP have increased broadband penetration, as compared to those without an NBP. As of mid-2014, worldwide there were 140 NBPs in place.

**Figure 29: Differences in broadband penetration levels as per the presence of an NBP (2013)**

<table>
<thead>
<tr>
<th></th>
<th>With NBP</th>
<th>Without NBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average level of fixed broadband penetration</td>
<td>12.7%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Average level of mobile broadband penetration</td>
<td>27.5%</td>
<td>8.9%</td>
</tr>
</tbody>
</table>

Source: ITU

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**Key recommendations**

- The Government should provide electricity connections to towers on priority and at the lowest tariffs wherever possible. Ministry of Power to be approached for “uninterrupted power consumer” status and a preferential uniform tariff to telecom tower installations in consultation with DoT.
- The Government’s communication on green telecom may be referred back to TRAI for a review. During the process, the DoT’s communication on its green telecom directive may be kept in abeyance.
- RET targets may be adjusted taking into account current status of RET deployment and learnings and significant technological changes in other energy solutions.
- The carbon emission measurement methodology should be aligned with international practices.

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45“Recommendations on Approach towards Green Telecommunications,” TRAI, 12 April 2011.
46“All India Study on Sectoral Demand of Diesel & Petrol,” Nielsen, 2013.
3.2.1. India’s NOFN plan

In line with global NBPs, the Indian Government has also introduced its National Optical Fibre Network (NOFN) project, with an aim to provide an impetus to rural broadband growth. Approved in October 2011, the NOFN project seeks to bridge the connectivity gap between the Gram Panchayats (GPs) and block levels. At present, optical fiber cable connectivity in India is available up to the block levels. The project aims to provide connectivity of 100Mbps broadband service to 250,000 GPs in the country.\(^48\) It is estimated that a total of 600,000 km. of optical fiber cable, i.e., incremental fiber of 2.4 km/GP has to be laid under the project.\(^49\) To achieve this, the Government has estimated a project cost of INR300 billion that is to be funded through USOF in a phased manner.\(^50\) A special-purpose vehicle, Bharat Broadband Network Limited (BBNL), has been set up to execute the project.

**Current status and revival of NOFN plan**

**Project status:**
- As of early April 2015, 20,000 village panchayats have been digitally connected.
- In January 2015, Idukki in Kerala became the first district in the country to be linked to the NOFN.

**Revival plan:**
- As part of the focus on overall Digital India, the Indian Government is seeking to overhaul the national broadband project program, renaming it BharatNet.
- A committee report analyzing the national broadband project expects that retail broadband services should be available at prices below INR150 a month in poorer states and approximately INR250 per month in more economically advanced states, with speeds ranging between 2Mbps and 20Mbps for all households. It further recommends on demand capacity to all institutions.
- BharatNet is expected to subsume all the ongoing and proposed broadband network projects taking the project outlay to around INR720 billion.

**3.2.2. Challenges in the current scenario and the way forward**

Despite the various steps taken by the Government in planning the NOFN project, its implementation has been facing multiple challenges and it has been delayed. Originally estimated to be completed by October 2013, it is now expected to complete in a phased manner by December 2016.\(^51\)

**Right of way**

Facilitation of RoW for laying cables is another concern hampering timely execution of the NOFN project. In this respect, 16 states and union territories had signed tripartite agreements with the Central Government and BBNL, and were expected to provide free RoW for laying optical fiber cables. However, operators are still facing issues in obtaining timely RoW-related clearances. In particular, obtaining RoW permission from the forest department, railways for railway crossing and national highway authority form a key challenge.

Given that the NOFN project requires large-scale deployment of cables throughout the country, it is imperative that all state governments ensure timely facilitation of RoW at reasonable costs and comply with the terms agreed with the Central Government.

As a welcome step, some state governments have given their assurance to facilitate free RoW for laying optical fiber networks. For instance, the Andhra Pradesh Government was the first to issue free RoW for the NOFN project in October 2013. In a similar manner, state governments should contribute to the NOFN project by way of not levying RoW charges.

**Lack of clarity on participation of service providers**

While the Government is providing for the optical fiber connectivity up to the GP level, telecom operators will need to set up their own infrastructure at the Panchayat level to provide services to end customers. This brings up another important concern relating to the NOFN project – lack of clarity on the participation of access providers. Although the project provides for nondiscriminatory access to all categories of service providers, details of their involvement or incentives provided to them on being a part of the project are not clear.

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\(^{49}\)Ibid.

\(^{50}\)Ibid.


52 Speeding ahead on the telecom and digital economy highway
Case study: success of PPP model for NBPs

Primary investment models used for an infrastructure deployment project include the ownership model (highest level of government involvement), PPP model (government partnering with private players) and financial incentive model (government mainly acting as a facilitator by providing incentives to public and private sector companies to deploy infrastructure).

Means of financing broadband plans globally (2012)

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<tr>
<th></th>
<th>48%</th>
<th>33%</th>
<th>25%</th>
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<th>19%</th>
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Source: ITU

According to industry studies, a strong partnership between the Government, industry and other stakeholders is likely to significantly facilitate deployment of broadband. Although governments must lead the way in developing national plans, success also depends on the active support of a broad ecosystem of public and private entities such as telecom service providers, banks and financial institutions, business organizations, and ICT equipment and infrastructure providers. Policy-makers should involve these stakeholders in a consultative and participatory approach.

Examples of PPP for broadband development in Latin America

<table>
<thead>
<tr>
<th>Country</th>
<th>Partners</th>
<th>Area of collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>Ministry of Communications, telecom service and ICT equipment providers</td>
<td>The last mile initiative, which is a large PPP incubating telecom connectivity in underserved and rural areas</td>
</tr>
<tr>
<td>Brazil</td>
<td>The Brazilian government and telecom service providers</td>
<td>Brazilian telecom service providers to support the NBP by offering more economical broadband services to customers in the country</td>
</tr>
<tr>
<td>Chile</td>
<td>Ministry of Digital Development, Ministry of Economy, Chilean Association of Information Technology Companies, telecom operator and market research firm</td>
<td>Collaborated to identify gaps in ICT adoption, including broadband service access</td>
</tr>
</tbody>
</table>

PPP can be utilized as a mutually beneficial model to deliver NBP goals and objectives

Sources: DoT; ITU; “National Broadband Plans Show a Diversity of Methods but a Unity of Purpose,” Pyramid Research, December 2011.
Adopt a uniform process to obtain RoW at reasonable costs.

- RoW permission should be granted “on priority” within stipulated time frame along with accountability for clearances.
- Single window mechanism should be adopted for granting RoW permission.
- RoW rates and issuance procedures should be standardized – all state governments should extend the facility of RoW for laying underground telecom cables to all licensees without payment of any compensatory charges, levy, lease rentals, license fee, revenue share or cashless equity. Admissible charges should include only reinstatement charges or charges directly linked to the restoration work.

In real estate, building and town planning, make it mandatory to place ducts or optical fiber, with well-defined access mechanisms, on all new road constructions along national highways, inter and intra city roads as well as buildings.

All buildings and towers should be provisioned with vertical conduits for carrying out last mile building wiring for FTTH services.

- Mark area for underground cables away from roads to avoid disruption during expansion.
- Buildings should have properly demarcated sections both within buildings and on rooftops for broadband infrastructure; development authorities should give mandate to developers and builders.
- There should be a tower and a common transmission or equipment room in every village panchayat, funded by the panchayat running through USOF along with fiber.
- Trenching activities of USOF should be supported through Mahatma Gandhi National Rural Employment Guarantee Scheme.
- Provide details on participation of service providers in the NOFN plan. Also provide fiscal and regulatory incentives for them to become a part of the project.