Liberalising Satellite Communications in India:

Opportunities for Inclusive Economic Growth

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ICRIER

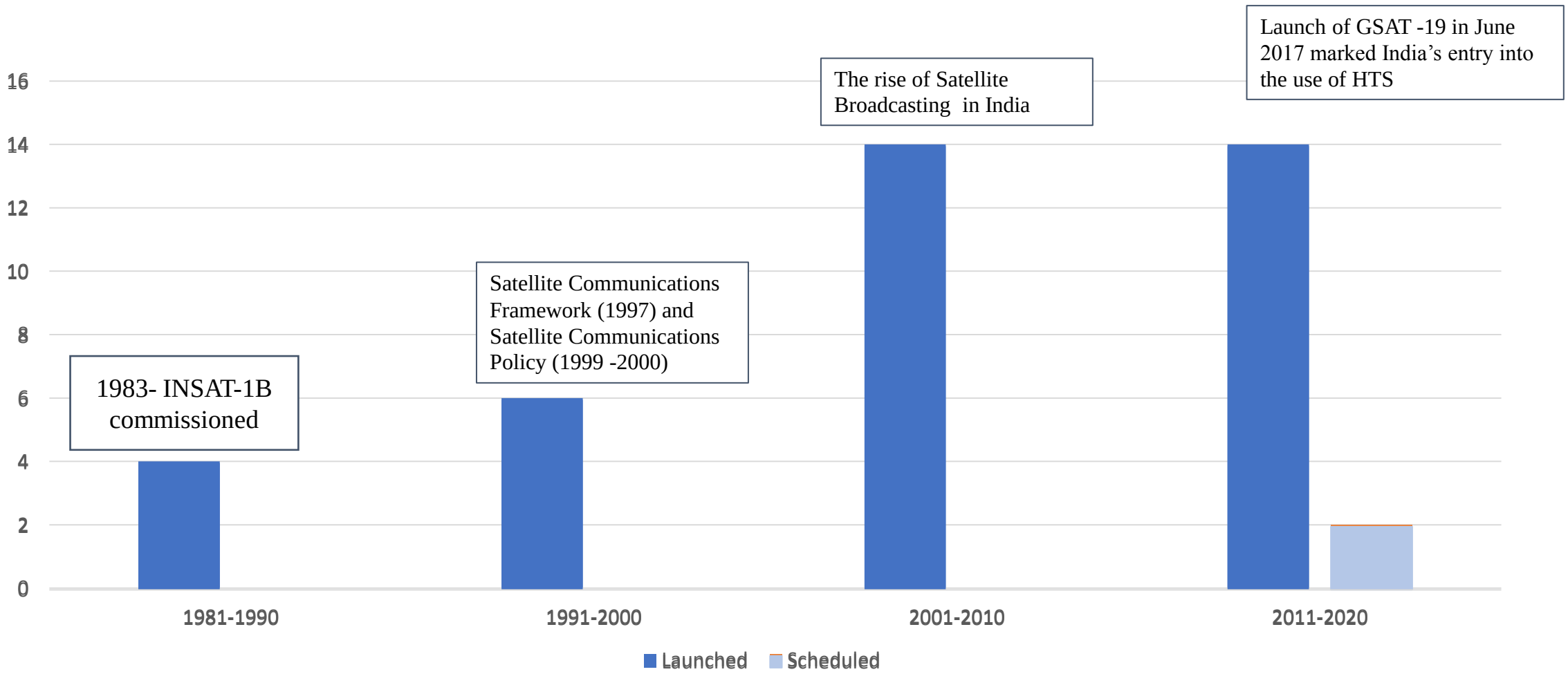
Key themes

- Overview of satellite communications in India
- Current and potential applications of satcom in India
- Open skies versus restricted skies
- Regulatory framework scoring parameters and analysis
- Review of stakeholder consultations
- Policy timeline and institutional analysis

Overview of Satellite Communication in India

- ISRO has played a crucial role in developing satellite capacity in India
- The Indian National Satellite System (INSAT) is one of the largest domestic communication satellite systems in the Asia-Pacific region
- A fleet of Indian communication satellites are operating over India with communication transponders in C-band, extended C-band, Ku-band, Ka/Ku band and S-Band
- The launch of HTS could propel India's Internet speed to 100 gigabits/second by 2019
- GSAT-29 - recently launched on November 14, 2018 is reported to bring better access to communication networks, specifically in the Jammu and Kashmir and North East

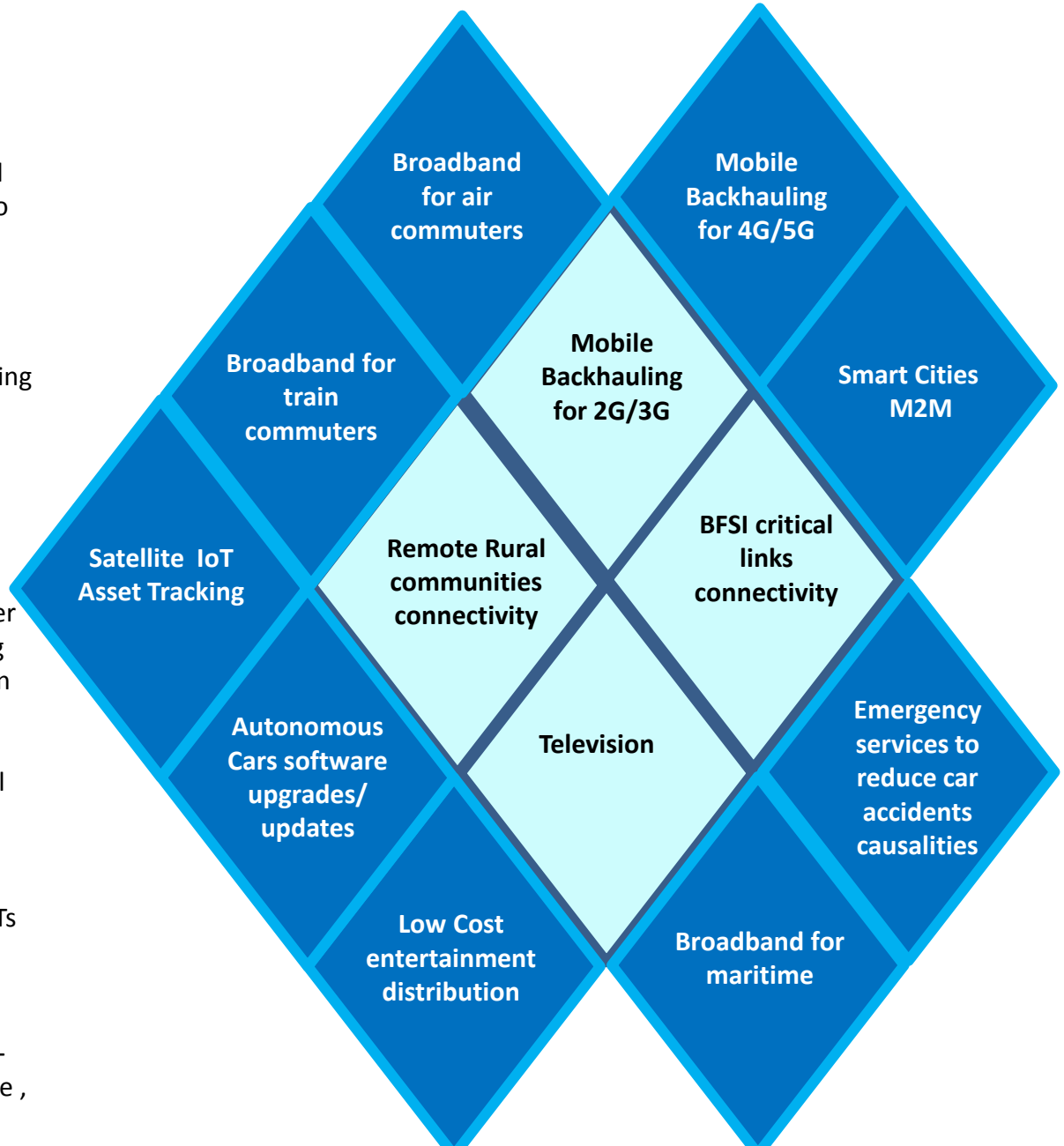
Launch of Communication Satellites in India



Applications of SatCom in India

Present applications

- High-power Ku-band transponders are used to support DTH services with small dish antennas all over India According to ISRO about 107 Ku transponders both from Indian and leased satellites are catering to DTH television
- SATCOM links have a major role in banking sectors linking the ATMs with banks
- According to provisional estimates 2,74,000 VSATs are being used for telecom and broadcasting applications
- According to TRAI estimates, the number of enterprise service providers requiring communications satellites has grown on average by 5% annually
- The technology setup of India's National Stock Exchange is the largest by any company in India and it uses satellite communication technology to energize participation in trading using 2,500 VSATs across 200 cities spread all over the country
- Social and developmental applications – disaster management, search and rescue , tele-medicine, tele-education



Potential applications

- Given the constraints in network demand, rural penetration of satellite broadband can help achieve universal access
- Satellite Communications multicasting and caching architecture can revolutionize Rural India Internet access capabilities by enabling "Off -Line browsing"
- Satellite backhaul can help ramp up a network's capability to handle data traffic. The more rural the region, the less cost-effective terrestrial backhaul becomes
- Satellite innovations enable the "Internet of Everywhere". It can be deployed for seamless high-speed broadband for users in maritime and aviation
- Satellite coverage adds value to the mix of access technologies for 5G, especially for mission critical and industrial applications where ubiquitous coverage is required.
- Innovations in Ka band, HTS with spot beams and frequency reuse, non-geo satellite (NGS) constellations, flexible payloads, flat panel antennas and several other developments are making satellite broadband connectivity more affordable globally.

Comparison of terrestrial and satcom technologies

- Countries like India with varying topographies and population densities, such as India, terrestrial technologies are often inadequate to achieve universal access. The current rural penetration in India is 20.82 percent
- Satellite technologies can circumvent mountain ranges or other geographical barriers and are arguably a better option for connecting remote locations such as the Andaman and Nicobar Islands or the mountainous Himalayan region in India
- The United States, despite being the most wired country in the world, it has the highest deployment of satellite broadband (over 4 million terminals)
- With large capacity satellites such as the Ka-band satellites, the disadvantages with respect to cost and capacity , in comparison to ground technologies is becoming lesser and lesser

Parameters	Terrestrial	Satellite
Coverage Cost	Additional cost per sq km ranges between $3000 and $30,000 per sq km	Additional cost per sq km ranges between $1.5 and $6 per sq km
Basic Infrastructure Requirement	In order to deliver broadband internet to homes and businesses in cities and towns through terrestrial means require long cables, laid underground to connect regions. Developing terrestrial infrastructure is an incremental process as it is not possible to provide connectivity to a village unless its surrounding areas are already connected.	All a consumer needs in order to access space-based internet is an antenna on the rooftop, and a set top box inside the house. Further, telecom towers using satellite mode can be deployed in new areas without worrying about surrounding infrastructure. However, the fixed cost of launching a new satellite is significantly higher
Economic Viability	In case there are not enough consumers in a particular region, recovering capital costs becomes a challenge. Since a significant portion of the Indian population that is yet to come online lives in semi-urban and rural areas, it may not be economically viable to lay optical fibres in some of those regions.	Owing to the minimal surrounding infrastructure required when telecom towers uses satellite as backbone, it expedites the return on investment for ground infrastructure.
Penetration	Ground broadband technology fails to provide quality coverage in remote and far-flung areas	Satellite systems are universal and can provide internet on oceans and islands, and even to those in the sky.

Source: ORF (2017): https://www.orfonline.org/expert-speak/exploring-the-potential-of-satellite-connectivity-for-digital-india/

Open Skies versus Restricted Skies

Country	Number of Satellites	Year of First Satellite Launch	GDP (nominal) in US$ million	Type of Regulatory Framework
Vietnam	3	2008	223,864	Limited Skies with Domestic Preference
Philippines	3	1987	313,595	Open Skies
Malaysia	7	1996	314,500	Open Skies
Singapore	10	1998	323,907	Open Skies
Thailand	9	1993	455,221	Limited Skies with Domestic Preference
Taiwan	10	1998	579,302	Open Skies
Indonesia	17	1976	1,015,539	Open Skies
Australia	20	1967	1,323,421	Open Skies
South Korea	23	1992	1,530,751	Limited Skies with services contracted by a small number of authorized carriers
United Kingdom	47	1962	2,622,434	Open Skies (however open to interpretation post Brexit
India	88	1975	2,597,491	Restricted – services must be contracted through a government agency
Japan	176	1970	4,872,137	Open Skies
China	327	1970	12,237,700	Limited - restricts services to only domestic and certain joint venture companies
European Union	148	1968	17,277,698	Open Skies
United States	1614	1958	19,390,604	Open Skies

Data source: N2YO.com (2018). *Satellites by Countries and Organisations*, World Bank (2018), Industry Sources

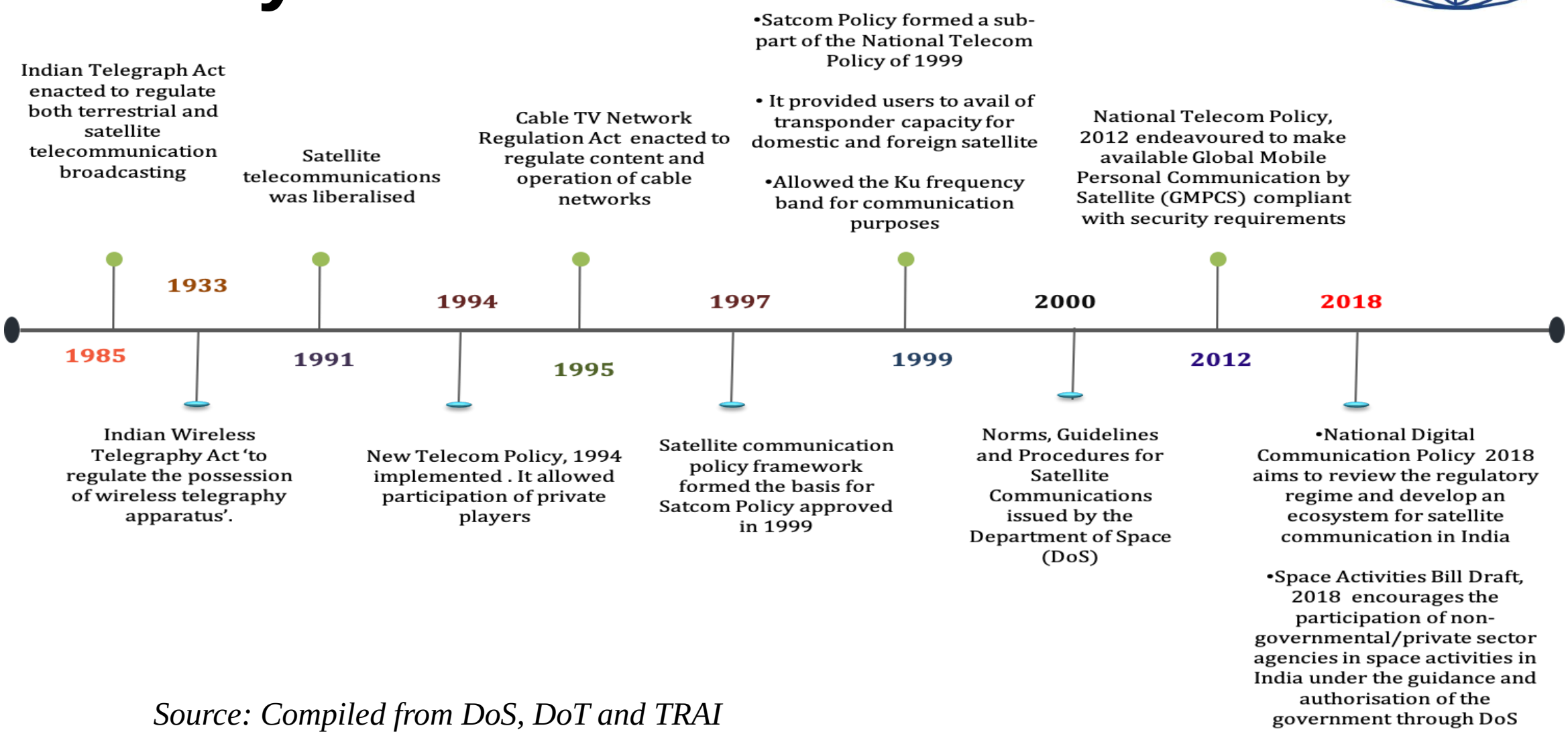
Highlights from China's Satcom industry

- China began to develop communication satellites at the end of the 1960s. At the beginning of 1980s China successfully built its first domestic satellite communication trial network for broadcasting and television. The national coverage of satellite broadcasting TV exceeds 85 percent
- VSAT satellite communications system has been used to complement the fibre network system employed in the project that aims to "covering every village", and is fulfilled by telecom operators, and more than 3 000 VSAT sites have been built for this purpose (Data as of 2013)
- China launched its first HTS in 2017 with a transfer capacity of 20 Gbps to meet the needs of distance education, digital news gathering, emergency communications etc.
- With a transfer capacity of 200 Gbps, a communication network covering China and the Asia-Pacific region is expected to be established in 2020
- The policy focuses on maximizing international collaboration and leveraging international advanced technology

Review of Stakeholder Interactions

	Government	SSOs	VSAT Service Providers	DTH	Ground Segment
Challenges	National security and creating a self sustainable space program for India	India is a no-go for foreign communication satellite investment. Policy uncertainty makes deters investment in an attractive market	Controlled access to foreign capacity that can limit growth. Policy uncertainty leads to conservative growth strategies	Lack of domestic satellite capacity and forced migration to Indian satellites. Absence of a clear cut roadmap	Build domestic capacity in manufacture of ground equipment.
Opportunities	Bringing a digital future to India along with several non-commercial applications	The potential applications of satcom in delivering broadband and DTH	Potential use cases and demand in enterprise services. The industry could scale much faster	Using new technologies satellite television could reach all homes in India	Connecting remote areas, emergency applications
Policy Suggestions	Following a mandate that improves India's space capabilities and reduce reliance on foreign companies	Opening up the sector to foreign and private sector participation	Competitive pricing of satellite bandwidth in India	Resolve issues related to "Windowing of Spectrum" and using foreign satellite capacity in the absence of domestic capacity, layout a procedure of regulatory approvals for migration , if at all	Address infrastructural concerns on the ground

Policy Timeline



Source: Compiled from DoS, DoT and TRAI

Comparing satellite bandwidth prices

Year	India – Satellite Bandwidth Tariff (USD per mpbs per month)	Global – Satellite Bandwidth Tariff (USD per mbps per month)	India – Mobile Broadband 1 GB Price (USD)	Global – Mobile Broadband 1 GB Price (USD)
2013	1760	1215	16.21	21
2014	1760	1100	4.1	18
2015	1897	945	3.8	15
2016	1998	625	4.28	14

Source: ITU (2018) and Industry Sources

- The price of satellite bandwidth in India is round six times the global prices (2016). Concomitantly, the cost of satellite broadband in India is among the highest in the world.
- The price of mobile data on the other hand is about one third of the global average (as on 2016).
- A fiercely competitive market for terrestrial technologies and disruptive new entrants has further lowered data tariffs in India.

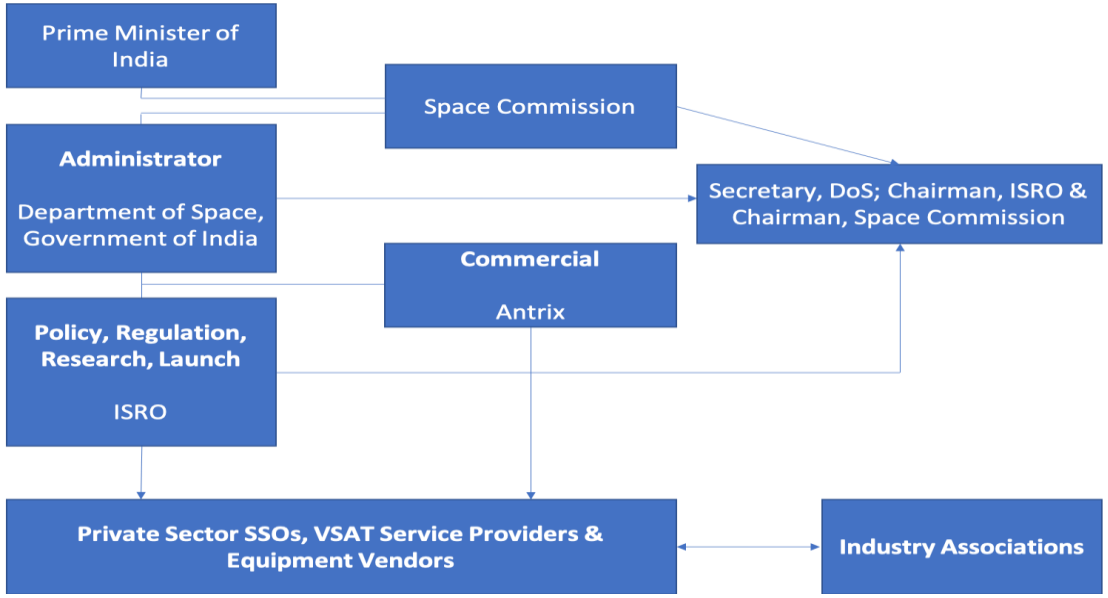
- BSNL pays less than half for bandwidth procured on foreign satellites (Thaicom) compared to an Indian satellite (GSAT 8)
- In the fine print the report mentions that Thaicom is ready to reduce the price to 6.5 Lakh per MHz if additional BW is allotted

Satellite	Frequency Band	Bandwidth Hired	Price per MHz	Application
GSAT-16	C-Band	684 MHz	Rs 15.84 Lakh per MHz	IDR Links
GSAT-18	C-Band	549 MHz	Rs 15.84 Lakh per MHz	IDR Links
GSAT-8	Ku-Band	36 MHz	Rs. 18.34 Lakh per MHz	VSAT
NSS-6	Ku-Band	24.5 MHz	Rs. 16.32 Lakh per MHz	DSPT
Thaicom-4* (Spot Beam)	Ka/Ku - Band	1488 MHz	Rs. 8.7 Lakh per MHz	VSAT, IDR
Total charges payable by BSNL per annum			Rs. 335 Crore	

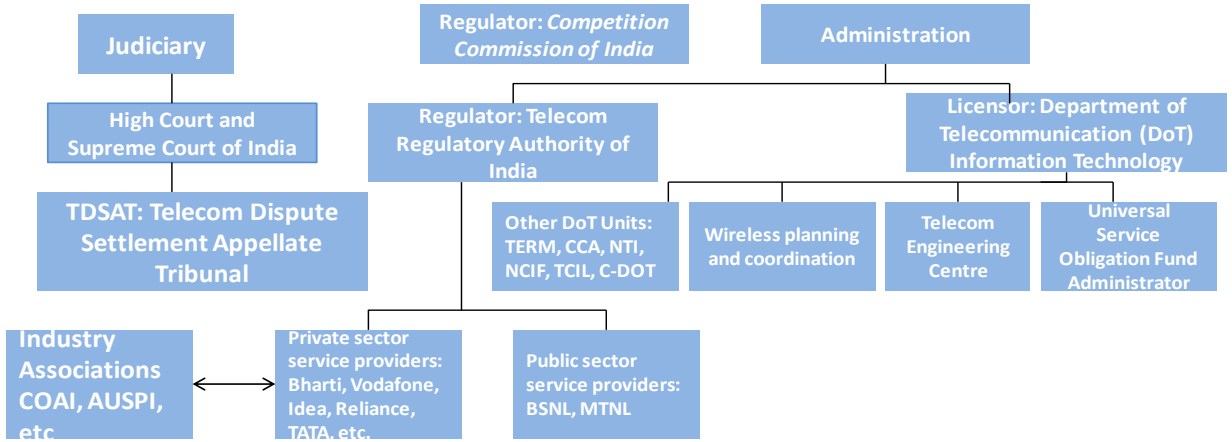
Source: Telecom Live, November 2018

Institutional Analysis

Satellite Communication



Telecom



- In 1990 the government appointed the Athreya Committee to study the re-structuring of telecoms. The committee recommended
  - Setting up of an independent regulator
  - Separation of DoT the service provider from DoT the policy maker
  - This permitted Indian registered companies to operate and promoted foreign investment in the telecom sector
- India's digital future can benefit immensely from the growth of satcom in India

Thank you!