

M.A. Space and Telecommunications Law NALSAR University of Law, Hyderabad, India.

Telecommunication Laws in India
Introduction to Telecom Industry in India
Dr. Mohanavelu

ONLINE LECTURE PROGRAM
Date: 19/08/2023 Rescheduled: 16:15-18:15

**M.A. Space and Telecommunications Law
NALSAR University of Law,
Hyderabad, India.**

**Introduction to Telecom Industry in India
(Telecommunication Laws in India)**

Speaker: K S Mohanavelu

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I also want to clarify that short falls in this paper, if any are entirely due to me.

K S MOHANAVELU

Introduction to Telecom Industry in India

We will discuss this subject in two parts:

- 1 Enabling Factors for Orderly and Efficient Operations of Telecommunication Services
(Laws, Authorities, Policies, Acts, Regulations, License Conditions, Rules of Procedures, Spectrum Management Principles and Practices)**

- 2 Profile of Telecommunication Services
(Various Services, Technologies, Subscriber Growth, Service Providers, Infrastructure Providers, etc.)**

Introduction to Telecom Industry in India

(Telecommunication Laws in India)

Topics

I Introduction

II Enabling Factors for Orderly and Efficient Operations of Telecommunication Services

- **Existing Government of India Acts and Rules**
- **Draft Indian Telecommunication Bill, 2022**
- **Government of India Policies for Telecommunication Sector**
- **Space Infrastructure / Satellite Based Telecommunications**
- **National Digital Communications Policy (NDCP) 2018**
- **National Telecommunications Regulations**
- **Regulatory Institutional Structure for Telecom Sector**
- **Telecom Regulatory Authority of India (TRAI)**
- **Telecom Service Authorisation/Licensing regime**
- **Telecom Service License Conditions**
- **International Telecommunication Union**
- **National Level Spectrum Management**
- **Satcom Spectrum and Satellite Service Licence**

Introduction to Telecom Industry in India

(Telecommunication Laws in India)

III Profile of Telecom Services and Service Providers

- **Status of Telecom Services**
- **Access Services - Mobile**
- **National Long Distance (NLD) by Optical Fibre Circuits**
- **International Long Distance (ILD) and Autonomous System (AS)**
- **Internet and Broadband Services**
- **VSAT Service**
- **Global Mobile Personal Communication by Satellite (GMPCS) Service in India**
- **Public Mobile Radio Trunking Services (PMRTS) and Captive Mobile Radio Trunking Service (CMRTS)**
- **Public Protection and Disaster Relief (PPDR) Networks**
- **Universal Service Obligation Fund (USOF)**
- **5G and Applications of 5G Technology**

IV Mobile Phones, Telecom Equipment Vendors and Support of IT Organisations

INTRODUCTION

- Telecom in India is seen more as a Service Industry.
- Telecommunication is an essential service for the Nation;
Key factor for overall National growth of the economy;
Fetches **Revenue through License fee and Spectrum Auctions**
Telecom growth in India is phenomenon.
Presently Total Telecom Subscribers: About 1.2 billion;
Total Internet Subscribers: About 865 million.
About 450 million OTT users
About 2.3 million Mobile Base Stations spread all over the country
About 2.8 million Km of Fibre
About 70 million DTH Subscribers; 45 million Cable TV subscribers
About 43 million Free Dish Users'; About 3 lakh VSATs
Last Year 5G Auctions: Government received Rs 1.5 lakh Crores.

INTRODUCTION

- .
- **Telecom Sector Stakeholders :**
Central Government/ Ministries/Departments,
State /UT Governments, local authorities,
industry and
user communities.

The Central Government has a pivotal role in the Telecom Sector and will co-ordinate with all stake holders. Central Government will design and implement policies.

- The Telecom infrastructure is largely provided by the Service Providers and Infrastructure Providers

Enabling Factors for Orderly and Efficient Operations of Telecommunication Services

GOVERNMENT OF INDIA ACTS AND RULES

Government of India Acts and Rules form the Legal Basis for Developing and Applying Telecommunication Regulations in India

Indian Telegraph Act 1885

<https://dot.gov.in/act-rules-content/2442>

India Wireless Act, 1933

<https://dot.gov.in/act-rules-content/2419>

Information Technology Act

<https://www.meity.gov.in/content/information-technology-act>

GOVERNMENT OF INDIA ACTS AND RULES (Contd.)

Telecom Regulatory Authority of India (TRAI) Act, 1997

<https://dot.gov.in/act-rules-content/2716>

Telecom Regulatory Authority of India (TRAI) Act, 1997

<https://dot.gov.in/act-rules-content/2426>

Telecom Dispute Settlement and Appellate Tribunal

(TDSAT) <https://www.tdsat.gov.in>

Indian Telegraph Right of Way Rules

<https://dot.gov.in/act-rules-content/3057>

Mobile Banking

TELECOM REGULATORY AUTHORITY OF INDIA NOTIFICATION

New Delhi, the 22nd November, 2016

<https://dot.gov.in/sites/default/files/Mobile%20Banking%20%28QoS%29%202nd%20Amendment%20Regulations%202016.pdf?download=1>

Draft Indian Telecommunication Bill

The Proposed New Telecom Bill provides a Road Map for Restructuring Telecom Sector; Promotes Innovation.

Ministry of Communications conducted public consultative process and developed a modern and future-ready legal framework in telecommunication.

<https://dot.gov.in/sites/default/files/Draft%20Indian%20Telecommunication%20Bill%20C%202022.pdf>

Deliberations on the Draft Bill:

Consultations on the draft Indian Telecommunication Bill

<https://dot.gov.in/sites/default/files/Inviting%20Comments%20on%20the%20draft%20Indian%20Telecommunication%20Bill%20C%202022.pdf>

Explanatory note to the draft Indian Telecommunication Bill, 2022

<https://dot.gov.in/sites/default/files/Explanatory%20Note%20to%20the%20draft%20Indian%20Telecommunication%20Bill%20C%202022.pdf>

Draft Indian Telecommunication Bill - New Regulatory Framework for Telecommunications Industry in India

With more than 1 billion subscribers, India is the world's second largest telecommunication eco system.

The telecommunication sector employs more than 4 million people and contributes about 8% of the country's GDP.

The existing regulatory framework for the telecommunication sector is mainly based on the Indian Telegraph Act, 1885.

The nature of telecommunication, its usage and technologies have undergone a massive change since the era of “telegraph”. The world stopped using “telegraph” in 2013.

We now live in the era of new technologies such as 4G and 5G, Internet of Things, Industry 4.0, M2M Communications, Mobile Edge Computing, etc. These technologies are creating newer opportunities for India's socio-economic growth. Therefore, India needs a legal framework attuned to the realities of the 21st century.

Noting the importance of Telecommunication Services for National Development, the Central Government proposed a new legal framework **“The Indian Telecommunication Act”**

Draft Indian Telecommunication Bill - New Regulatory Framework for Telecommunications Industry in India

The new Bill will replace the existing legal framework governing telecommunication in India, comprising of

The Indian Telegraph Act, 1885,

The Wireless Telegraphy Act, 1933 and

The Telegraph Wires (Unlawful Possession) Act, 1950.

Draft Indian Telecommunication Bill - New Regulatory Framework for Telecommunications Industry in India

Key themes for developing a new legal framework for Telecommunications

In Consultations with various stakeholders and industry associations, the Government had identified the following key themes for developing a new legal framework for Telecommunication Services:

- Recognition and acknowledgement of the need for a **new legal framework that is future-ready**;
- The need for updating the nomenclature and definitions of relevant terms in the telecommunication legal framework;
- The role that a strong legal framework can play in ensuring steady rollout of new telecommunication technologies;
- Need for legal certainty regarding spectrum management including issues relating to the use, allocation, and assignment, based on the underlying principle that spectrum is a natural resource that needs to be assigned in a manner that best subserves the common good;

Draft Indian Telecommunication Bill - New Regulatory Framework for Telecommunications Industry in India

Key themes for developing a new legal framework for Telecommunications (contd.)

- **Alignment of telecommunication standards with international standards and best practices;**
- Importance of cybersecurity, national security and public safety concerns, while ensuring constitutional and procedural safeguards;
- Need for a distinctive insolvency framework that allows continuity of provision of telecommunication services, so long as the licensee pays all dues; and
- Need for rationalization of penalty framework, providing for specific penalties that are clearly linked with the nature of breach and gravity of the offence.

Draft Indian Telecommunication Bill - New Regulatory Framework for Telecommunications Industry in India

The Indian Telecommunication Act – The Present Status

As per media reports the Bill has been approved by the Government. The bill is believed to have been approved by the Cabinet but it is not clear when it will be tabled in Parliament.

Two Modifications:

It appears the government is likely to have removed over-the-top (OTT) players or applications from the bill and this may be a great relief to providers of social media channels.

It appears that the government has proposed administrative allocation of spectrum for satellite services and this may be also a major victory for satellite operators of Starlink, OneWeb, etc. but could be a set back to Reliance Jio and Vodafone.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Preamble

1. The preamble of the Bill recognises that telecommunication is a key driver of socio-economic development. It specifies that telecommunication infrastructure and telecommunication network are important parts of public infrastructure. **It emphasizes the need to ensure availability of affordable, reliable, secure and universal telecommunication services.**

2. It further recognises that spectrum is a valuable and inexhaustible natural resource, which has an element of public good. Therefore, **it is vital to ensure efficient use and management of spectrum.**

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act - Chapter 2: Definitions

The Bill replaces the outdated concepts under the existing framework such as “telegraph”, “telegraph officer”. The new definitions are comprehensive and relevant to present day realities.

The term “telecommunication” has been defined to mean transmission, emission, or reception of any messages, whether by wire, radio, optical or other electro-magnetic systems.

The term “telecommunication services” has been defined to include broadcasting services, electronic mail, voice mail, voice, video and data communication services, audiotex services, videotex services, fixed and mobile services, internet and broadband services, satellite based communication services, internet based communication services, in-flight and maritime connectivity services, interpersonal communications services, machine to machine communication services, over-the-top (OTT) communication services which is made available to users by telecommunication.

(OTT – As per media reports OTT has been removed in the recently approved document)

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Chapter 2: Definitions (contd.)

The term **“telecommunication network”** means
a **system or series of systems of telecommunication equipment**,
or telecommunication infrastructure, or both,
including terrestrial or satellite networks or submarine networks,
or a combination of such networks,
used or intended to be used for providing telecommunication services,
but **shall not include customer equipment.**

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Chapter 3:

Licensing, Registration, Authorization and Assignment

The Bill recognizes the globally established principle of **exclusive privilege of the Central Government** in relation to telecommunication services, telecommunication network, telecommunication infrastructure and spectrum.

The Bill further provides the structure for the Government to exercise this privilege through the grant of:

- (a) licenses for telecommunication services or telecommunication networks;
- (b) registrations for establishing telecommunication infrastructure;
- (c) authorization for the possession of wireless equipment; and
- (d) assignment of spectrum.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Licensing, Registration, Authorization and Assignment (Contd.)

License: For provision of Telecommunication Services and Telecommunication Networks, an entity shall have to obtain a license. To ensure that there is no disruption in the sector, an entity providing telecommunication services or telecommunication network under current law shall be entitled to continue to operate under its existing terms and conditions till it migrates to a set of new terms and conditions.

Registration: For providing telecommunication infrastructure, an entity shall have to obtain only a registration, not a license. This will simplify the setting up of infrastructure. Telecommunication infrastructure includes telecommunication lines, posts, telecommunication towers, ducts, conduits, cable corridors, or any civil, electrical, or mechanical infrastructure used or capable for use for telecommunication as notified by the Central Government. A list of such telecommunication infrastructure is provided in Schedule 5. An entity providing telecommunication infrastructure under existing laws shall be entitled to continue to operate under existing terms and conditions for five years or optimally migrate to a set of new terms and conditions.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Licensing, Registration, Authorization and Assignment (Contd.)

Authorization: For possession of wireless equipment, an entity shall have to obtain an authorization. Wireless equipment refers to any telecommunication equipment used or capable of use in wireless communication, including any wireless transmitter that is capable of use for broadcasting or emission of wireless communication. The possession and use of any equipment (such as jammers) that blocks telecommunication or is likely to disrupt law and order, shall be prohibited unless its use is authorized by the Central Government.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Licensing, Registration, Authorization and Assignment (Contd.)

The Bill provides that the Central Government may prescribe rules for the grant of license, registration, authorization or assignment, their terms and conditions and payments. It has been ensured that subordinate legislation is within the limits set by main legislation.

The Bill also provides that the terms and conditions of a license, registration, authorisation, or assignment, as the case may be, **will not be modified with retrospective effect to the detriment of the relevant entity.** This will remove any uncertainty in the minds of existing stakeholders.

As brought out above, the Bill provides adequate provisions to ensure regulatory certainty. It provides for continuity of licenses and authorizations under the old regime. (To avoid any possible disruption, the Bill provides that rules, guidelines and administrative orders issued under the existing laws will continue until they are superseded by rules under the new law.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Licensing, Registration, Authorization and Assignment (Contd.)

(The Bill provides that any entity that has been granted license under this Act shall identify the persons to whom it provides the services through a verifiable mode of identification. The Bill also provides that the identity of the person sending a message shall be available to a user. This provision is important to prevent cyber frauds.)

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Licensing, Registration, Authorization and Assignment (Contd.)

Spectrum Management – Spectrum Assignment

Spectrum is a scarce natural resource. It is not merely an economic good but also a public good and its efficient use is in public interest.

At present, spectrum assignment in India is done through a combination of government policies and judicial decisions.

The Bill lays down explicit statutory framework and regulatory clarity for the Central Government to undertake spectrum assignment. The underlying philosophy of the Bill is that spectrum assignment should serve the common good and ensure widespread access to telecommunication services.

The Bill provides for assignment of spectrum primarily through auction.

For certain specified functions relating to government and public interest like defence, transportation, research, etc. the Bill provides an enabling framework for assignment of spectrum through administrative process.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Licensing, Registration, Authorization and Assignment (Contd.)

Spectrum Management – Spectrum Assignment

Spectrum belongs to humanity. The Bill provides for an enabling framework for optimal utilization of spectrum in the country. These include the following provisions:

- (a) Technology agnostic use: To enable the utilization of the spectrum in a liberalized and **technologically neutral manner**, a spectrum assignee may deploy new technologies within its spectrum.
- (b) Re-farming and re-purposing: To enable repurposing of any frequency range for a different use, re-arrangement of the frequency range is often required. Therefore, the Bill provides for **re-farming and harmonization of frequency range**.
- (c) **Sharing, trading, leasing, and surrender**: To enable effective utilization of spectrum, the bill enables sharing, trading, leasing and surrender of spectrum assigned, subject to prescribed terms and conditions.
- (d) Returning unused spectrum: To ensure efficient utilization of spectrum, the Bill provide a process of return of unutilized spectrum.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Licensing, Registration, Authorization and Assignment (Contd.)

Breach of Terms and Conditions of

License, Registration, Authorization or Assignment

Voluntary undertaking

The Bill lays down a framework for “voluntary undertakings”. It is a mechanism through which a licensee, registered entity, or assignee may submit an undertaking to address any breach of terms and conditions. This innovative approach towards remedying breaches will bring in significant relief for the entire telecom ecosystem.

Dispute resolution

The Bill provides for the right of appeal before the appellate authority. It also creates an enabling provision for the Central Government to set up an alternate dispute resolution mechanism such as arbitration, mediation or other process of dispute resolution.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Chapter 4: Right of Way for Telecommunication Infrastructure

Right of Way is a pre-requisite for establishing telecommunication networks and improvement of telecommunication services. The existing regulatory framework, based on Right of Way Rules, 2016, has had a limited impact in addressing bottlenecks in rapid expansion of telecommunication infrastructure.

Chapter 5: Restructuring, Defaults in Payment and Insolvency

Insolvency

Special framework to address defaults in payment by licensee, registered entity, or assignee

Chapter 6: Standards, Public Safety and National Security

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Chapter 7: Telecommunications Development Fund

The Universal Service Obligation Fund (“USOF”) was established under the Telegraph Act, to meet the “universal service obligation” which was to provide **telecommunication access to people in rural and remote areas** at affordable and reasonable prices.

Under the Bill, the USOF is sought to be expanded into the “Telecommunication Development Fund” (“TDF”), by **adding further objectives of underserved urban areas, R&D, skill development, etc.**

Chapter 8: Innovation and Technology Development

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act Chapter 9: Protection of Users

Schedule 3 provides a tabulation of penalties for violation of specific provisions of the Bill. Offences for which imprisonment and fine are prescribed include:

- (a) providing telecommunication service or establishing networks, without a license;
- (b) **gaining unlawful access to telecommunication network, or unlawfully intercepting any message;**
- (c) contravention detrimental to national security;
- (d) possessing equipment that blocks telecommunication;
- (e) wilful tampering, removing or damaging telecommunication infrastructure or telecommunication network;
- (f) use unauthorised telecommunication service, network or infrastructure, knowingly;
- (g) impersonating authorized personnel of licensee, registered entity or assignee to perpetuate fraud; and
- (h) misrepresentation of identity required for availing telecommunication services.

Draft Indian Telecommunication Bill - Important Features

The Indian Telecommunication Act

Chapter 12: Repeal and Savings

The Bill seeks to replace three laws:

the Indian Telegraph Act, 1885,

the Indian Wireless Telegraphy Act, 1933 and

the Telegraph Wires (Unlawful Possession) Act, 1950.

However, with a view to ensuring smooth transition to the new framework, and avoid any possible disruption, it provides for continuity of actions taken under the repealed laws.

It also provides that rules under the repealed laws would continue, till such time that new rules are formulated.

GOVERNMENT OF INDIA POLICIES FOR TELECOMMUNICATIONS SECTOR

NATIONAL DIGITAL COMMUNICATIONS POLICY- 2018

The NDCP 2018 seeks to unlock the transformative power of digital communications networks - to achieve the goal of digital empowerment and well-being of the people of India; and towards this end, attempts to outline a set of goals, initiatives, strategies and intended policy outcomes.

https://dot.gov.in/sites/default/files/2018_10_29%20NDCP%202018_0.pdf

National Broadband Mission - December 2019

Enabling Broadband connectivity across the country is essential to bridge the Digital divide between rural-urban and rich-poor. In this context Department of Telecommunications has taken a step by launching the National Broadband Mission with a vision to provide affordable and universal access of Broadband connectivity to all.

https://dot.gov.in/sites/default/files/National%20Broadband%20Mission%20-%20Booklet_0.pdf?download=1

Space Infrastructure / Satellite Based Telecommunications

Indian National Space Promotion and Authorization Center (IN-SPACe)

Recently Government of India has established IN-SPACe

IN-SPACe is an independent nodal agency under Department of Space for allowing space activities and usage of DOS owned facilities by NGPEs as well as to prioritise the launch manifest.

The Policies and Guidelines formulated and adopted by

IN-SPACe will be applicable for establishing and operating space infrastructures for providing **Satellite Based Telecommunication Services** in the Country.

<https://www.isro.gov.in/indian-national-space-promotion-and-authorization-center-space>

Space Infrastructure / Satellite Based Telecommunications

Indian National Space Promotion and Authorization Center (IN-SPACe)

IN-SPACe has already started taken actions on the usage of DOS owned facilities by NGPEs and the Launch Manifest.

Recently IN-SPAC has made formal announcements on SATCOM Policy and other space matters.

[https://www.inspace.gov.in/inspace?id=inspace_search&spa=1
&q=POLICY](https://www.inspace.gov.in/inspace?id=inspace_search&spa=1&q=POLICY)

<https://www.isro.gov.in/indian-national-space-promotion-and-authorization-center-space>

Space Infrastructure / Satellite Based Telecommunications

Indian Space Policy – 2023

Indian Space Policy – 2023 has thus been formulated as an overarching, composite and dynamic framework to implement the reform vision approved by Cabinet.

Vision

To augment space capabilities; enable, encourage and develop a flourishing **commercial presence in space**; use space as a driver of technology development and derived benefits in allied areas; pursue international relations, and create an ecosystem for effective implementation of space applications among all stakeholders; for, the nation's socio-economic development and security, protection of environment and lives, pursuing peaceful exploration of outer space, stimulation of public awareness and scientific quest.

Space Infrastructure / Satellite Based Telecommunications

Indian Space Policy – 2023 (contd.)

Strategy

In pursuance of the vision set out for the space sector, Government seeks to pursue a holistic approach by **encouraging and promoting greater private sector participation in the entire value chain of the Space Economy**, including in the creation of space and ground based assets. Thus, Indian consumers of space technology or services (such as communication, remote-sensing, data-services, launch-services, etc), whether from **public or private sectors**, shall be free to directly procure them from any source, whether private or public.

Space Infrastructure / Satellite Based Telecommunications

Indian Space Policy – 2023 - Roles

IN-SPACe

Indian National Space Promotion & Authorisation Centre.

IN-SPACe shall function as an autonomous Government organization, mandated to promote, hand-hold, guide and authorize space activities in the country. For this purpose, IN-SPACe shall periodically issue guidelines and procedures, that would among other things promote ease of doing business.

Non-Governmental Entities. NGEs shall be allowed to undertake end-to-end activities in space sector through establishment and operation of space objects, ground-based assets and related services, such as communication, remote sensing, navigation, etc. This would be subject to such guidelines/regulations as prescribed by IN-SPACe. NGEs would be encouraged to offer national and international space-based communication services, through **self-owned or procured or leased GSO/NGSO communication satellites.**

Space Infrastructure / Satellite Based Telecommunications

Indian Space Policy – 2023 - Roles (contd.)

Indian Space Research Organization ISRO, as the National Space Agency, will focus primarily on **research and development** of new space technologies and applications, and for expanding the human understanding of outer space.

Department of Space: DOS shall oversee the distribution of responsibilities outlined in this policy and ensure that the different stakeholders are suitably empowered to discharge their respective functions, without overlapping into others' domain.

Space Infrastructure / Satellite Based Telecommunications

Indian Space Policy – 2023 Roles (contd.)

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NewSpace India Limited NSIL, as the Public Sector Undertaking under DOS, shall:

1. be responsible for commercialising space technologies and platforms created through public expenditure.
2. manufacture, lease, or procure space components, technologies, platforms and other assets from private or public sector, on **sound commercial principles**. (i.e. Only **on the basis of Business Plan or Commercial viability**)
3. service the space-based needs of users, whether Government entities or NGEs, on sound commercial principles.

National Digital Communications Policy (NDCP)2018

Government of India National Digital Communications Policy (NDCP) 2018

Document available at the DOT website <https://dot.gov.in › files › EnglishPolicy-NDCP>

The Policy Recognizes Digital Infrastructure and Services are Key Enablers of Country's growth and well being.

NDCP forms the foundation for Reforms in Telecom.

The Policy considers Telecommunications as Vital Service to people.

NDCP 2018 lays out a consistent policy and principles framework.

We see rapid technological developments happening in the field of Telecommunications (example 2G, 3G, 4G, LTE, 5G)

Advances like High throughput GSO and NGSO Satellite Networks for providing country wide internet connectivity, etc.

The Policy guideline is to ensure that the advantages of new technologies are accessible to all equitably and affordably.

National Digital Communications Policy (NDCP)2018 (Contd.)

India - *About mobile phones: 1.2 billion; broadband users: 865 million*

With more than a billion mobile phones and nearly 865 million broadband users, **Indians regularly use** mobile phones, internet, social media platforms, transmit/receive audio/video streams, data consumption / generation across India, mobile banking/digital payments.

Clearly Digital communication services are no longer the prerogative of the privileged few.

The Policy aims Universal Service rather than just revenue generation.

The overall Objective of the National Policy on digital communications is **to prepare the country and its citizens for the future**

National Digital Communications Policy (NDCP)2018 (Contd.)

National Communications Policy Aims

National Communications Policy aims to accomplish the following Strategic Objectives by 2022:

- Provisioning of Broadband for All
- Creating 4 Million additional jobs in the Digital Communications sector
- Enhancing the contribution of the Digital Communications sector to 8% of India's GDP from ~ 6% in 2017
- Propelling India to the Top 50 Nations in the ICT Development Index of ITU from 134 in 2017
- Enhancing India's contribution to Global Value Chains
- Ensuring Digital Sovereignty

National Digital Communications Policy (NDCP)2018 (Contd.)

Vision is for:

- Establishment of Digital Communication Infrastructure
- Creation of Universally Accessible and Affordable Digital Communications Services

What about Missions?

National Digital Communications Policy (NDCP)2018 (Contd.)

Missions

NDCP 2018 envisages three missions:

- **Connect India:** Creating Robust **Digital Communication Infrastructure** to promote ‘Broadband for All’ as a tool for socio-economic development, while ensuring service quality and environmental sustainability;
- **Propel India: Enabling Next Generation Technologies and Services** through Investment, Innovation and IPR generation to harness the power of emerging digital technologies, including 5G, AI, IoT, cloud and big data to enable provision of future ready products and services; and to catalyse the fourth industrial revolution (Industry 4.0); and
- **Secure India: Ensuring Sovereignty, Safety and Security** of Digital Communications to secure the interests of citizens and safeguard the digital sovereignty of India with a focus on ensuring individual autonomy and choice, data ownership, privacy and security, while recognising data as a crucial economic resource.

Goals: Policy Framework identifies Goals to be accomplished by 2022 under the aegis of these Three Missions.

National Digital Communications Policy (NDCP)2018 (Contd.)

Goals

The Policy provides exhaustive information on various time bound goals to be accomplished in order to meet the objectives of the Policy.

Topics covered by the Goals include:

- Universal Broadband Connectivity at 50 Mbps speed
- Fixed Internet Connectivity at Homes / Offices /Buildings / Public Utility / Mobile Network Base Stations
- High speed Internet Broadband connectivity for Gram Panchayat / Developmental Institutions / Educational Institutions / Remote Areas

National Digital Communications Policy (NDCP)2018 (Contd.)

Goals (Contd.)

- Sharing Telecom Infrastructure and IP - Switching, and International Connectivity
- Optical Fibre Cable based Connectivity Solutions and Establishment of National Fibre Authority
- Promoting alternate technologies
- Optimum use of Spectrum for public benefit and ensuring allocation of Spectrum for new Telecom Services
- Data Protection and Security, Building Secure, Safe and Robust Infrastructure and Safety of Citizens
- **Reforms in the Licensing and Regulatory Regime of Telecommunications**

National Digital Communications Policy (NDCP)2018 (Contd.)

Topics covered by the Goals (contd.)

- Promoting Next Generation Technologies
- Enabling Hi-speed internet, Internet of Things and M2M by rollout of 5G technologies:
- Establishing India as a global hub for cloud computing, content hosting and delivery, and data communication systems and services
- Leveraging Artificial Intelligence and Big Data in a synchronized and effective manner to enhance the overall quality of service, spectrum management, network security and reliability
- Strengthening Satellite Communication Technologies in India - Review the **regulatory regime for satellite communication** technologies - **Optimise Satellite communications** technologies in India - Developing **ecosystem for satellite communications** in India

National Digital Communications Policy (NDCP)2018 (Contd.)

Topics covered by the Goals (contd.)

- Widening the scope of Telecom Infrastructure Providers, **Attracting Investments and Capacity Building, Ensuring a holistic and harmonised approach for harnessing Emerging Technologies**
- Channelizing the Universal Service Obligation Fund (USOF) for various deserving Developmental Activities
- Ensuring Standards and Quality Assurances for Telecom Services
- Facilitating the establishment of a Pan-India network for Public Protection and Disaster Relief (PPDR)
- Research and Development and Local Manufacturing and Value Additions
- Creating Job Opportunities and Training Personnel in the Digital Communications Sector

National Telecommunications Regulations

In India, Government of India ensures development and application of National Telecommunication Regulations through

DOT, WPC, SACFA, NFAP, TEC, MI&B, etc.

This includes Roles of Service Providers in private sector.

- TRAI: TRAI is the Telecom Regulatory Authority of India (TRAI).
- DOT is Licensing Authority for Telecommunication Services.
- TEC deals with equipment specifications and quality requirements.
- MI&B is the Licensing Authority for Broadcast Services (DTH, FM Radio, TV Channels, Uplink, Downlink, Cable TV, etc.)
- WPC, SACFA and NFAP deal with Radio Frequency Spectrum matters.
- Regarding TRAI, Please see the web reference <https://www.trai.gov.in/about-us/history>
- Web sites of DOT, WPC, MI&B, etc. provide information on National Regulations.
- [Seth Dua & Associates](#) provide information in the article “In brief: telecoms regulation in India” Please see the web reference:
- <https://www.lexology.com/library/detail.aspx?g=45ac7f16-f40c-42ea-b3df-dfe6e357e2c0#>

Existing Regulatory Institutional Structure for Telecom Sector

<https://www.lexology.com/library/detail.aspx?g=45ac7f16-f40c-42ea-b3df-dfe6e357e2c0#>

The regulatory and policy framework encompassing the communications sector in India comprises a number of statutes, rules, regulations, guidelines, etc, laid down by the government of India. The primary statutes regulating the sector include:

- the Indian Telegraph Act 1885 (the Telegraph Act);
- the Indian Wireless Telegraphy Act 1933 (the Wireless Act);
- the Telecom Regulatory Authority of India (TRAI) Act 1997 (the TRAI Act);
- TDSAT (Telecom Disputes Settlement and Appellate Tribunal) - TRAI Act of 1997 was amended in the year 2000 and TDSAT was set up to adjudicate disputes and dispose of appeals with a view to protect the interests of service providers and consumers of the telecom sector and to promote and ensure orderly growth of the telecom sector.
- the telecoms policy amended from time to time, the latest being the National Digital Communications Policy 2018 (the NDCP 2018), which was approved in September 2018;
- the National Broadband Mission 2019; and
- the Information Technology Act 2000 (the IT Act).

Telecom Regulatory Authority of India (TRAI)

(<https://www.trai.gov.in/about-us/history>)

The **Telecom Regulatory Authority of India (TRAI)** was established with effect from 20th February **1997** by an Act of Parliament, called the Telecom Regulatory Authority of India Act, 1997, to regulate telecom services, including fixation/revision of tariffs for telecom services which were earlier vested in the Central Government.

TRAI's mission is to **create and nurture conditions for growth of telecommunications** in the country in a manner and at a pace which will enable India to play a leading role in emerging global information society.

On various subjects, TRAI prepared Consultation Papers (CP) and circulated for consultation process with stake holders.

These Consultation Papers form very good source of information on technology, regulations, tariff and various other Telecom matters.

Telecom Regulatory Authority of India (TRAI)

(<https://www.trai.gov.in/about-us/history>)

One of the main objectives of TRAI is to provide a **fair and transparent policy environment** which promotes a level playing field and facilitates fair competition.

In pursuance of above objective TRAI has issued from time to time recommendations on a large number of **regulations, orders and directives** to deal with issues coming before it and provided the required direction to the evolution of Indian telecom market from a Government owned monopoly to a multi operator multi service open competitive market.

The directions, orders and regulations issued cover a wide range of subjects including **tariff, interconnection and quality of service** as well as governance of the Authority.

Telecom Service Authorisation/Licensing regime

<https://dot.gov.in/sites/default/files/UL.pdf>

Access Services: The licensing regime for the provision of the telecoms sector witnessed a sea change in 2013 with the introduction and implementation of the **‘unified licence regime’**.

The unified licence regime has been implemented primarily with the objective of **‘one nation, one licence’**, as envisaged under the NTP 2012. It replaces the earlier regime where the players were required to obtain separate licences for different telecoms services in India, such as internet services, national long-distance (NLD) services, international long-distance (ILD) services and so on.

The unified licence regime for the first time allows telecoms operators to offer all telecoms services under one licence, subject to separate service authorisation for the provision of different telecoms services, covered by the unified licence

The unified licence covers within its ambit all the fixed, mobile and satellite services and communication both on wire line and wireless media with full mobility, limited mobility and fixed wireless access.

Telecom Service Authorisation/Licensing regime

<https://dot.gov.in/sites/default/files/UL.pdf>

The service authorisations covered by the unified licence are:

- unified licence (All Services)
- access service;
- internet service;
- NLD service;
- ILD service;
- global mobile personal communication by satellite service;
- public mobile radio trunking service;
- very small aperture terminal (VSAT) closed user group (CUG) service;
- Indian national satellite system mobile satellite system reporting service; and
- resale of international private leased circuit service.

Telecom Service Authorisation/Licensing regime

Telecommunication Services

<https://dot.gov.in/carrier-services>

- [PMRTS](#) (Public Mobile Trunking Service)
- [GMPCS](#) (GLOBAL MOBILE PERSONAL COMMUNICATION BY SATELLITE)
- [International Long Distance](#)
- [National Long Distance](#)
- [CMRTS](#)
- [Infrastructure Provider](#)
- [Voice Mail /Audiotext /UMS](#)
- [Voice Mail /Audiotext /UMS](#); [NOC for Reselling of International SIM Cards](#)
- [Other Services Providers\(Including BPO\)](#) ; [Telemarketing](#); [Resale OF IPLC](#)
- [Restrictions on the use of Satellite Phone](#)
- [EMF Radiation Issues](#)

Carrier Services could be also for B2B services for applications like Core Networks, Back Haul, Closed User Group communications, etc.

Telecom Service Authorisation/Licensing regime

Data Services

ISP Authorisation under Unified License

<https://dot.gov.in/dataservices/data-services>

DOT Letter [No. 20-281/2010-AS-I \(Vol VI\) dated 28.03.2016](#)

Presently, all the licenses including Internet Service Provider (ISP) Licenses for category 'A', 'B' and 'C' are being issued under Unified License.

Telecom Service License Conditions

Telecom Service License Structure and format may be more or less same for all Services

But actual Licensing conditions vary with respect to Services.

To give some idea Typical Licensing Conditions are presented.

However the Latest information needs to be obtained from DOT Websites.

Telecom Service License Conditions (Contd.)

Typical Licensing Conditions pertaining to Unified License

- The licensing regime for the provision of the telecoms sector witnessed a sea change in 2013 with the introduction and implementation of the ‘**unified licence regime**’.
- The unified licence regime has been implemented primarily with the objective of ‘one nation, one licence’, as envisaged under the NTP 2012.
- It replaces the earlier regime where the players were required to obtain separate licences for different telecoms services in India, such as Access Services, Internet services, national long-distance (NLD) services, international long-distance (ILD) services and so on.
- The service areas for each of the service authorisations have also been defined.
- The unified licence is granted for a period of **20 years** from the effective date of the licence.
- **Applicant must be an Indian Company registered under Indian Companies Act 1956.**
- Application must be submitted as per the prescribed format.
- Applicant must be at least for one of the Services identified by DOT

Telecom Service License Conditions (Contd.)

- 250 million Rupees (Rs 25 Crores) is fixed for the minimum equity and **net worth** of the licensee company, 150 million Rupees for **the entry fees** and 100,000 Rupees for the application **processing charges**.
- For the provision of the services, an amount of 2.2 billion rupees has been fixed as the performance bank guarantee (**PBG**) and 440 million rupees as the financial bank guarantee (**FBG**). (**Recently some relaxations were given**)
- In addition, 8 per cent of the adjusted gross revenue (**AGR**) shall be annually charged from the service providers as the licence fee, which includes the levy for universal service obligations, currently **5 per cent of AGR**. However, it should be noted that the mechanism for computation of AGR has been specified for different service authorisations.

Telecom Service License Conditions (Contd.)

Telecom Service Provider (TSP) Entry Conditions, Duration of the License, Net worth, License Fee (as the percentage of AGR), FBG, PBG

After successful processing, DOT will issue **LOI (Letter of Intent)** to the Applicant.

Payment of Non Refundable Entry Fee

Submission of FBG and PBG (FBG-Financial Bank Guarantee; PBG-Performance Bank Guarantee)

In addition to the Entry Fee, an annual License fee as a percentage of Adjusted Gross Revenue (AGR) shall be paid by the Licensee as per procedure prescribed.

The License fee is at present 8% of the AGR, inclusive of USO Levy which is presently 5% of AGR.

Telecom Service License Conditions (Contd.)

Telecom Service Provider (TSP) Entry Conditions, Duration of the License, Net worth, License Fee (as the percentage of AGR), FBG, PBG (Contd.)

Terms of License including Technical Specifications and Standards and Type Approvals of User Terminal and other Equipment as Recommended by TEC.

Provision of Telecommunication services using satellite media - Conditions subject to satellite communication policy, V-SAT policy etc

Security Conditions – **Monitoring of Calls originated and terminated In India**, Suspending of Services in the geographical areas identified by the GOI, Location of Gateway Stations in India, etc.

Telecom Service License Conditions (Contd.)

- The general, operating, monitoring, **financial and security** conditions for each of the service authorisations have been divided into the general unified licence conditions (applicable irrespective of the service authorisation) and the specific service authorisation-related conditions (applicable only if the said authorisation has been granted).
- Apart from **freeing up the spectrum from the licence**, the unified licence also bars cross-holding in different telecommunications companies.
- With regard to the official fees, the charging heads have been defined separately under the unified licence with different limits for entry fees, net worth, paid-up capital, bank guarantees and processing fees.
- However when a licensee applies for authorization for more than one service, the unified licence sets out the upper limits for financial implications accordingly. The prescribed upper limits are also the amounts applicable in cases of the licensee applying for all the services covered by the unified licence.

Telecom Service License Conditions (Contd.)

Infrastructure provider

- In addition to the unified licence, the DOT has also prescribed a registration process for infrastructure provider entities wishing to do business in India.
- This registration process covers the providers of telecoms infrastructure such as dark fibre, right of way, duct space and tower.
- The financial requirement for the registration includes a small processing fee and does away with the entry fees and bank guarantee.
- **The infrastructure providers engaging in India would have an easier entry as they would merely have to register themselves rather than obtaining a licence.**

Allocation of Spectrum

- **Allocation of Spectrum is delinked from Licenses.**
- Spectrum for IMT Bands (Cellular Mobile) is allocated through **Auction process**. For other Bands/Services,
- Spectrum is allocated as per the procedures prescribed by WPC/DOT keeping in view the ITU Radio Regulations and the international regulatory obligations. India is a signatory to ITU Radio Regulations which has the force of International Treaty.

International Telecommunication Union (ITU)

- At international level, it is considered that the natural resource Radio Frequency Spectrum belongs to the humanity.
- Accordingly, International Telecommunication, a specialized Agency of the United Nations facilitates the use of the spectrum by all countries efficiently and equitably
- **While countries have the right to use the spectrum to meet their own requirements but they also have obligations not to cause interference into others. ITU ensures harmonized usage of spectrum through the regulatory procedures outlined in the ITU Radio Regulations.**
- ITU Radio Regulations include Table of Frequency Allocations. Usually Frequency bands are allocated for more than one service for example Fixed Satellite Service (FSS) and Fixed Service (FS) and ITU Radio Regulations define the sharing criteria for achieving compatibility among different services for operations in the same band.
- The Tables of Frequency Allocations are discussed and developed at the ITU Conferences and Meetings taking into account the requirements of various countries, technical considerations like propagation, technology developments, standardization of equipment and criteria for sharing the spectrum by different services.

National Level Management of Spectrum

- At national level, in accordance with the ITU regulatory framework, **National Frequency Allocation Plan (NFAP)** and other procedures are developed and applied for National Level Management of Spectrum. On the basis of NFAP, Spectrum / Frequencies are put into use in India.
- The ITU issues the international frequency table for the purpose of giving the member countries a basis on which they can formulate their own frequency allocation plan.
- With ITU Table of Frequency Allocations as the basis, NFAP is developed in the form of guidelines for frequency usage in India.
- This plan clearly allocates different frequency bands for different radio communication services. Although it allocates same frequency bands for certain services on a shared basis.

National Level Management of Spectrum (Contd.)

- Like ITU, **NFAP does not give individual ownership rights to services/departments, Government of India manages the use of radio frequency spectrum.**
- NFAP-81 was in force till December 31, 1999 for commercial and other uses. NFAP-81 was formulated for a time, when usage of frequency bands was primarily done by the government agencies
- From January 1, 2000, in order to better manage the increased use of Spectrum, the revised version of NFAP (NFAP-2000) replaced NFAP-81 and this document is kept in public domain.
- Currently NFAP-2018 and NFAP-2022 versions are available in the DOT/WPC websites.

National Level Management of Spectrum (Contd.)

- Currently NFAP-2018 and NFAP-2022 versions are available in the DOT/WPC websites:

<https://dot.gov.in/sites/default/files/NFAP%202018.pdf?download=1>

<https://dot.gov.in/whatsnew/national-frequency-allocation-plan-2022>

- **While frequency allocations for various services, a lot of attention is given to the frequency bands identified for Mobile services. The frequency bands identified for Mobile Services are referred to as International Mobile Telecommunications (IMT Bands).**
- Next ITU World Radio Conference (WRC-23) is scheduled to be held in 2023. In future new version of NFAP will be issued taking into account the decisions of WRC-23 Conference.

Satellite Spectrum and Satellite Service License

- 2G/3G/4G/LTE/5G are terrestrial wireless services. Of late a lot of interest is being shown for Space Spectrum and Space Services especially because of the price and universal service availability for internet connectivity expectations due to LEO/MEO Satellite Constellations.
- Broadband India Forum, an association of technology players like [Google](#), Hughes, etc, is opposed to Spectrum Auctions and feels that since spectrum for Satcom is not exclusive to an operator as is the case with terrestrial spectrum used for mobile services, auctioning makes no sense.
- **It is argued that World over, satellite spectrum is authorised for ‘right-to-use’ by all administrations and is allocated only by administrative process at charges essentially covering the cost of administration.**

Satellite Spectrum and Satellite Service License (Contd.)

- Unlike terrestrial spectrum, satellite spectrum is never exclusively assigned to the operator but coordinated internationally and shared among multiple operators for different orbital slots and all types of satellites. Thus, the terrestrial concept of exclusivity does not apply and auctioning therefore is not applicable according to India Broadband India Forum (BIF).
- TRAI has recently started consultation process with stakeholders on the question of auctioning Satellite Spectrum.
- TRAI is expected to come out soon with a Consultation Paper on this subject. (*It appears recently the government has proposed administrative process for allocation of spectrum for satellite services*)

Profiles of Telecom Services and Service Providers in India

Telecom Industry in India - Profile

Major Telecom Services are: Access Services, NLD, ILD, ISP and others.

Access Services play a predominant role in the Telecom Industry.

Access Services contribute more than 80 % of Revenue of Telecom Services.

Reliance Jio, Bharti Airtel, Vodafone Idea and BSNL are the major TSPs.

Reliance Jio tops the ownership of Mobile Wireless Infrastructure.

Total Telecom Subscribers 1,176 Million.

Total Internet Subscribers 865 Million.

LTE/FW-LTE Technology dominates Wireless Access Services.

Optical Fiber Technology dominates Wired Internet Services.

Tele-densities are low in States like Bihar, Jharkhand, Chhattisgarh, MP and UP.

Public Mobile Radio Trunking Services (PMRTS) – Declining.

5G: It is reported that 5G rollout fastest in India with deployment of 2.7 lakh 5G sites within nine months. ET News July 2023

Telecom Industry in India - Profile

Satellite DTH – No Significant Increase in Subscribers.

Cable TV Market – Declining.

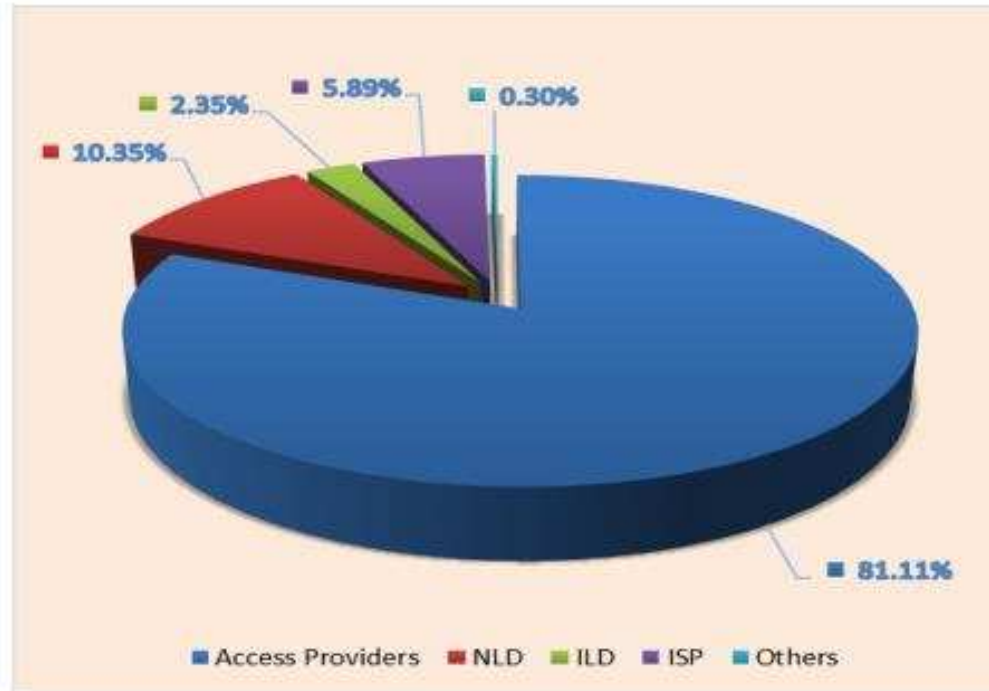
DD Free Dish Service – Substantial Subscribers.

OTT Users > 420 Million – Growth Rate 40 % ?

Smart TV Sets (i.e. Internet / OTT Enabled TV Sets) are growing.

Satellite VSATs – Declining.

Chart 3.1: Composition of Adjusted Gross Revenue



Access Services contributed 81.11 % of the total Adjusted Gross Revenue (AGR) of telecom services.

Access Services and Access Service Providers (TSPs) play a predominant role in the Telecom Industry. (QE Dec 2022)

Table 3.2: Service-wise GR, ApGR, AGR, LF, SUC and PTC for QE Dec-22
(in Rs. Crore)

Service	GR	ApGR	AGR	LF	SUC	PTC
Access Providers	72,132.83	61,763.08	51,022.80	4,082.42	806.81	10,974.35
NLD	7,335.47	6,495.99	6,513.06	521.10	-	219.45
ILD	3,543.23	3,456.26	1,479.43	118.60	-	2,017.08
ISP	4,978.21	4,725.37	3,702.86	296.04	-	1,164.08
Others	176.63	186.71	185.59	13.21	4.68	5.76
Total	88,166.38	76,627.40	629,03.76	5,031.37	811.49	14,380.73

Table 3.3: Access Services - Service Provider wise Adjusted Gross Revenue
(Rs.in Crore)

Service Provider	AGR			Q-o-Q Growth (%)	Y-o-Y Growth (%)
	(Rs. in Crore)				
	Q.E. Dec 2021	Q.E. Sep 2022	Q.E. Dec 2022		
Reliance Jio	19,063.75	22,192.19	22,586.32	1.78	18.48
Bharti Airtel	14,484.48	17,893.47	18,290.13	2.22	26.27
Vodafone Idea	6,541.83	7,478.73	7,328.74	-2.01	12.03
BSNL	1,984.94	1,929.24	1,985.74	2.93	0.04
Tata	530.21	571.83	574.18	0.41	8.29
MTNL	254.78	201.67	188.61	-6.47	-25.97
Reliance	61.69	53.40	51.22	-4.07	-16.97
V-Con Mobile & Infra	-4.80	-4.38	14.98	442.13	412.17

Service Provider	AGR			Q-o-Q Growth (%)	Y-o-Y Growth (%)
	(Rs. in Crore)				
	Q.E. Dec 2021	Q.E. Sep 2022	Q.E. Dec 2022		
GPX Services	0.00	0.75	2.04	173.79	0.00
Quadrant	13.22	8.82	0.75	-91.51	-94.33
Shyam Spectra	0.00	0.04	0.08	91.88	91.88
Tata Play Broadband	0.00	1.34	0.00	-100.00	0.00
Total	42,930.10	50,327.10	51,022.80		

Reliance Jio, Bharti Airtel, Vodafone Idea and BSNL are the Major TSPs

Profile of Telecom Service Providers (TSP)

Reliance Jio tops the Mobile Wireless Infrastructure

BASE STATIONS BTS

RELIANCE JIO 930390

AIRTEL 622087

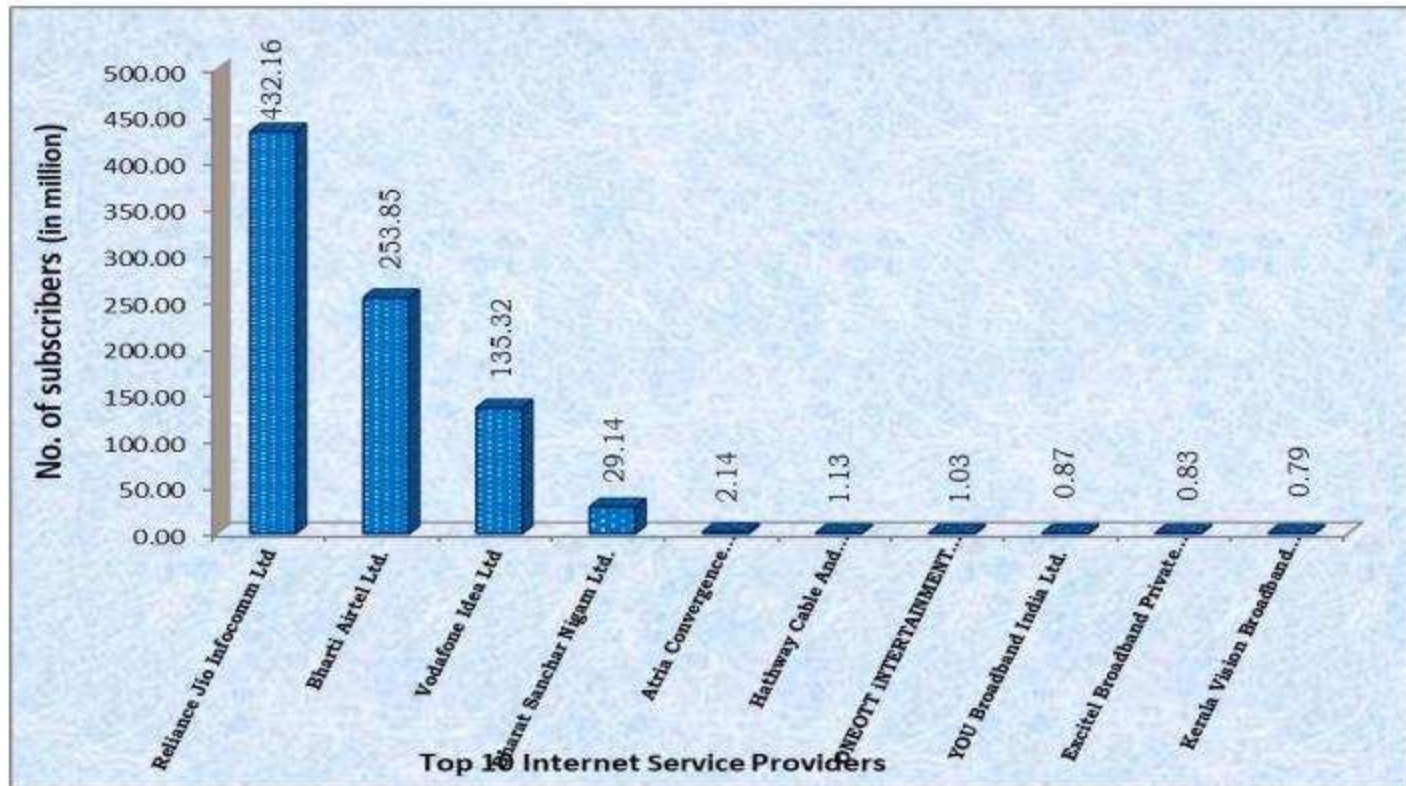
VODAFONE 529329

BSNL 153628

MTNL 4242

As per Reports there are about 2.3 million Mobile base stations in the country

Chart 1.17 : Subscriber base of top ten ISPs



Snapshot

(Data as on Q.E. 31 st December, 2022)	
Telecom Subscribers (Wireless+Wireline)	
Total Subscribers	1,170.38 Million
% change over the previous quarter	-0.13%
Urban Subscribers	652.39 Million
Rural Subscribers	517.99 Million
Market share of Private Operators	89.83%
Market share of PSU Operators	10.17%
Tele-density	84.56%
Urban Tele-density	134.16%
Rural Tele-density	57.69%

Total Internet Subscribers

Internet/Broadband Subscribers	
Total Internet Subscribers	865.90 Million
% change over previous quarter	1.76%
Narrowband subscribers	33.70 Million
Broadband subscribers	832.20 Million
Wired Internet Subscribers	32.41 Million
Wireless Internet Subscribers	833.49 Million
Urban Internet Subscribers	516.37 Million
Rural Internet Subscribers	349.53 Million
Total Internet Subscribers per 100 population	62.56
Urban Internet Subscribers per 100 population	106.19
Rural Internet Subscribers per 100 population	38.93
No. of Public Wi-Fi Hotspots	1,76,662
Aggregate Data Consumed (GB)	1,40,24,519

Table 1.28: Trend of Internet subscriber base

Segment	Mode of Access								Total Subscribers (in million)	
	Wired Subscribers (in million)		Wireless Subscribers (in million)							
			Fixed Wireless (Wi-Fi, Wi-Max, Radio & VSAT)		Mobile Wireless (Phone + Dongle)		Total Wireless			
	Sep-22	Dec-22	Sep-22	Dec-22	Sep-22	Dec-22	Sep-22	Dec-22	Sep-22	Dec-22
Broadband	30.79	32.38	1.15	1.13	783.99	798.69	785.14	799.82	815.93	832.20
Narrowband	0.02	0.02	0.01	0.01	34.98	33.67	34.99	33.67	35.01	33.70
Total	30.82	32.41	1.16	1.13	818.98	832.35	820.13	833.49	850.95	865.90

Table 1.31: Internet Subscriber Base and Market Share of top 10 Service Providers

S.No	ISP	No. of Subscribers (In million)	Share (%)
1	Reliance Jio Infocomm Ltd	432.16	49.91
2	Bharti Airtel Ltd.	253.85	29.32
3	Vodafone Idea Ltd	135.32	15.63
4	Bharat Sanchar Nigam Ltd.	29.14	3.37
5	Atria Convergence Technologies Pvt. Ltd.	2.14	0.25
6	Hathway Cable And Datacom Limited	1.13	0.13
7	ONEOTT iNTERTAINMENT LIMITED	1.03	0.12
8	YOU Broadband India Ltd.	0.87	0.10
9	Excitel Broadband Private Limited	0.83	0.10
10	Kerala Vision Broadband Ltd.	0.79	0.09
Total of Top 10 ISPs		857.26	99
Others		8.64	1
Grand Total		865.90	100

Chart 1.20 : Technology trend for Wireless Internet Access

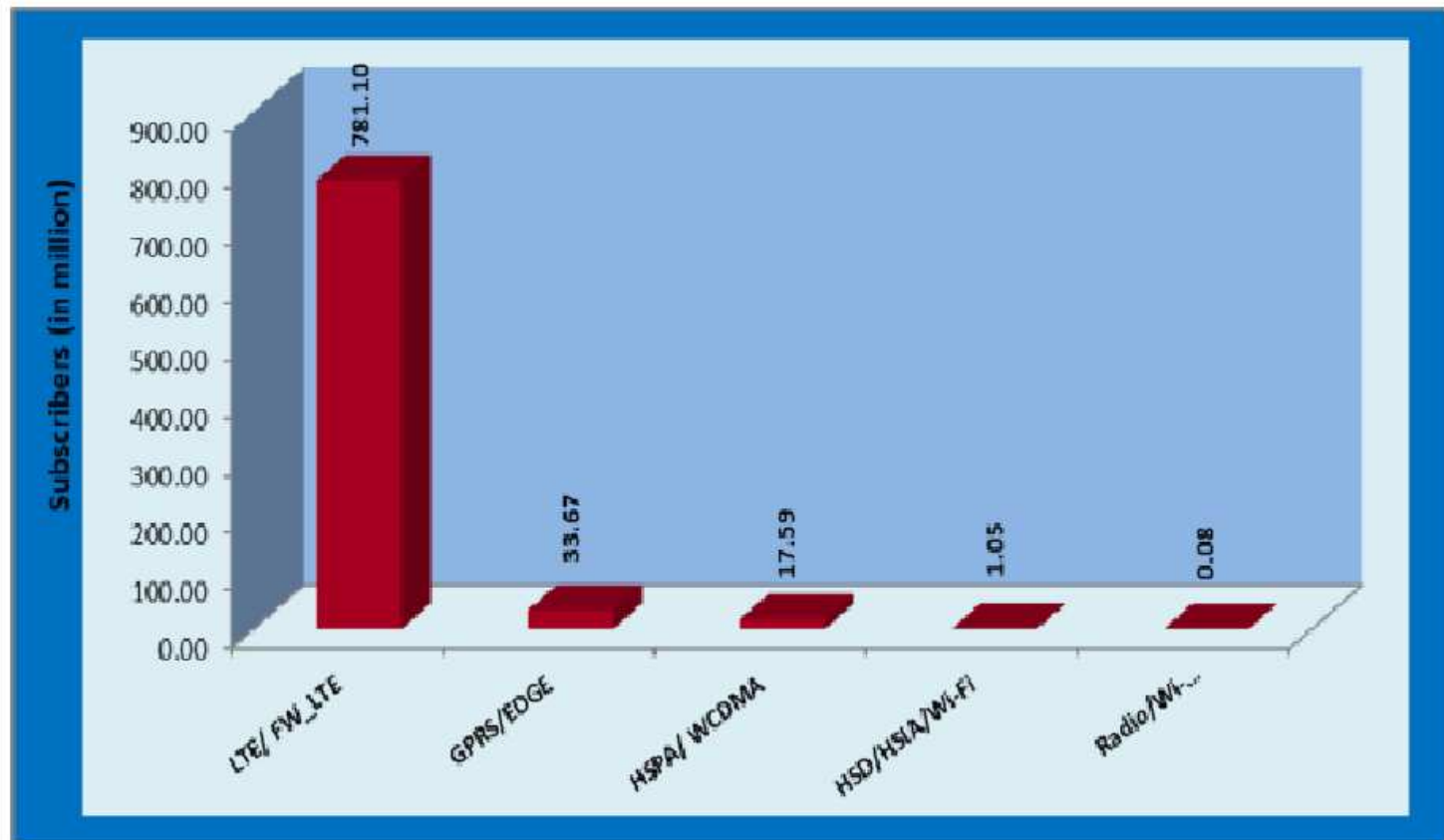


Chart 1.21: Technology trend for Wired Internet Access



- 1.52 Top five service areas in terms of internet subscriptions (wired+wireless) are Maharashtra 73.83 million, U.P.(East) 68.47 million, Andhra Pradesh 65.01 million, Bihar 63.49 million and Madhya Pradesh 59.70 million.

Tele densities are low in States like Bihar, Jharkhand, Chhattisgarh, MP and UP.

Table 1.6 : State/UT wise total Tele-density

Sl.No.	State/UT	Total Tele-density (%)		
		Total	Rural	Urban
1	Andhra Pradesh	82.23	120.76	227.07
2	Arunachal Pradesh	82.26	72.42	110.89
3	Assam	70.04	52.06	167.78
4	Bihar	53.66	42.68	132.14
5	Chhattisgarh	66.87	43.83	128.96
6	Goa	146.00	204.71	127.08
7	Gujarat	92.93	70.22	116.91
8	Haryana	110.59	68.52	168.69
9	Himachal Pradesh	130.36	94.76	440.14
10	Jharkhand	60.09	44.72	103.48
11	Karnataka	102.53	69.83	143.60
12	Kerala	122.41	218.89	90.20
13	Madhya Pradesh	66.37	40.46	129.91
14	Maharashtra Incl. Mumbai	101.32	65.26	139.63
15	Manipur	74.70	45.26	136.18
16	Meghalaya	75.09	58.59	138.57
17	Mizoram	113.66	100.45	124.48
18	Nagaland	72.31	68.07	77.37
19	Odisha	76.04	61.15	140.17
20	Punjab	114.05	68.24	177.93
21	Rajasthan	79.05	56.74	140.63
22	Sikkim	137.38	161.01	112.51
23	Tamil Nadu (incl. Chennai)	103.98	64.27	138.35
24	Telangana	107.50	84.12	133.19
25	Tripura	75.32	64.65	92.00
26	Uttar Pradesh (UPE +UPW)	67.87	47.65	131.92
27	Uttarakhand	112.63	86.48	159.49
28	West Bengal Incl. Kolkata	81.09	56.67	123.18
Union Territories				
1	Andaman & Nicobar Islands	139.09	98.55	190.55
2	Chandigarh	156.89	-	-
3	Dadra and Nagar Haveli and Daman and Diu	73.48	140.57	57.90
4	Delhi	202.85	-	-
5	Jammu & Kashmir	87.67	60.32	150.02
6	Ladakh	160.55	127.43	235.07
7	Lakshdweep	116.18	-	-
8	Puduchery	68.20	70.46	67.23
Total		84.56	57.69	134.16

Aggregate Data Consumed (GB)	1,40,24,519
Broadcasting & Cable Services	
Number of private satellite TV channels permitted by the Ministry of I&B for uplinking only/downlinking only/both uplinking and downlinking	903
Number of Pay TV Channels as reported by broadcasters	357
Number of private FM Radio Stations (excluding All India Radio)	388
Number of total active subscribers with pay DTH operators	66.52 Million
Number of Operational Community Radio Stations	408
Number of pay DTH Operators	4

Satellite DTH Subscribers: Pay DTH has attained total active subscriber base of around 66.62 million. This is in addition to the subscribers of the DD Free Dish (free DTH services of Doordarshan). The total active subscriber base has increased from 65.58 million in September 2022 to 66.62 million in December 2022.

No Significant increase in the demand for satellite DTH. May be Declining.

Free Dish (DD) Subscribers: About 40 million

Cable TV Subscribers: About 50 million? **Declining market**

OTT Market Share in India 2023: OTT Growth Rate at about 40 %?

OTT is an internet-based service

The consultancy firm estimates that India has 424 million OTT users.

With the emergence of smartphones and fast 4G networks, more and more people are switching to OTT.

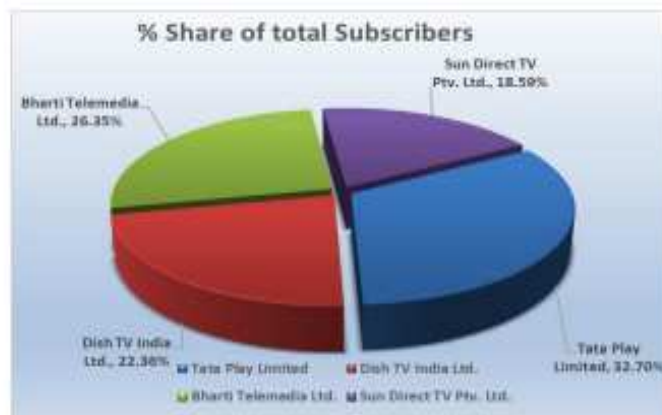
It is reported that nearly 80% OTT users in India from tier II, tier III cities, rural India.

Therefore, as a motivation to switch over to OTT, the fibre penetration must be also increasing.

**Chart 5.4: - Total active subscriber base of pay DTH sector
(in millions)**



Chart 5.5 : Market share of DTH Operators



Source : As reported by DTH service providers

Section E : Other Value Added Services - PMRTS & VSAT

Public Mobile Radio Trunk Services (PMRTS)

1.66 The subscriber base of PMRTS decreased from 65,823 at the end of Sep-22 to 65,607 at the end of Dec-22 with quarterly decline rate of 0.33%.

Table 1.34 : PMRTS Subscriber base - Service Provider wise

Sl. No	Name of the Service Provider	Subscriber Base as on 30.06.2022	Subscriber Base as on 30.09.2022	Net Addition	% Growth in subscribers in QE Sep-22
1	Arya Omnitalk Radio Trunking Services Pvt. Ltd.	53,795	53,720	-75	-0.14
2	Procall Ltd.	4,218	4,158	-60	-1.42
3	Quick Call	1,895	1,836	-59	-3.11
4	Inative Networks Pvt Ltd	1,825	1,825	0	0.00
5	Smartalk Pvt Ltd	1,570	1,501	-69	-4.39
6	Bhilwara Telenet Services Pvt Ltd	882	889	7	0.79
7	Wiwanet Solutions Pvt Ltd	1,046	1,048	2	0.19
8	Airtalk Solutions & Services Pvt Ltd	592	630	38	6.42
Total		65,823	65,607	-216	-0.33

Very Small Aperture Terminal (VSAT)

1.68 The total number of VSAT subscribers decreased from 2,65,505 at the end of Sep-22 to 2,63,066 at the end of Dec-22. Net decrease during the quarter has been 2,439 at the decline rate of 0.92%.

Chart 1.26 : Number of VSAT Subscribers & Rate of Growth (%)



Table 1.35 : VSAT Service Providers currently providing service & their subscriber base

Sr. No	Name of Service Providers	Subscriber base at the Quarter ending		Net Addition	%age Growth	Market Share (%) Dec-22
		Sep-22	Dec-22			
1	Hughes Communications Ltd.	1,82,003	1,78,791	-3212	-1.76	67.96
2	Nelco Ltd.	74,441	75,126	685	0.92	28.56
3	BSNL	6,387	6,526	139	2.18	2.48
4	Infotel Satcom	2,624	2,616	-8	-0.30	0.99
5	Cloudcast Digital (eartwhile Planetcast Media Services)	50	7	-43	-86	0.00%
Total		2,65,505	2,63,066	-2,439	-0.92%	100

1.69 Hughes Communications Ltd. is the market leader having 1,78,791 subscribers with market share of 67.96% followed by Nelco Ltd. having 75,126 subscribers with market share of 28.56% at the end of Dec-22.

National Long Distance (NLD) by Optical Fibre Circuits

- Currently, India has an optical fibre-based network spanning across 2.8 million kilometres as against the target set up by the National Broadband Mission to deploy as much as 5 million kilometres of optical fibre by 2024.
- Only less than one-fourth of the Towers are fibre-connected
- There are some far-flung remote villages(around 43,000) in India, still devoid of having any mobile services
- Aim is to increase the fibre foot print by **five fold**

<https://techblog.comsoc.org/2020/11/15/indias-telco-and-infrastructure-groups-fiber-optic-network-growth-essential/>

<https://economictimes.indiatimes.com/industry/telecom/telecom-news/trai-paper-to-explore-better-fibre-network-capacity-in-5g/articleshow/69334322.cms?from=mdr>

<https://www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-broadband-infrastructure-for-transforming-india-noexp.pdf>

https://www.trai.gov.in/sites/default/files/CP_29012020.pdf

National Long Distance (NLD) by Optical Fibre Circuits

- In order to expand mobile and broadband connectivity across the country, it is necessary to explore and utilise the opportunities presented by next-generation-networks like **5G and satellite communications**
- It would be critical to focus on fibre deployment and Right of Way clearances, for both over ground and underground infrastructure,
- OFC Infrastructure will form the bedrock of next generation technologies

<https://economictimes.indiatimes.com/industry/telecom/telecom-news/trai-paper-to-explore-better-fibre-network-capacity-in-5g/articleshow/69334322.cms?from=mdr>

<https://www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-broadband-infrastructure-for-transforming-india-noexp.pdf>

https://www.trai.gov.in/sites/default/files/CP_29012020.pdf

International Long Distance (ILD)

- The New Telecom Policy'99 envisaged the opening up of the International long distance service to the private operators.
- The Government has opened the International Long Distance Service without any restriction on the number of operators.
- Applicant must be an Indian company, registered under the Companies Act'1956
- ILD operators include Reliance Communications Limited, Airtel, BSNL, Tata Communications Ltd., Vodafone and others.

Autonomous System (AS)?

https://en.wikipedia.org/wiki/Tier_1_network

- [The Internet](#) is a network of networks*, and autonomous systems are the big networks that make up the Internet.
- More specifically, an autonomous system (AS) is a large network or group of networks that has a unified [routing](#) policy.
- Every computer or device that connects to the Internet is connected to an AS.

India Based “ AS “ as an Example: Tata Communications

NAME	HQ	AS NO	RANK	ROUTE KM	
Tata Communications (formerly Tele globe) ¹²³	India	6453	8	700,000 ¹²³	Peering Policy

Internet and Broadband Services

Internet Service Provider (ISP) Licensing started in 1998 and Unified License (UL) regime started in 2014. These Licenses were issued in DOT field offices.

ISP Authorization Granted Under Unified License and Unified License (VNO)

As on December 2020, there are 324 Unified Licenses (VNO) have been issued with ISP authorization which include 30 Category “A”, 241 Category “B” and 53 Category “C”.

VSAT Service

VSAT service Licenses are granted on non-exclusive basis for Very Small Aperture Terminal (VSAT) service using INSAT satellite system within the territorial boundaries of India.

Under the VSAT licence, the Licences provide data connectivity within CUG amongst various sites throughout India using VSATs and central hub. There are two categories:
VSAT CUG: As on October 2020: 9 licences; 4 VNO licences

Captive CUG VSAT: As on October 2020: 24 Captive CUG VSAT networks

VSAT Service

As per TRAI Recommendations recently some changes have been introduced permitting:

Provision of Cellular Backhaul Connectivity via Satellite through Very Small Aperture Terminal under Commercial Very Small Aperture Terminal (VSAT) CUG Service Authorization.

VSAT Service

The main features of TRAI Recommendations include:

VSAT CUG Service provider permitted to provide backhaul connectivity for cellular mobile services through satellite and establish Wi-fi hotspots using VSAT terminal located in the service area of the Access Service Providers.

The VSAT terminal can be located anywhere in the country
Enabling provisions of backhaul connectivity to be made in stand-alone Commercial VSAT CUG Service License, Unified License and Unified License (Virtual Network Operators).

Global Mobile Personal Communication by Satellite (GMPCS) Service in India

- The New Telecom Policy'99 envisages introduction of Global Mobile Personal Communication by Satellite (GMPCS) Service in India.
- With GMPCS Service a subscriber can communicate from any point on earth through hand-held terminal. The subscriber will have one telephone number irrespective of his location.
- The mobile satellite networks can operate with satellites either in Low Earth Orbit (LEO) upto 1000 KMs, Medium Earth Orbit (MEO) upto 10,000 KMs or GSO Stationery Earth Orbit (GSO) at 36,000 KMs. from the surface of the earth.

Global Mobile Personal Communication by Satellite (GMPCS) Service in India (Contd.)

- Reliance Jio and Bharti Airtel are in the process of obtaining GMPCS Licence to operate in India.
- GMPCS having global reach with the help of a network of Gateway Earth Stations will provide connectivity towards satellite as well as PSTN.
- With GMPCS easy, flexible and convenient communication will be possible with more economical use of radio frequency spectrum.

Public Mobile Radio Trunking Services (PMRTS)

Public Mobile Radio Trunking Services (PMRTS) is a two-way land mobile service in which the users communicate among themselves through a pair of Radio Frequencies out of a pool in a designated band assigned to the system. This license is used to provide Public Mobile Radio Trunking Service on a commercial basis.

PMRTS comes under Unified License since 2013.

Service Areas for PMRTS: Metro or Circle-wise

As of on November 2020, there are 41 PMRTS licenses in existence providing PMRTS service in the country.

Captive Mobile Radio Trunking Service (CMRTS)

Captive Mobile Radio Trunking Service (CMRTS) is similar to PMRTS service and the difference is that it used for non commercial captive purpose.

CMRTS is not covered under Unified License.

DOT issues license only for agencies/companies like Police, Metro Rail Services, etc.

As of November 2020, there are 111 CMRTS licenses existence to provide CMRTS service

Public Protection and Disaster Relief (PPDR) Networks

Enhancing the Public Protection and Disaster Relief (PPDR) plan for India by:

<https://dot.gov.in › files › EnglishPolicy-NDCP>

Facilitating the establishment of a Pan-India network for Public Protection and Disaster Relief (PPDR)

Making necessary spectrum available for PPDR including by establishing INSAT satellite-based mobile communication systems

Implementing global and regional harmonized spectrum Plans for PPDR

Broadband PPDR Networks(3GPP) <https://dcpw.gov.in/session1.php>

Today, voice is the primary mode of communication within Public Protection & Disaster Relief (PPDR) agencies, which is provided by dedicated PPDR communication networks such as TETRA, APCO 25 or DMR etc. Until now, PPDR agencies (e.g. Police, Fire brigades, Medical emergencies, etc.) rely on these narrow band LMR (Land Mobile Radio) systems, in the field for day to day operations.

The LMR communication networks provide reliable and resilient mobile voice services, as well as basic data services.

However, these traditional communication networks show substantial limitations, when matched against modern requirements of PPDR agencies:

Narrowband; No Interoperability among various PPDR Agencies;
Inefficient use of Spectrum

Advantages of Next Generation Technologies for PPDR communications:

4G(LTE /LTE-Advanced) and 5G network Features;

Rich multimedia content like live video or high quality resolution images;

PPDR agencies to use the common communication platform without any boundary limitations and significantly improve the speed and reliable communications across multiple Govt. departments like Fire, Police, Ambulance, Security Forces, etc.

Universal Service Obligation Fund

Extracts From DOT Annual Report 2020-21

4.4.1.4 Functions and Objectives

The USO Fund was established with the fundamental objective of providing access to 'basic' telecom services to people in the rural and remote areas at affordable and reasonable prices. Subsequently the scope was widened to provide subsidy support for enabling access to all types of telecom services, including mobile services, broadband connectivity and creation of infrastructure like OFC in rural and remote areas.

The implementation of the USO related activities is carried out by the “eligible operators”, i.e. the entities having valid license or registration or authorization from Central Government/ Department of Telecommunication for providing telecom services or infrastructure or any other entities as specified by the Central Government from time to time.

DOT USOF Office determines cost figures for implementation of various types of infrastructure for utilizing USOF Fund.

USOF Ongoing Activity – Migration to 4G and Introducing Satellite Solutions

- (xx) The following proposal of USOF scheme for Provision of mobile services in Left Wing Extremism (LWE) Phase-II areas:
- a. Revision of technology from '2G+4G' to 4G for LWE-II project.
 - b. Floating of RFP on 4G technology for 2542 tower locations at the estimated cost of Rs. 2,288 crore @ ₹0.90 crore per tower (CAPEX ₹1307 crore + OPEX ₹981 crore for 5 years), as benchmark cost.
 - c. Total cost estimate will be ₹2,745.60 crore including cost of 20% additional towers as per quantity variation clause.
- (xxi) The proposal for increase in number of GPs through Satellite based connectivity at difficult places like NER, J&K, HP, Uttarakhand, Islands etc. and for two additional Gateways and Last Mile Connectivity at these GPs, along with its consequent Cost revision under BharatNet project Phase-II with a revised cost of ₹973.37 crores exclusive of GST and other statutory charges / infra lease charges which shall be paid on actuals.

Further, provision of Last Mile connectivity at 5521 locations for an overall cost of ₹77.064 crore for 9633 Access Points excluding taxes.

Satellite Operators may propose use of USOF Funds for providing Satellite Based Services to Villages in future?

5G

https://www.business-standard.com/article/companies/dot-allocates-spectrum-for-5g-trials-to-telecom-service-providers-121052801737_1.html

5G is the 5th generation mobile network.

5G enables a new kind of network that is designed to connect virtually everyone and everything together including machines, objects, and devices.

5G wireless technology is meant to deliver higher multi-Gbps peak data speeds, ultra low latency, more reliability, massive network capacity, increased availability, and a more uniform user experience to more users.

Higher performance and improved efficiency empower new user experiences and connects new industries.

5G is based on OFDM (Orthogonal frequency-division multiplexing), a method of modulating a digital signal across several different channels to reduce interference.

5G uses 5G NR air interface alongside OFDM principles.

5G also uses wider bandwidth technologies such as sub-6 GHz and mm Wave.

5G (Contd.)

Applications of 5G technology

<https://www.rfpage.com/applications-5g-technology/>

High-speed mobile network – 20 to 30 Gbps; Latency 1 milli second

Entertainment and multimedia – HD Video

Internet of Things – Connecting everything Smart Home

Logistics and shipping – RFID, GPS

Industrial IoT

Smart farming; Fleet management

Healthcare and mission critical applications – SHARING LARGE FILES LIKE MRI SCAN REPORTS

Autonomous Driving and Drone Operation

Security and surveillance

5G (Contd.)

Products/Solutions/Applications

There are a lot of expectations of what 5G can do for the country. 5G data speeds will jump from 30 MBPS of 4G to 60 MBPS -1 GBPS range enabling Faster OTT Platform, high end TV (8K TV), Virtual Reality Games, advance Health Care applications, mobile banking, new e-governance and online education applications, speedy shopping, new and innovative applications in agriculture, manufacturing and transport sectors and introduction of new private networks with higher bandwidths.

5G (Contd.)

Spectrum

5G Auctions are over. Government received Rs 1.5 lakh Crores worth of Auction bids from TSPs. Government had put about 72000 of MHz of spectrum in auction, of which about 51000 MHz of spectrum has been sold with a bid amounting to Rs 1.5 lakh Crores.

(Comparison with GSO Satellite: The large quantum of 5G spectrum indicates the potential for enormous capacity in terms of throughputs. Such large spectrum availability for 5G is due to well established cellular frequency reuse technologies. Spectrum/Capacity available for GSO HTS System is limited as satellites need to be kept at least 5 or 6 degrees apart in GSO for a given service area.

Comparison with LEO/MEO Satellite Constellations: Large Spectrum/Higher Capacities are possible for Non-GSO Systems like LEO/MEO Satellite constellation but these satellite systems are essentially global systems and only a few operators can gather international support and internationally coordinate the orbit-spectrum resources, build, launch and operate such systems successfully.)

5G (Contd.)

Alliances

Airtel has tie-up with Tech Mahindra.

Jio is talking to Samsung as a third party service provider. Jio is also collaborating with Google Cloud.

Vodafone partners with US based Ciena to construct a future ready network for 5G.

Vodafone has also tie-up with L&T.

C-Dot may work with BSNL.

Multinationals

Google, Microsoft and Amazon may extend their public data networks to enter into Private Network markets. SingTel and Verizon may see 5G has an opportunity to enter B2B Platforms/Services markets.

Mobile Phones, Telecom Equipment and Infrastructure

Manufacturers of Telecom Equipment and 5G Phones will be also active in working with TSPs.

The country has over 700,000 towers and this has to be doubled for a smooth rollout for 5G.

Fiberisation is only 30 percent at present and needs to increase to 80 percent for meaningful rollout of 5G.

Profile of Telecom Equipment Vendors

**Foreign Vendors Dominate in the Indian Telecom Industry in
the areas of**

**Mobile Phone Manufacturing
Wireless Infrastructure/ Equipment Manufacturing
IT Products and Services**

•

Mobile Phone Manufacturing and Marketing in India (Indications Only)

Due to the huge middle class and large population, India is one of the most attractive mobile markets for many top brands.

From June 2019 to June 2020,

Xiaomi has 26.02%,

Samsung has 21.13%,

Mobicel has 12.89%

Oppo has 11.16%,

Realme has 4.87% and

Apple has 3.54% market share in India.

Xiaomi Corporation has 7 factories in India. It has sold 99% of its phones made in India.

Other Brands: Huawei, OnePlus, Vivo, Lenova, LG, etc.

Mobile Brands in the World



Top wireless infrastructure companies

<https://www.rcrwireless.com/20160531/network-infrastructure/top-5-wireless-infrastructure-makers-tag4-tag99>

- 1. Huawei**
- 2. Ericsson**
- 3. Nokia**
- 4. ZTE**
- 5. Samsung**

IT Companies

IT Companies like Infosys, TCS, IBM and others provide IT support to Telecom Service Providers.

**Impetus needs to be given to Domestic Telecom
Manufacturing and Production.**

**DOT Notification asks Government agencies to buy from
Domestic Equipment Manufacturers**

**NDCP 2018 Aims Enhancing India's contribution to Global
Value Chains**

New Indian Telecommunication Bill will come into force soon.

**This is an Important Subject
There is a need to analyse and study these aspects in detail.**

Thank You