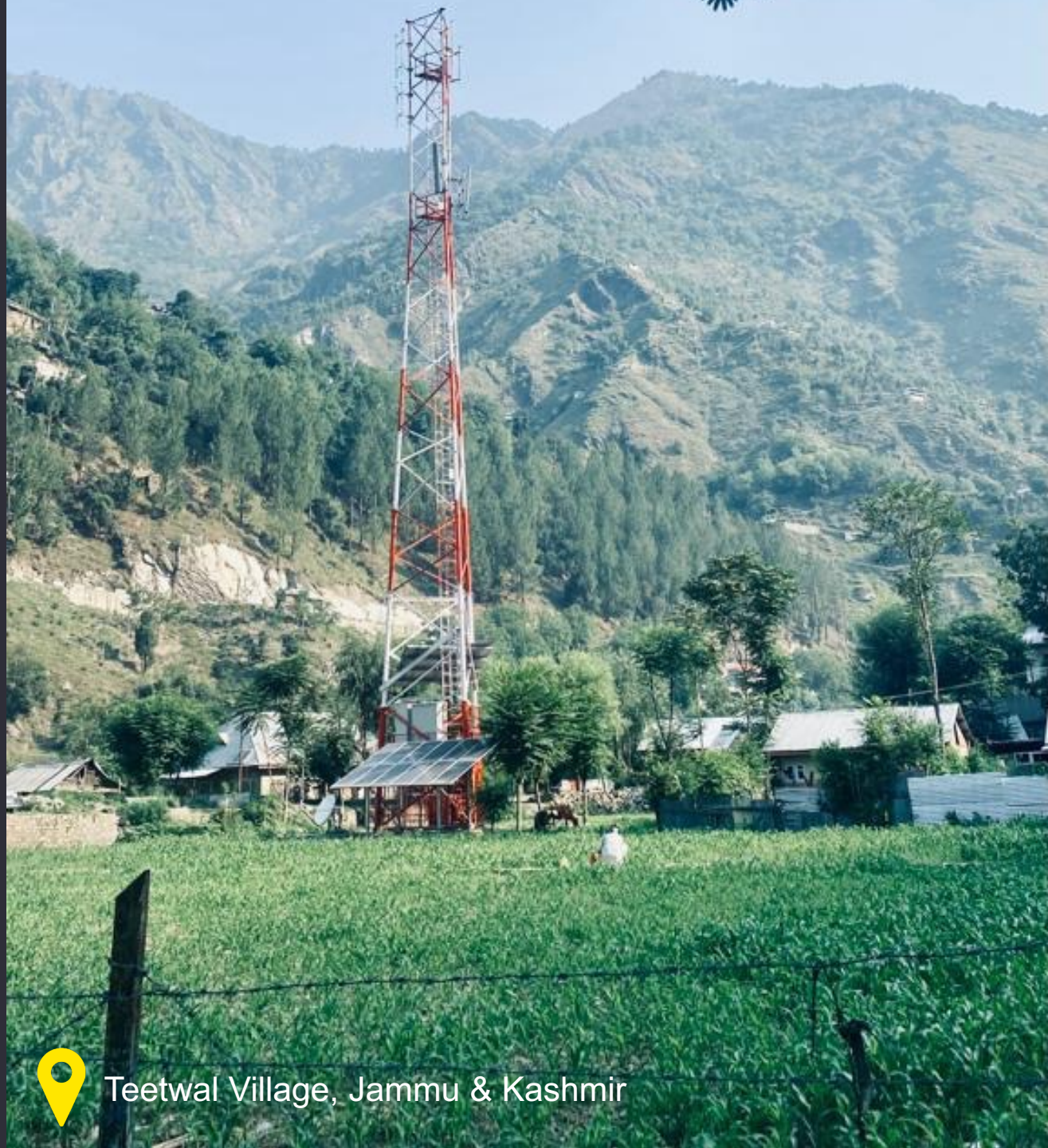
Last Mile Connectivity solutions for rural and remote areas

8th August 2022



Agenda

1. Telecommunication Sector Current Scenario
2. Government Initiatives
3. Last Mile Connectivity
4. Challenges and Global Comparison
5. Access Technologies
6. Best Practices from India
7. Way Forward

Telecommunication Sector Current Scenario

Telecommunication Sector in India

Telecom Subscribers
1170 mn

Tele Density
85%

Internet Subscribers
830 mn

Broadband Subscribers
790 mn

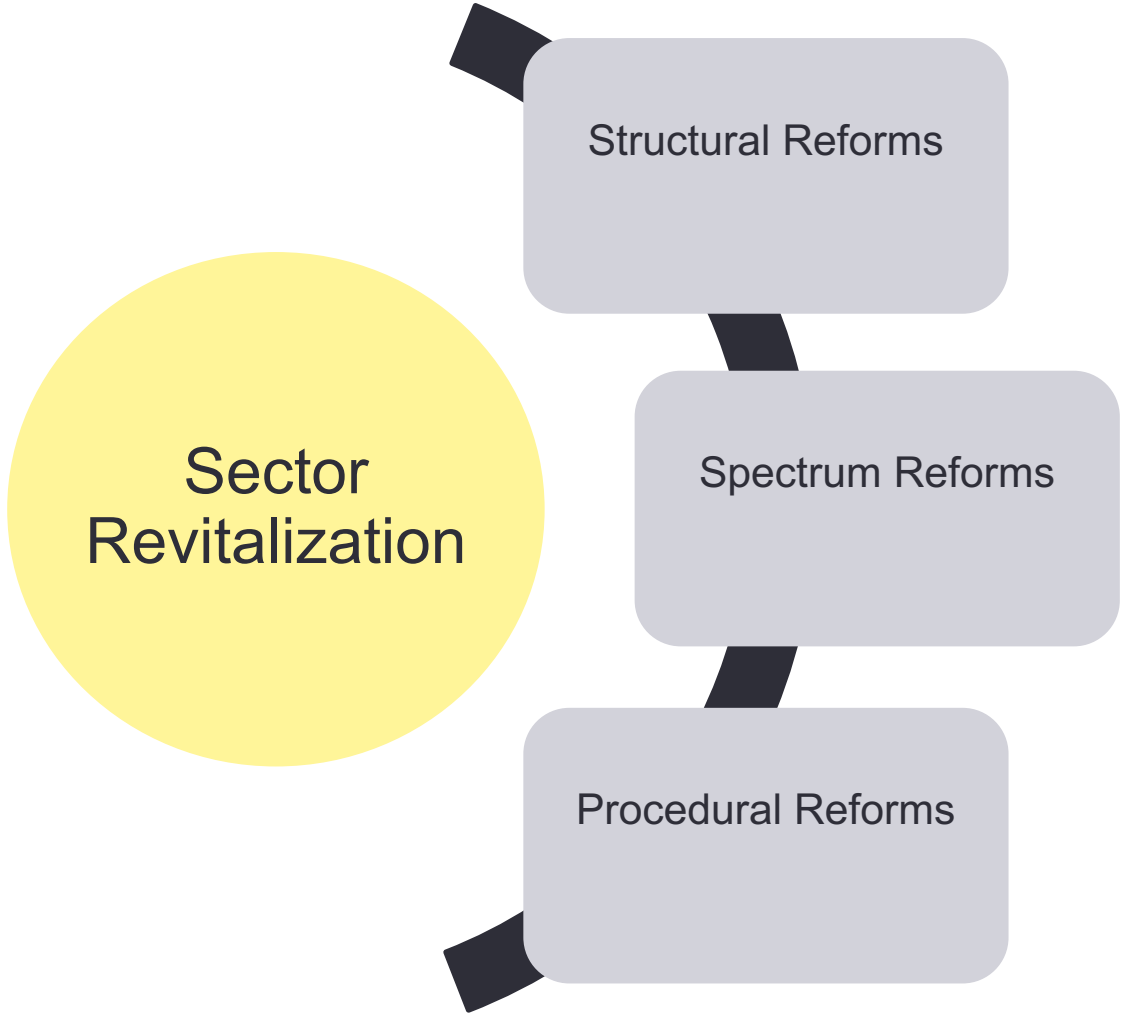
Wireless Data Usage
34,608 PB Quarterly

Telecom Towers
727 K

Telecom Usage
$1.5 Monthly Wireless ARPU

BharatNet GPs connected
180 K

Telecommunication Sector Reforms



- Rationalisation of definition of Adjusted Gross Revenue.
- Streamlining Bank Guarantees, interest rates and penalty
- 100% FDI under automatic route.

- No Spectrum Usage Charge for future auctions.
- Surrender of spectrum allowed after 10 years.
- Ease of spectrum sharing and a calendar for auction.

- Fully automated SACFA clearance process.
- Self-declaration based import clearances.
- 24*7 One-click license renewals.

Bridging the digital divide

19%

Growth in Telecom Urban Subscriber Base

555 mn in 2014

663 mn in 2021

Rural growth is **double** the Urban growth

42%

Growth in Telecom Rural Subscriber Base

377 mn in 2014

537 mn in 2021

780%

Growth in Urban Broadband Connections

57 mn in 2014

502 mn in 2021

Rural growth is **ten times** the Urban growth

7900%

Growth in Rural Broadband Connections

4 mn in 2014

322 mn in 2021

Rural India comprises of **39%** Broadband users in India

Data Source: TRAI

Key performance indicators

1115%
Growth in Broadband Subscribers

65 mn in 2014 to **790 mn** in 2022

380%
Growth In Smartphones

165 mn in 2014 to **790 mn** in 2022

15,000%
Growth in Average Monthly Data Consumption Per Subscriber

0.1GB in 2014 to over **15 GB** in 2022

95% Data Tariff Reduction
Average Data tariff per GB

$ 2.5 in 2014 to **$ 0.125** in 2022

More than **70 %** increase in Telecom towers

0.42 mn in 2014 to **0.72 mn** in 2022

More than **190 %** increase in BTS

0.8 mn in 2014 to **2.36 mn** in 2022

400 %
increase in OFC

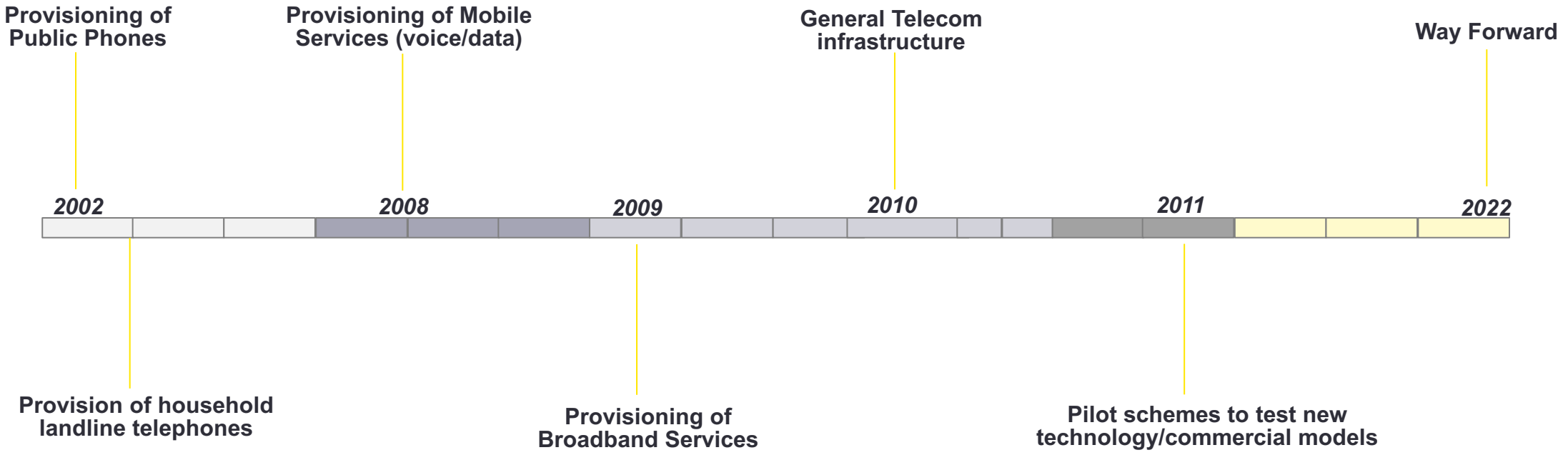
0.11 mn Km in 2014 to **0.58 mn Km** in 2022

Data Source: TRAI

Government Initiatives

Universal Service Obligation Fund

Established in 2002 by an act of Parliament under the Indian Telegraph (Amendment) Act 2003. Aims to provide financial support for the provision of telecom services in commercially unviable rural and remote areas of the country.



USOF is a non-lapsable fund with an existing amount of **$7.5 bn** and yearly accrual of **~$1.2 bn**

Universal Service Obligation Fund

Schemes

A	BharatNet
B	Comprehensive Telecom Development Plan for North Eastern Region
C	Special areas and other uncovered villages schemes
D	Comprehensive Telecom Development Plan for Islands
E	Mobile services in aspirational districts

Operational Models

A	**Mobile Towers:** Viability Gap Funding + O&M for 5 years; Infrastructure transfered to Service Provider after 10 years.
B	**Bharat Net:** Government funding + O&M for 3 years; Infrastructure retained with the government.
C	**Submarine Project:** Government funding + O&M for 5 years by respective Union Territories after netting with revenues earned; Infrastructre retained with the government.
D	**Satellite Project:** Bandwidth is on actuals whereas infrastructure is VGF based for VSAT backhaul. Fully funded in case of BSNL backhaul.

BharatNet Project

- National Asset
- Being implemented to provide broadband connectivity to all Gram Panchayats in India.
- **180 K GPs** out of 260K GPs are service ready.
- **600 K Km of OFC laid** and **100 K wifi hotspots** installed.
- Total data usage per month – **2140 TB.**
- Total FTTH connections – **260 K.**
- A total of **$ 4500 million** has already been spent.
- Middle or Aggregation layer of Network
- Non-Discriminatory access being provided to Service Providers

Utilisation Enhancement Initiatives

- **Special Assistance to States:** An amount of **$ 375 mn** has been earmarked for Last Mile Connectivity Projects.

- **Dark Fibre leasing:** Underway to leverage the existing OFC infrastructure for fiberisation of towers.

- **Fibre to the Premises (FTTP):**Taking the broadband connectivity to the home (FTTH), rural government institutions, and enterprises (FTTB).

- **WiFi Hotspots:** Public Wi-fi hotspots at rural telephone exchanges of BSNL and CSC WiFi Choupal in villages.

Last Mile Connectivity

Policy Imperative in India

..... Statutorily Mandated in the objective of **Universal Service Obligation Fund**,

"To provide subsidy support for enabling access to various types of telecom services including mobile services broadband connectivity and creation of infrastructure like OFC in rural and remote areas."

….. Enumerated as an objective of the **National Broadband Mission 2019**,

"To facilitate universal and equitable access to broadband services for growth and development throughout the country and especially in rural and remote areas."

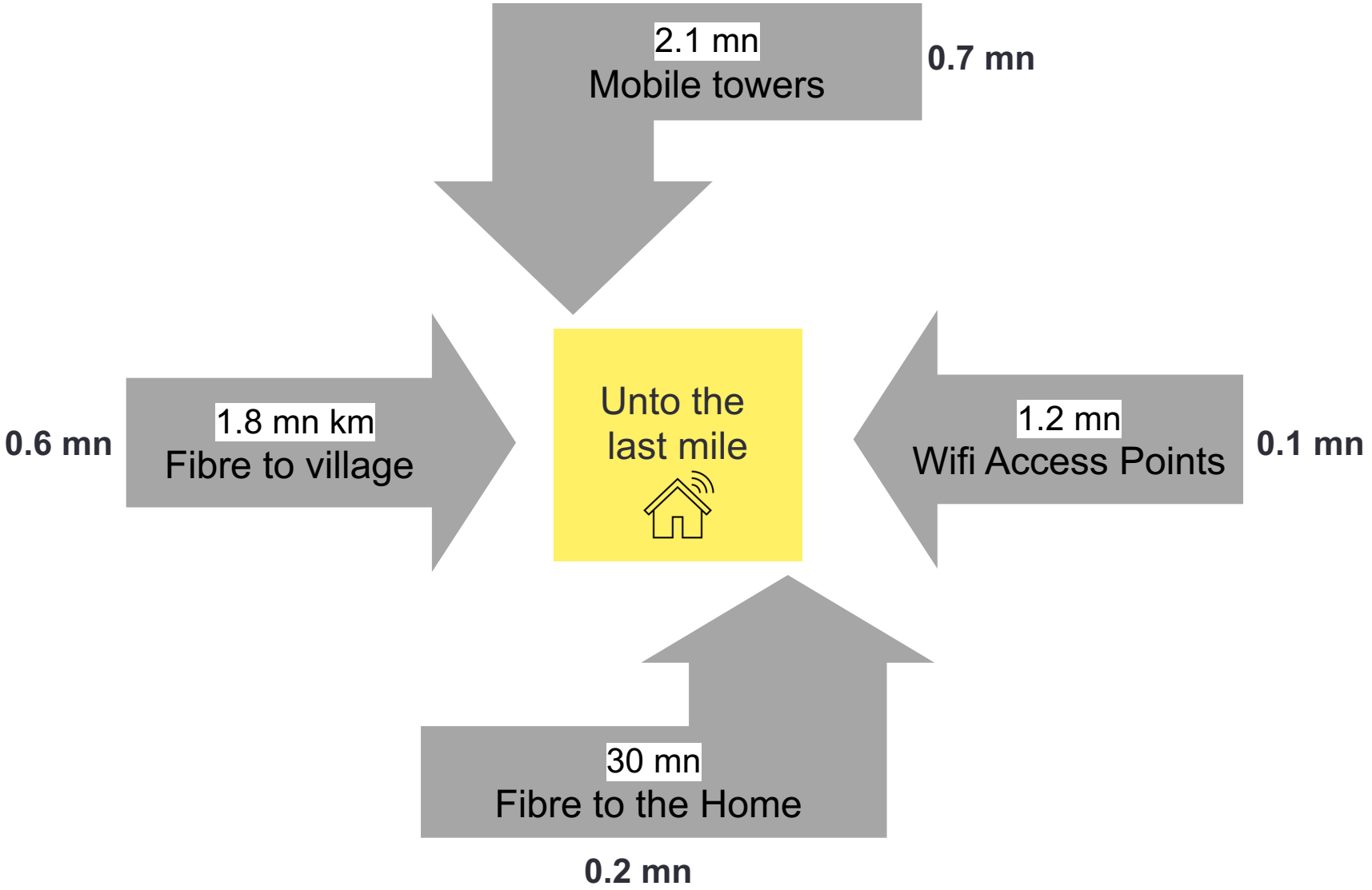
…. Defined as a goal in **National Digital Communication Policy 2018**,

"Provide connectivity to all Gram Panchayats of India."

ITU report on LMC states,

~ 49% of the world's population, or 3.7 billion people, were still offline and excluded from the direct benefits of the global digital economy at the end of 2019.

Approach to Last Mile Connectivity



Challenges and Global Comparison

Challenges that still remain

Low paying capacity

Affordability is observed as an impediment in LMC even after coverage

Sub-optimal Uptime of the backhaul

Major bottleneck identified for leveraging existing fibre infrastructure

Time Consuming and Uncertain RoI

Long gestation period from planning to execution due to isolated processes

Damage to existing infrastructure and sporadic utility provision

Infra at local level prone to frequent damage due to other infra work

Skill Gap

Low levels of literacy and digital skills, perceived lack of relevance, safety and security concerns

High Capital Expenditure for Fixed Broadband

3% broadband subscribers have access to fixed broadband

Comparison with the Peers

Fiberised telecom towers

75% in USA

70% in South Korea

34% in India

Fixed line broadband connections

120 million in USA

22 million in South Korea

33 million in India

Fixed line broadband connections (per 100 inhabitants)

36.41 in USA

43.55 in South Korea

1.6 in India

Fibre Development Index 2021

#19 USA

#2 South Korea

#67 India

Fibre Development Index Score

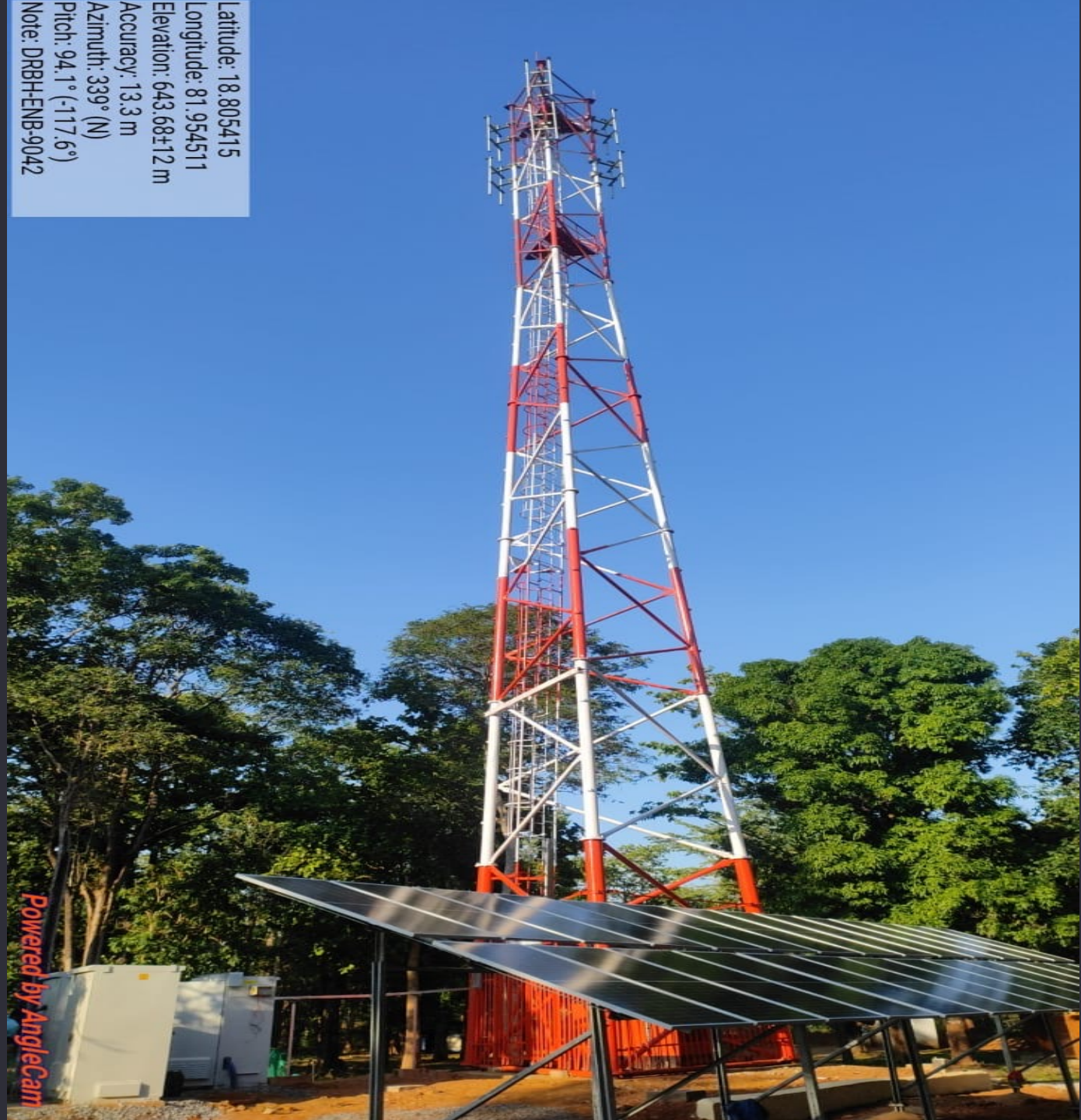
45 for USA

76 for South Korea

10 for India

Sources:1. https://www.icraresearch.in/; 2. Data published by ITU-2019 and Omdia 2021

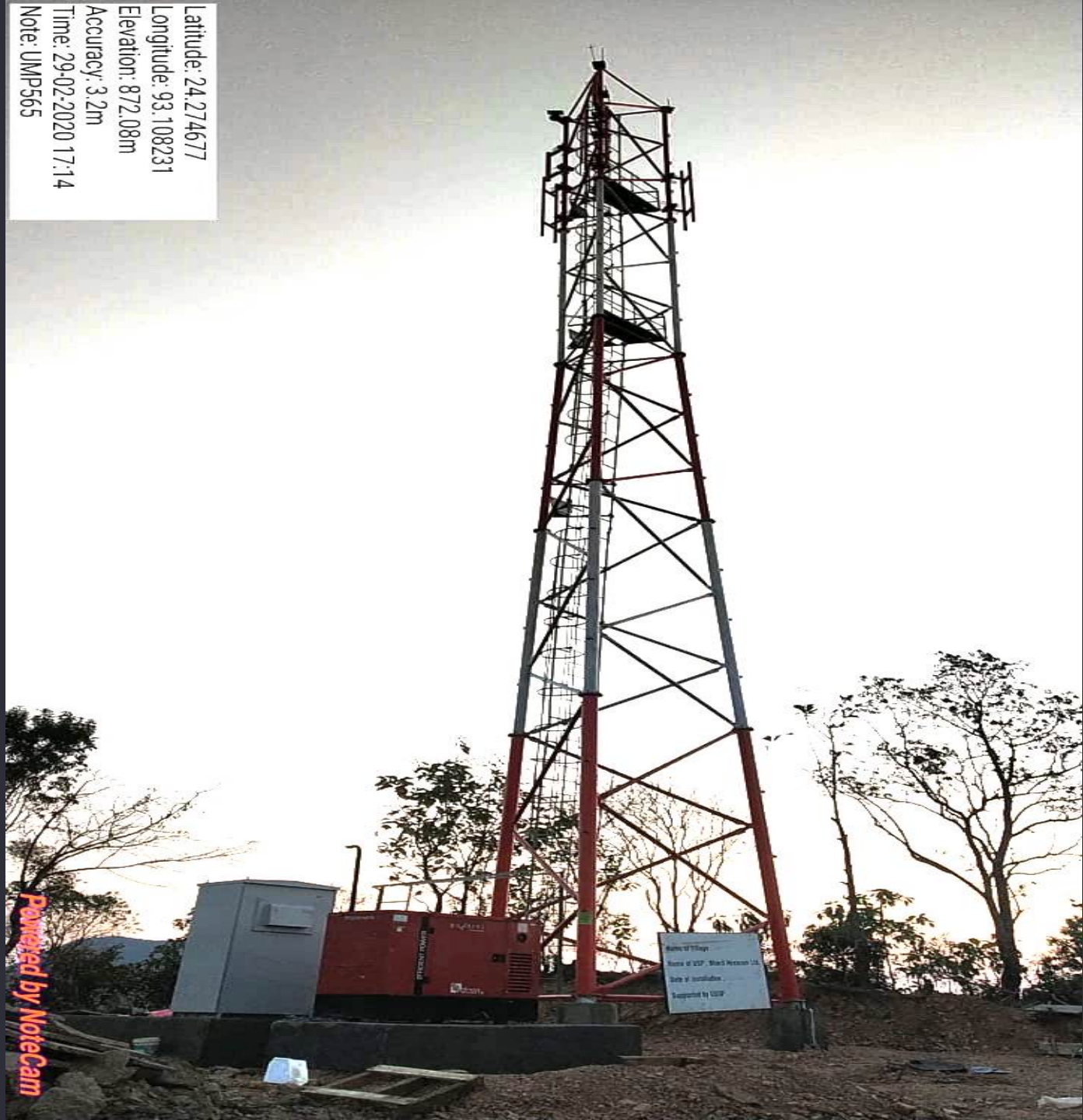
Access Technologies



LMC Access Technologies

Technology Type	QoS	Capital Expenditure	Infrastructure Required	Suitability for LM deployment	Access device type
WiFi: 802.11	2 Mbit/s to 10 Gbit/s	Low	Wi-Fi routers	Yes, but backhaul required	Wi-Fi enabled smartphones, tablets, computers
Mobile Cellular (2G, 3G, 4G, 5G)	0.1 to 1000 Mbit/s	Medium to High	Towers and radio equipment	Yes, but backhaul required	Cellular mobile phones, laptops, personal computers
Fixed Wireless Access (4G/5G)	20 to 1000 Mbit/s	Low to Medium	Towers and radio equipment	Maybe, depending on financial viability	CPEs, Modem or Wi-Fi
Satellite	5 to 150 Mbit/s	High	Earth Station, satellite, very small aperture terminal	Yes	Aperture terminal, CPEs or Wi-F
Fibre	100-1000 Mbit/s	Overhead: low to medium	Tower, poles, cabinets, active network equipment	Yes	Modem, Ethernet-enabled devices or Wi-Fi
		Below ground: medium to high	Subterranean duct work, cabinets, active network equipment	Yes, depending on terrain and financial viability	

Best Practices from Government initiatives in India



Submarine Cable Connectivity

Cost of the project - $ 3000 mn

OFC laid - 2313 Km

OFC laying underway - 1891 Km

Project CANI completed - Aug 2020

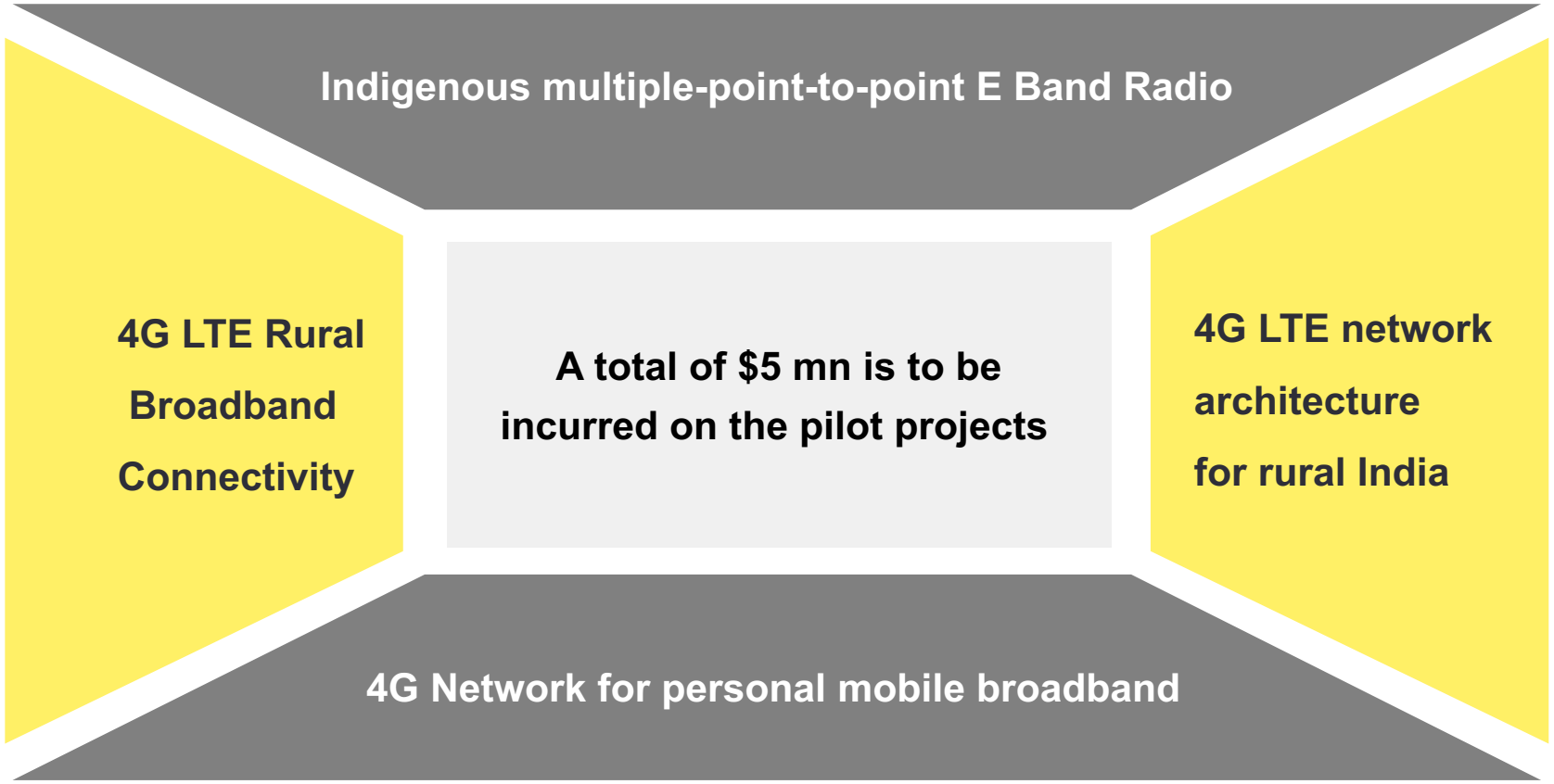
Project KLI to be completed – May 2023

Connected all the **8 islands** under CANI.

Bandwidth Tariff reduction by **50-60%**.

CANI Net bandwidth capacity in service for July is **75.7 Gbps**.

Pilot Projects under USOF



Way Forward


Latitude: 26.123803
Longitude: 95.079661
Elevation: 1723.08 m
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Way Forward

Government has been taking proactive measures to bolster the sector and exponentially enhance LMC

Enhancing the infrastructure until the village

- Research and Development fund earmarked from USOF
- Expanding the coverage to the remaining 400 K villages by deploying innovative solutions

Saturating 4G Connectivity to all villages

- Enhancing coverage to 600 K villages
- 30 K uncovered villages to get 4G coverage
- 20 K towers to be setup across India

Expanding scope of USOF through a statutory provision

- Creation of a Telecom Development Fund with emphasis on Last Mile Connectivity
- Enhancing the Scope of USOF to Urban Remote areas
- Skill development and promotion of indigenous technologies/industries

Thank You

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