Mobile Broadband Enhancement Plan

Nepal's Road to 5G

Nepal Telecommunications Authority

Jamal, Kathmandu

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1 Becoming 5G Ready

1.1 Background

Mobile communication has started in Nepal from 1999 with the launch of 2G (GSM) service in 900 MHz band. As the technology evolved, other wireless services, namely 2G (CDMA), 3G (WCDMA, EVDO), 4G (LTE, WiMAX) were introduced in following years. Spectrum at 800 MHz, 850 MHz, 900 MHz, 1800 MHz, 2100 MHz and 2300 MHz are used to provide these services. 5G pilot trial was conducted by Nepal Doorsanchar Co. Ltd. (Nepal Telecom) in 2023 with 60 MHz in 2600 MHz band.

As the telecommunication industry has started providing mobile broadband, data demand on the network is increasing rapidly. Present demand for cellular spectrum is created mainly by growth in broadband traffic. Approximately 30 to 40 percent annual increase in data traffic has been observed in Nepal in recent years, and the exponential growth is expected to continue in the future. To address this high traffic demand, small cells and/or more spectrums as well as robust backhaul network is required.

Sustaining this growth requires:

- Additional spectrum
- Efficient spectrum refarming
- Dense network infrastructure (small cells)
- Robust high-capacity fiber and microwave backhaul
- Migration from legacy 2G/3G to modern LTE/5G services including CS based voice service to PS based VoLTE/VoNR voice service (ultimately without fallback)
- Policy modernization and stakeholder coordination

1.2 Status of Spectrum Allocation and Assignment

The following table lists different frequency bands that are allocated for mobile technology. The same table shows the size of assigned and unassigned spectrum.

Table 1: Allocated, assigned and unassigned frequencies for Mobile Technologies

Frequency Bands	Frequency Range	Duplexing	Bandwidth	Assigned Bandwidth	Unassigned Bandwidth
700 MHz Band	703-748 MHz paired with 758-803 MHz	FDD	2×45 MHz	-	2×45 MHz
800 MHz Band	847-862 MHz paired with 806-821 MHz	FDD	2×15 MHz	2×15 MHz	-
850 MHz Band	824-834 MHz paired with 869-879 MHz	FDD	2×10 MHz	2×2.5 MHz	2×7.5 MHz
900 MHz Band	880-915 MHz paired with 925-960 MHz	FDD	2×35 MHz	2×24.6 MHz	2×10.4 MHz
1800 MHz Band	1710-1785 MHz paired with 1805-1880 MHz	FDD	2×75 MHz	2×52 MHz	2×23 MHz
2100 MHz Band	1920-1980 MHz paired with 2110-2170 MHz	FDD	2×60 MHz	2×25 MHz	2×35 MHz
2300 MHz Band	2300-2400 MHz	TDD	100 MHz	10 MHz	90 MHz
2600 MHz Band	2500-2690 MHz	TDD	190 MHz	-	190 MHz
3500 MHz Band	3300-4200 MHz	TDD	900 MHz	-	900 MHz
26000 MHz Band	24.25 – 27.50 GHz	TDD	3.25 GHz	-	3.25 GHz

1.3 Recent Development

- **CDMA Shutdown**:

  CDMA services have been officially discontinued including limited-mobility phones and mobile phones. The shutdown was completed in the fiscal year 2079/80 (2022/23), releasing the 850 MHz band spectrum for refarming & future wireless technologies.

- **Capping Revision and Introduction of New Spectrum Bands:**

  The Authority has revised spectrum capping policies to allow more flexible and efficient use of frequency bands. Capping of spectrum bands such as 700 MHz, 2100 MHz, 2300 MHz, 2600 MHz and 3500 MHz bands have been changed, while new frequency bands have been identified for future allocation to support the deployment of advanced technologies like 5G.

- **Spectrum Revocation:**

  The Authority has initiated process to identify unused frequencies. As a result, unused or inefficiently used spectrum allocations will be revoked to ensure optimal utilization of this scarce resource.

- **5G Trial:**

The Authority assigned 60 MHz of spectrum in the 2600 MHz band to Nepal Doorsanchar Company Limited (Nepal Telecom) for conducting 5G trials in 2023. These trials took place at selected locations, including Babarmahal, Sundhara, Pokhara, and Birgunj. During the trials, peak throughput of 1 Gbps has been achieved. These trials confirmed feasibility of mid-band for urban capacity, importance of backhaul readiness, and need for scalable spectrum allocation.

1.4 Need for Mobile Broadband (MBB) Enhancement Plan

As 4G penetration and user density are increasing, the existing spectrum allocation is already nearing saturation at many network sites. To maintain service quality and provide an improved user experience, Service Providers urgently require additional spectrum. And with the rise of data-intensive applications like Machine-to-Machine Communication, high-definition gaming, and video streaming, the need for more bandwidth will only increase.

The transition to 5G requires major upgrades in infrastructure, policy support, and a substantial increase in spectrum assignment. The growing demand for mobile data across various spectrum bands underscores the need for strategic actions. A comprehensive mobile broadband enhancement plan in Nepal is becoming increasingly essential to expand spectrum availability, deploy 5G networks, and prepare for the next wave of digital services. This plan is crucial to ensure that Nepal remains competitive in the global digital economy while effectively addressing the growing and evolving needs of its users.

1.5 5G Potentials

Defined as IMT-2020 by ITU, 5G is the fifth generation of mobile technology, designed to provide faster data speeds, lower latency, and higher connectivity density.

- **Speed**

  Although data rates can be influenced by various factors, such as network congestion and the spectrum bandwidth used by a carrier, the 5G standard from the International Telecommunication Union's (ITU's) IMT-2020 report on 5G increases download rates to a minimum of 100 Mb/s and a potential maximum of 20 Gb/s. Peak 5G speeds are expected to be up to 100 x faster than the speed of 4G LTE networks.

- **Latency**

  The 5G standard is intended to substantially reduce downloading latency down to 4 milliseconds for phone devices and one millisecond for devices such as self-driving

vehicles that depend on ultra-reliable low latency connectivity (about ten times quicker than LTE's ten milliseconds).

- **Increased Capacity**

  Increased capacity on 5G networks can minimize the impact of load spikes, like those that take place during sporting events and news events. ITU has envisioned to support 1 million devices in one square kilometer area in 5G network for Massive Machine Type Communications (mMTC) use case scenario. This will suffice for the dense network of IoT devices/ sensors in smart cities and modern automated factories.

5G promises to transform various sectors such as telecommunications, healthcare, education, agriculture, and manufacturing, paving the way for innovations like smart cities, connected devices, and augmented reality. However, alongside its vast benefits, 5G also comes with a range of positive and negative factors to consider.

Strengths

- Nationwide 4G coverage creates strong baseline
- Government commitment to digital transformation
- Grwoing digital demand supports justification
- Improved optical fiber backhaul in urban and semiurban areas
- Strategic geographic location

Weaknesses

- High cost of CAPEX and OPEX
- Geographic challenges and infrastructure gap
- Limited local expertise
- Legacy voice-centric licensing framework
- Regulatory bottlemecks and administrative delays
- High license and spectrum fees discourage 5G investment

Opportunities

- Position 5G as national digital infrastructure (health, disaster, education)
- Use 5G to expand rural broadband vis FWA
- Enable enterprise and private 5G under regulatory sandbox
- Reform towards service-neutral/unified licensing
- Economic growth,digital transformation and digital inclusion
- Attracting foreign investment and partnerships
- Vertical integration and innovation

Threat

- Continued delay may widen gap with regional peers
- Excessive fees may stall roleout or reduce coverage ambitions
- Financial viability risks from slow market uptake
- Cybersecurity and privacy risks
- Social and economic inequality
- OTT substitution reducing tranditional telco revenues

2 Vision

Nepal's vision for 5G and MBB enhancement is to ensure:

- **Ubiquitous access** to reliable, high-speed broadband
- **Digital inclusion** across all demographics and geographies
- **Integration of 5G into key sectors**: education, healthcare, agriculture, manufacturing, tourism and disaster management
- **Economic empowerment and job creation** through digital transformation
- **Preparation for 6G and future innovations**

Key Targets:

- At least **20 Mbps nationwide average speed** by 2027
- **100 Mbps in metros and sub-metros** by 2030
- **Nationwide 5G coverage by 2035**

3 Smooth Transition Actions and Roadmap

3.1 3G Sunset

Service Providers in Nepal are primarily operating 3 mobile networks, 2G, 3G and 4G. Introducing 5G means they have to operate 4 different networks. User behavior suggests that they are likely to use 2G network for voice services, and 4G for data services. The VoLTE users are also increasing. Currently, less than 3% of the users rely on 3G data but consumes costly spectrum and OPEX.

Maintaining legacy 3G networks requires significant resources including spectrum. Phasing out 3G leads operators to more efficient network management and cost savings. This way, operators can prioritize upgrading their networks to 5G without the added complexity of managing 3G, thus accelerating the pace of 5G adoption. However, the phasing out operation should be carefully managed to avoid financial strain for those who rely solely on 3G.

Actions:

- Import of only 3G handsets and UEs will be discontinued immediately.
- Service Providers shall phase out 3G services by 2026.
- Service Providers shall introduce campaigns and promotional packages to facilitate migration.

3.2 More Spectrum for MBB

One of the key challenges in Nepal's mobile broadband landscape is the limited availability of cellular spectrum. As of now, 238.2 MHz of cellular spectrum has been assigned to the service providers in the country. However, spectrum assignments in each frequency band are capped, and multiple technologies are operational sharing the same limited resources. Currently, approximately 35% of the cells are operating at maximum Physical Resource Block (PRB) utilization, requiring capacity upgrades to meet the increasing data demand while ensuring an acceptable quality of experience for users.

This may means going beyond the frequency caps specified in the frequency policy.

Actions:

- More spectrum will be assigned such that operators can run 4G services in existing bands with full carrier capacity.
- Carrier Aggregation will be mandated.

- Amendment of the policy will be recommended to the Radio Frequency Policy Determination Committee. Group-wise capping, instead of band-wise capping will be proposed.

3.3 Small cells and Fixed Wireless Access (FWA)

The current macro cell-based mobile network infrastructure in Nepal, while sufficient for voice and basic mobile broadband, is not optimized to handle the ultra-dense data traffic expected in the 5G era, especially in urban and high-demand areas. Moreover, the limited reach of fiber infrastructure constrains high-speed internet access in remote and semi-urban regions. Small Cells (Micro cells, Pico cells and Femto cells) with their low-power, short-range design, and Fixed Wireless Access (FWA), which leverages cellular spectrum to deliver broadband, are critical to enhancing both capacity and coverage. These technologies provide a cost-effective and scalable solution for last-mile connectivity, especially where fiber deployment is economically or physically unviable.

Actions:

- Small cell deployment will be encouraged in dense urban zones to improve spectral efficiency, indoor access and localized capacity.
- FWA will be adopted as a primary tool to expand broadband access in underserved/remote areas.
- Infrastructure sharing and street furniture sharing will be promoted to reduce deployment costs for small cells and FWA.

3.4 Backhaul Modernization for 5G

Nepal's transition to 5G necessitates a robust and high-capacity backhaul network to handle increased data throughput and ultra-low latency requirements. Without sufficient backhaul, 5G merely behaves like enhanced 4G. While urban centers and major corridors have seen considerable fiber-optic deployments, many remote and mountainous areas still rely on microwave links due to the logistical and financial challenges of laying fiber in such terrains. To ensure a seamless 5G rollout, it's imperative to enhance both fiber and microwave backhaul infrastructures, tailoring solutions to the geographical and economic contexts of different regions.

Actions:

- Fiber-optic network expansion to connect base stations and core nodes will be prioritized, focusing on urban and feasible rural areas.
- Microwave backhaul capacity will be enhanced using high-capacity bands like E-Band where fiber is impractical.
- Right-of-way and permission procedures (including National Park/Forest Area) for fiber and microwave installations will be simplified to speed up development.
- Telecom operators will be encouraged to share backhaul infrastructure to reduce redundancy and optimize resources.

3.5 Data Privacy and Security Framework

5G introduces new risks due to virtualization, slicing, IoT scaling and cloud integration. The 5G transition will increase cybersecurity and privacy risks, requiring a robust framework to protect data and networks while ensuring compliance and trust.

Actions:

- Data privacy and cybersecurity policies will be developed and enforced, through licensing and regular audits, with privacy-by-design principles.
- Enforce zero-trust architectures for 5G cores and regular cyber security audits for operators.
- Training programs on cyber threat detection and data protection will be conducted for operators and regulators.
- Public awareness campaigns on data privacy and safe digital practices will be launched.
- Collaboration platforms for threat intelligence sharing and coordinated response will be established among government, private sector, academia, and international partners.

4 5G Strategies

The strategic design of Nepal's 5G rollout must balance cost-efficiency, inclusiveness, and long-term technological sustainability. Global practices show that architecture choice, operator models, rollout priorities, and spectrum planning significantly influence success. 3GPP officially spells out multiple deployment options, which can be summarized as follows.

- Non -Standalone (4G+5G RAN) over 4G's EPC (Early Drop) which addresses the most urgent deployment needs for eMBB.
- Stand- Alone 5G (Main Drop) which contains full standalone 5G support with 5G core.
- Non-Standalone (4G+5G RAN) over 5G's NG-core (Late Drop)

4.1 SA vs. NSA

5G can be deployed through two main architectures: Non-Standalone (NSA), which relies on existing 4G infrastructure for control signaling, and Standalone (SA), which uses a completely new 5G core network enabling full 5G functionalities such as ultra-low latency, network slicing, and support for massive IoT.

Both approaches have merits. NSA allows for faster and more cost-effective rollout, especially in markets with strong 4G coverage, while SA is necessary for advanced enterprise and industrial use cases.

Strategies:

- Service providers will have the flexibility to choose between NSA and SA architectures based on their market assessments, investment capacity, and service priorities.
- The regulator and government will provide a supportive policy and licensing environment for both NSA and SA deployments.
- SA deployments will be encouraged in specific verticals (e.g., smart cities, healthcare, industry 4.0) where full 5G capabilities are critical.
- A migration path from NSA to SA may be outlined to ensure long-term sustainability and future-proofing of networks.

4.2 Single Wholesale Network (SWN) vs Multiple Operators

Single Wholesale Network (SWN) consolidates infrastructure under one national operator to avoid duplication and ensure universal access. Multi-Operator Models encourage competition and innovation.

Strategies:

- A hybrid model will be considered:
  - core national infrastructure (like backhaul/fiber) may be centralized or shared under open access principles,
  - retail 5G services, including RAN will be deployed competitively.
- Infrastructure sharing will be mandated where economically or geographically justified.
- Neutral-host or RAN sharing or local roaming models may be adopted in remote areas.

4.3 Rollout Approach: Geographic and Demographic Prioritization

International experience shows that 5G deployment strategies vary based on market conditions, demand patterns, and infrastructure readiness. Accordingly, service providers shall retain flexibility to determine the sequencing and mix of 5G deployment models, including mobile broadband and Fixed Wireless Access, based on technical and commercial considerations.

At the same time, global rollout trends indicate that early 5G deployments typically concentrate in dense urban areas and economically productive zones before expanding to semi-urban and rural areas. In this context, service providers shall be encouraged to prioritize high-demand urban centers and key economic hubs in the initial phase, followed by phased expansion to underserved areas.

The Authority will maintain a technology-neutral and non-prescriptive regulatory approach, while facilitating pilot deployments and sectoral testbeds in priority public sectors, in alignment with national development frameworks and digital inclusion objectives.

4.4 Spectrum Strategy and Band Selection

The success of 5G hinges on the strategic allocation and efficient use of radio spectrum across various frequency ranges. Globally, 5G utilizes low-band (sub-1 GHz) for wide coverage, mid-band (1–6 GHz) for a balance of coverage and capacity, and high-band (mmWave) for ultra-high capacity in dense environments.

Nepal's Radio Frequency (Allocation and Pricing) Policy for Telecommunication Services, 2023 emphasizes technology neutrality, allowing service providers the flexibility to deploy any generation of mobile technology in the assigned spectrum bands.

Strategies:

- Technology neutrality will be maintained, enabling operators to use their assigned spectrum for 5G or any other technology as per their commercial and technical consideration.
- Following Spectrum bands will be auctioned for mobile broadband enhancement and 5G deployment:
    - 2300 MHz and 2600 MHz: 4G expansion and subsequent upgrade to 5G.
    - 3500 MHz: Optimal trade-off between coverage and capacity.
    - 700 MHz: Coverage in rural and underserved areas.
    - 26 GHz: Capacity in ultra-dense use cases, such as smart cities, industrial zones, and enterprise campuses.
- Fixed Service (FS) and Fixed Satellite Service (FSS) frequency bands will be made available as per national requirements and international developments to support 5G backhaul, rural connectivity, and enterprise use cases.
- Spectrum refarming and harmonization efforts will be undertaken to ensure efficient use of existing bands.
- Auctions or administrative allocations will follow transparent and fair mechanisms.

4.5 Network Slicing and Vertical Use-Cases

One of the transformative features of 5G is network slicing, which allows the creation of multiple virtual networks over a shared physical infrastructure. Each slice can be tailored to meet specific performance and security requirements for different industry verticals.

This capability is especially valuable for sectors like smart healthcare, manufacturing, disaster response, education, logistics, and agriculture — many of which are central to Nepal's development agenda.

Strategies:

- Network slicing capabilities will be supported as part of the long-term 5G evolution, particularly under Standalone (SA) deployments.
- Vertical-specific pilot projects (e.g., smart agriculture, connected ambulances, remote learning) will be encouraged through regulatory facilitation and public-private partnerships.

- A Master Action Plan for the Integration of 5G in Vertical Sectors — including healthcare, education, transport, and public safety — will be finalized in coordination with sectoral ministries.
- Priority access and dedicated slices may be considered for essential services and disaster management systems, especially in remote or high-risk areas.
- Capacity-building programs for enterprises, academia, and government stakeholders will be initiated to foster innovation and adoption of 5G-based solutions.

5 Strategic Roadmap for 5G Rollout in Nepal

The strategic roadmap for 5G rollout in Nepal is structured in progressive phases to ensure regulatory readiness, infrastructure preparedness, ecosystem development, and long-term technological evolution. The Authority shall adopt a technology-neutral and non-prescriptive approach, allowing Mobile Service Providers to determine their respective rollout strategies based on technical, commercial, and market analyses, within the applicable regulatory framework.

5.1 Short-Term (2025-2026):

Pilot Phase, Awareness, and Regulatory Readiness

The initial phase focuses on creating an enabling environment for 5G through trials, capacity-building, and foundational policy work.

Key Activities:

- The Authority shall facilitate **pilot 5G deployments** to support assessment of technology performance, potential use cases, and infrastructure readiness under local conditions.
- Public awareness campaigns will be launched to communicate the benefits and safety of 5G.
- Spectrum refarming and efficient band utilization will be implemented to ensure adequate capacity.
- Regulatory frameworks will be reviewed and updated, including spectrum policies, licensing, and quality-of-service benchmarks.

5.2 Medium-Term (2027-2030):

Infrastructure Upgrade, Partnerships, and Capacity Building

This phase scales up technical readiness and ecosystem development to support commercial 5G rollout.

Key Activities:

- Backhaul and transport infrastructure will be upgraded, focusing on fiber expansion and high-capacity microwave solutions.

- To accelerate ecosystem maturity and public adoption, cross-sectoral collaboration will be initiated to support 5G integration into verticals such as healthcare, education, transport, agriculture, smart cities, disaster management and energy sector.
- Human capital development programs will be launched to train engineers, technicians, and policy professionals for 5G.
- Stakeholder engagement with industry, academia, and government will be intensified to align national priorities.
- Data governance and cybersecurity frameworks will be revised to address emerging challenges.

5.3 Long-Term (5+ Years):

Nationwide Rollout, Local Innovation, and 6G Preparedness

This final phase drives inclusive access, innovation, and long-term strategic positioning.

Key Activities:

- Nationwide 5G coverage will be pursued, with a focus on rural connectivity, smart villages, and digital inclusion.
- Support for local innovation and startups in areas like IoT, AI, robotics, and smart infrastructure will be strengthened through regulatory sandboxes and innovation funds.
- Advanced use cases (e.g., network slicing, private 5G networks, edge computing) will be commercialized.
- Preparation for 6G and future technologies will begin through international collaboration, research funding, and early standardization efforts.

5.4 Stakeholders Breakdown:

Strategic Task	***Responsible Stakeholders***	***Supporting Stakeholders***
Conduct pilot 5G trials in selected areas	Telecom Operators	NTA, MoCIT
Allocate spectrum and define trial guidelines	NTA	MoCIT
Launch public awareness and education campaigns	MoCIT	NTA, Operators
Update and streamline regulatory frameworks	NTA	MoCIT
Facilitate stakeholder consultations	NTA	MoCIT, Private Sector, Academia
Initiate cybersecurity and data governance frameworks	MoCIT, Ministry of Home Affairs	NTA, Experts, International Partners
Upgrade backhaul and core infrastructure (fiber, microwave, IP)	Operators	MoCIT, NTA (RTDF)
Refarm and optimize spectrum allocations	NTA	Operators
Enable 5G integration in key sectors (health, agriculture, education)	Line Ministries (Health, Education, etc.)	Operators, NTA
Implement national-level training and upskilling programs	Academia, Training Institutes	MoCIT, NTA
Ensure nationwide 5G access including rural areas	Operators	MoCIT, Rural Telecom Fund
Promote local innovation and 5G-enabled startups	Private Sector, Innovation Hubs	NTA, MoICS, Donors
Commercialize advanced features (network slicing, private 5G, etc.)	Operators	NTA
Initiate research and 6G Roadmap	Universities, R&D Institutions	MoCIT, International Partners, NTA

6 Stakeholders and Collaboration

6.1 Key Stakeholders

Successful 5G adoption will require collaboration between multiple entities. Following are the key stakeholders identified for effective deployment of 5G.

Key Stakeholders:

- Ministry of Communications and Information Technology (MoCIT): Responsible for overall policy-making.
- Nepal Telecommunication Authority (NTA): Oversees spectrum assignment, sets technical standards and ensures compliance and regulation.
- Mobile Service Providers (MSPs): Key players in deploying mobile network infrastructure, enabling 5G rollouts, and driving innovation through advanced services and technologies.
- Internet Service Providers (ISPs): Play significant role in ensuring seamless connectivity by providing infrastructure support and enabling network integration
- Nepal Electricity Authority (NEA): Vital for providing electricity infrastructure for telecom towers.
- Concerned Ministries and Local levels.
- Vendors: Supply the necessary equipment and technology for 5G infrastructure.
- International Development Partners: Organizations like the World Bank and Asian Development Bank can provide funding and technical assistance.

Additionally, partnerships with global telecom operators, tech companies, and international organizations is essential to leverage their expertise in 5G deployment. Engaging in regional and international forums on 5G will also help to align Nepal's strategy with global standards and attract foreign investment.

6.2 Steering Committee

A Steering Committee, as specified below, will be established to monitor the progress and support Service Providers in upgrading their network capacity and transitioning to the fifth-generation network.

Committee:

Senior Director, Technology and Infrastructure Directorate:	Coordinator
Director, Regulation Division:	Joint Coordinator
CTOs of two major MSPs:	Members
Deputy Director, Spectrum Assignment and Management Section:	Member Secretary

The Committee will convene on the first Wednesday of each month, with the agenda centered on assessing the progress of Service Providers in enhancing mobile broadband (MBB). Additional invitees may be included as necessary.

7 Annex: Case Studies

7.1 Malaysia: Government-led 5G Deployment focused on Digital Economy[1]

Malaysia launched its 5G rollout under the **Jalinan Digital Negara (JENDELA)** initiative, which emphasizes expanding digital infrastructure, especially fiber networks, ahead of 5G. The government adopted a **single wholesale network (SWN)** model via Digital Nasional Berhad (DNB) to build and operate 5G infrastructure, leasing capacity to multiple operators. This approach aims to reduce duplication and accelerate nationwide coverage.

Key Lessons:

- Centralized infrastructure deployment via a wholesale network model can reduce capital expenditure and speed up rollout.
- Prior investment in fiber and fixed broadband infrastructure is crucial to support high-capacity 5G backhaul.
- Government policies focusing on digital economy enable integrated growth of 5G with e-commerce, smart manufacturing, and digital services.
- Emphasis on public education and stakeholder collaboration ensures smooth adoption and innovation.

7.2 India: Large-Scale 5G Rollout with Spectrum Auctions & Rural Focus[2]

India's 5G rollout began in 2022, following a high-profile spectrum auction raising over $19 billion for 5G bands (700 MHz, 3.3-3.6 GHz, and mmWave bands). The government prioritized affordable spectrum and incentivized rural connectivity through USO Fund support.

Key Lessons:

- Spectrum auctions must balance revenue goals with affordable access to encourage widespread rollout.
- Leveraging government subsidy mechanisms for rural and underserved areas accelerates digital inclusion.

[1] https://www.gsma.com/about-us/regions/asia-pacific/wp-content/uploads/2025/02/200225-Malaysia-tech-economy.pdf
[2] https://www.ericsson.com/en/reports-and-papers/mobility-report/articles/5g-standalone-india-jio

- Collaboration between operators and public sector for infrastructure sharing can reduce costs.

7.3 South Korea: Early Adoption & Network Slicing for Vertical Industries[3,4]

South Korea was among the first to launch commercial 5G in 2019, rapidly expanding coverage and emphasizing urban and industrial zones. Operators introduced advanced use cases like network slicing to support autonomous vehicles, smart factories, and telemedicine. The government actively promoted innovation through 5G testbeds and R&D funding.

Key Lessons:

- Early investment in 5G pilot zones with vertical industry collaboration accelerates ecosystem maturity.
- Network slicing and private 5G networks can address specific sector needs, maximizing ROI.
- Government-led innovation hubs and testbeds facilitate technology validation and attract private investment.

7.4 China: Massive Infrastructure Deployment & Technology Leadership[5]

China leads globally in 5G base station deployments, supported by aggressive state policies, integrated telecom giants (China Mobile, China Telecom), and huge investments in fiber and 5G R&D. Focus areas include smart cities, IoT, and AI integration. Spectrum management is flexible, with rapid refarming to optimize network capacity.

Key Lessons:

- Coordinated government policy and industry collaboration can accelerate nationwide coverage.
- Investment in fiber backbone and dense small cells supports high-capacity and low-latency services.
- Flexible spectrum management allows operators to adapt quickly to evolving demand.

[3] https://www.lifewire.com/5g-south-korea-4583813
[4] https://documents1.worldbank.org/curated/en/852791623927787358/pdf/Entering-the-5G-Era-Lessons-from-Korea.pdf
[5] https://www.mobileworldlive.com/china-mobile/analysis-how-long-can-china-5g-footprint-continue-to-rise/