Business Case Analysis and Plan for 5G

Ncell
हामी तपाईंकै लागि

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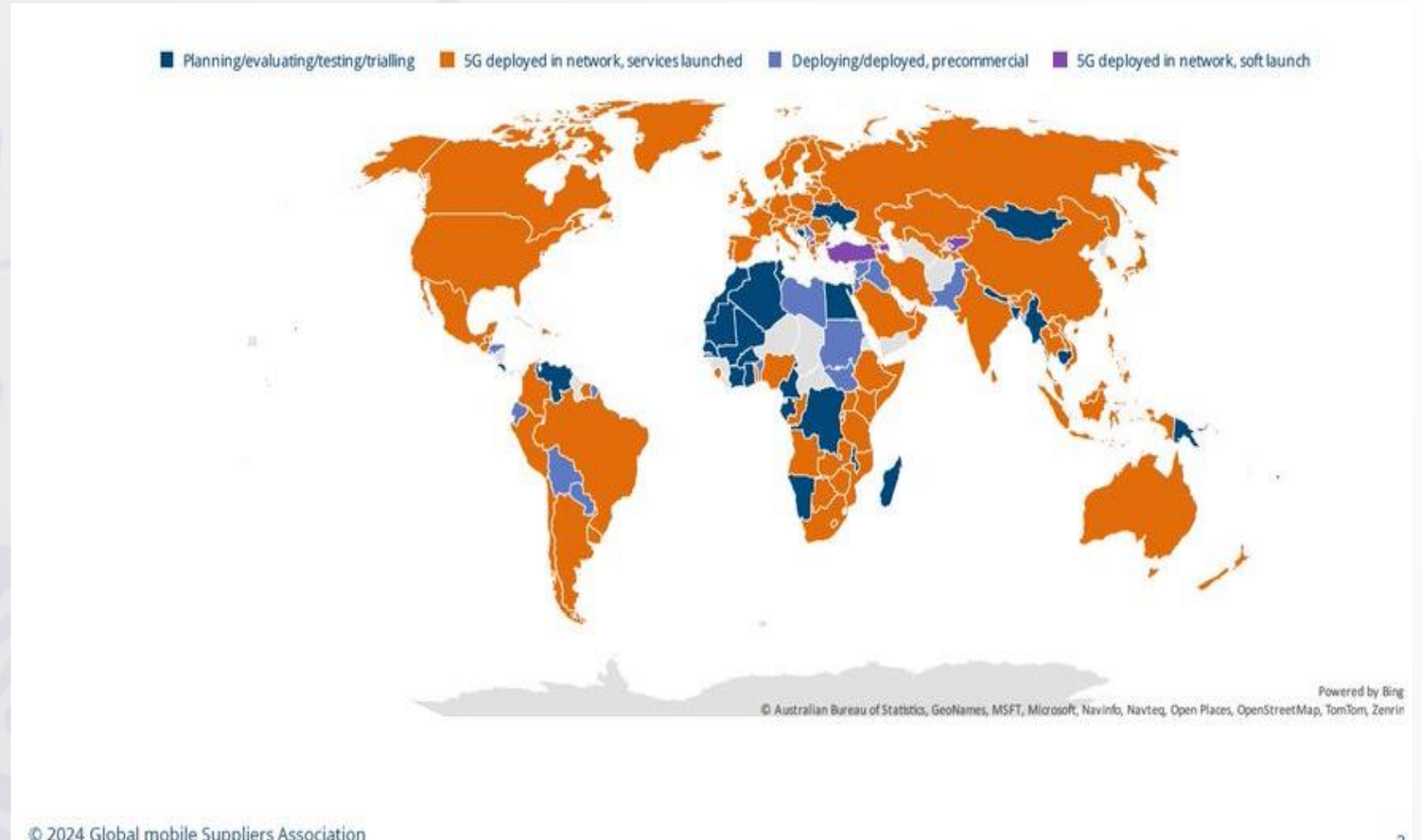|	Agenda
1	**Global 5G Scenario**
2	Global 5G Spectrum Utilization Scenario and Use Cases
3	Nepal 5G Readiness Scenario
4	5G Business Case for Nepal Operators

Global 5G Scenario
5G technology has been deployed or adoption is planned across countries and operators worldwide.

Over 600 operators in **183 countries** have been investing in 5G Networks in the form of tests, pilots, license acquisitions as well as planned and actual deployments.

Out of these, **343 operators** in **126 countries** and territories have launched commercial public 5G services
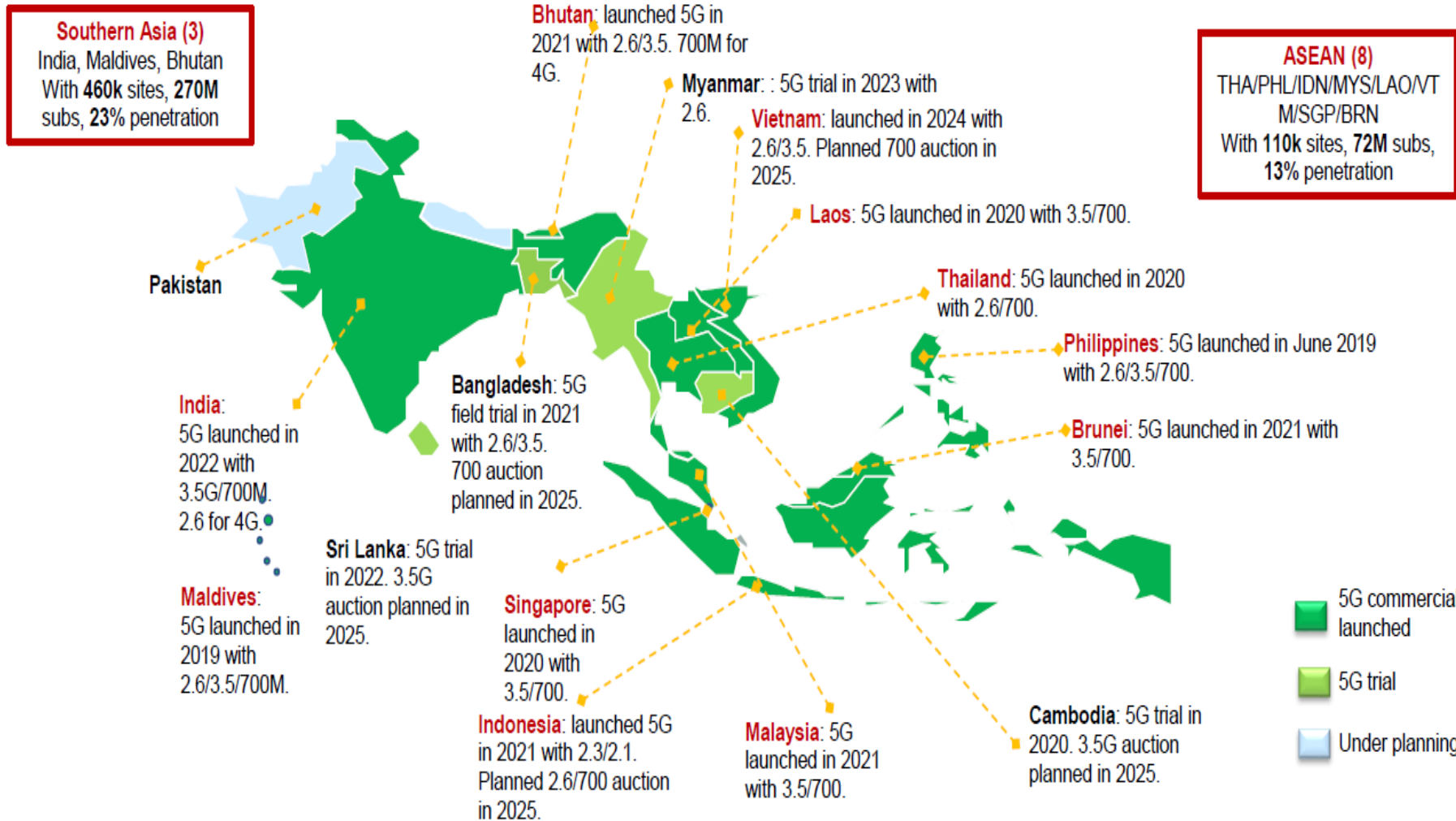
These investments underscore the critical role of 5G in shaping the future of connectivity, enabling advancements in various sectors.

Legend: ■ Planning/evaluating/testing/trialling ■ 5G deployed in network, services launched ■ Deploying/deployed, precommercial ■ 5G deployed in network, soft launch

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South and Southeast Asia Scenario

The 5G deployment landscape in South Asia and Southeast Asia is evolving rapidly, with countries at varying stages of rollout and adoption. **Only Nepal and Pakistan are behind.**

Source: GSMA and Huawei MI

Southern Asia (3)
India, Maldives, Bhutan
With **460k sites, 270M** subs, **23% penetration**

ASEAN (8)
THA/PHL/IDN/MYS/LAO/VTM/SGP/BRN
With **110k sites, 72M subs, 13% penetration**

Bhutan: launched 5G in 2021 with 2.6/3.5. 700M for 4G.

Myanmar: : 5G trial in 2023 with 2.6.

Vietnam: launched in 2024 with 2.6/3.5. Planned 700 auction in 2025.

Laos: 5G launched in 2020 with 3.5/700.

Thailand: 5G launched in 2020 with 2.6/700.

Philippines: 5G launched in June 2019 with 2.6/3.5/700.

Brunei: 5G launched in 2021 with 3.5/700.

Pakistan

India:
5G launched in 2022 with 3.5G/700M. 2.6 for 4G.

Bangladesh: 5G field trial in 2021 with 2.6/3.5. 700 auction planned in 2025.

Maldives:
5G launched in 2019 with 2.6/3.5/700M.

Sri Lanka: 5G trial in 2022. 3.5G auction planned in 2025.

Singapore: 5G launched in 2020 with 3.5/700.

Indonesia: launched 5G in 2021 with 2.3/2.1. Planned 2.6/700 auction in 2025.

Malaysia: 5G launched in 2021 with 3.5/700.

Cambodia: 5G trial in 2020. 3.5G auction planned in 2025.

- 5G commercial launched
- 5G trial
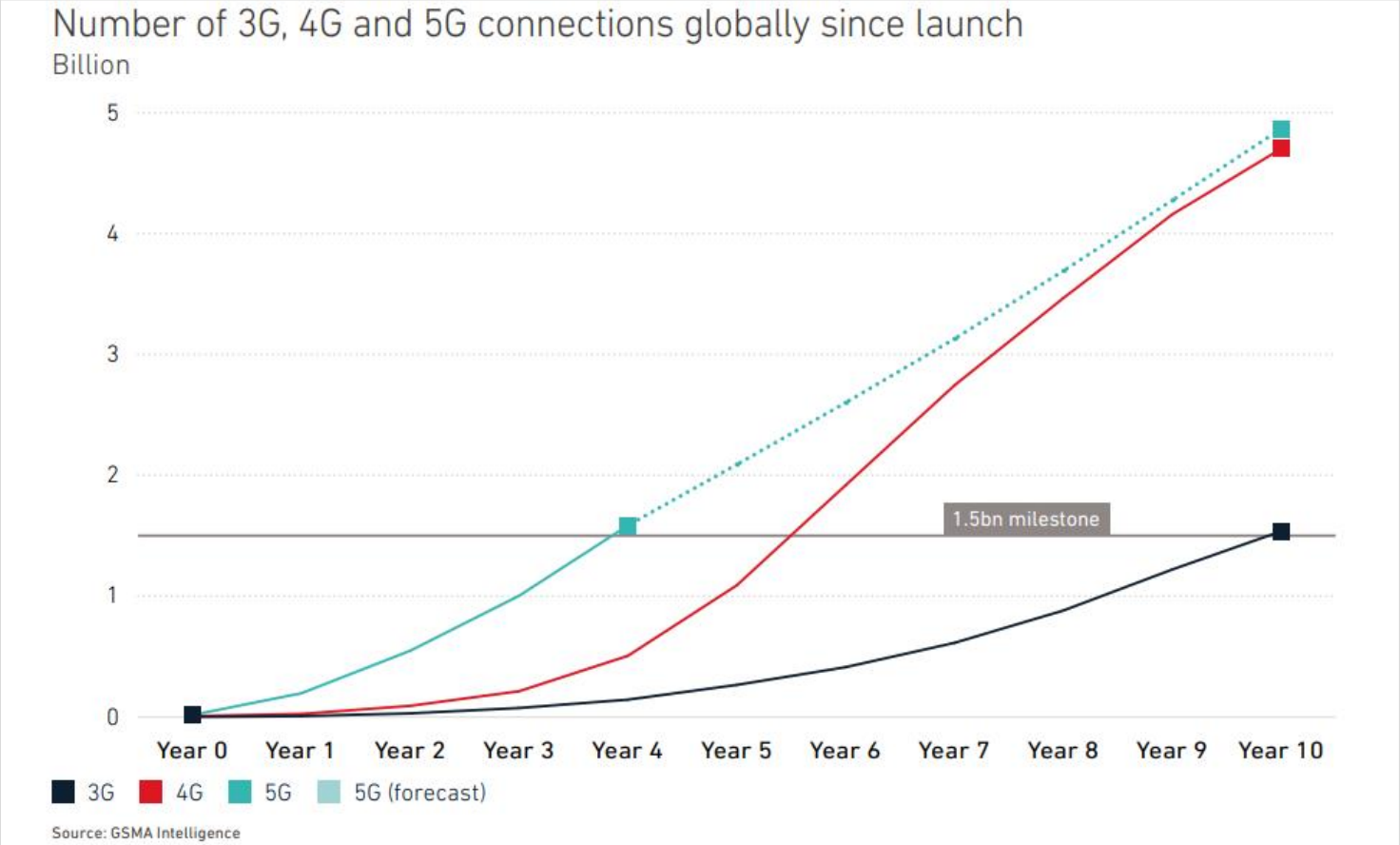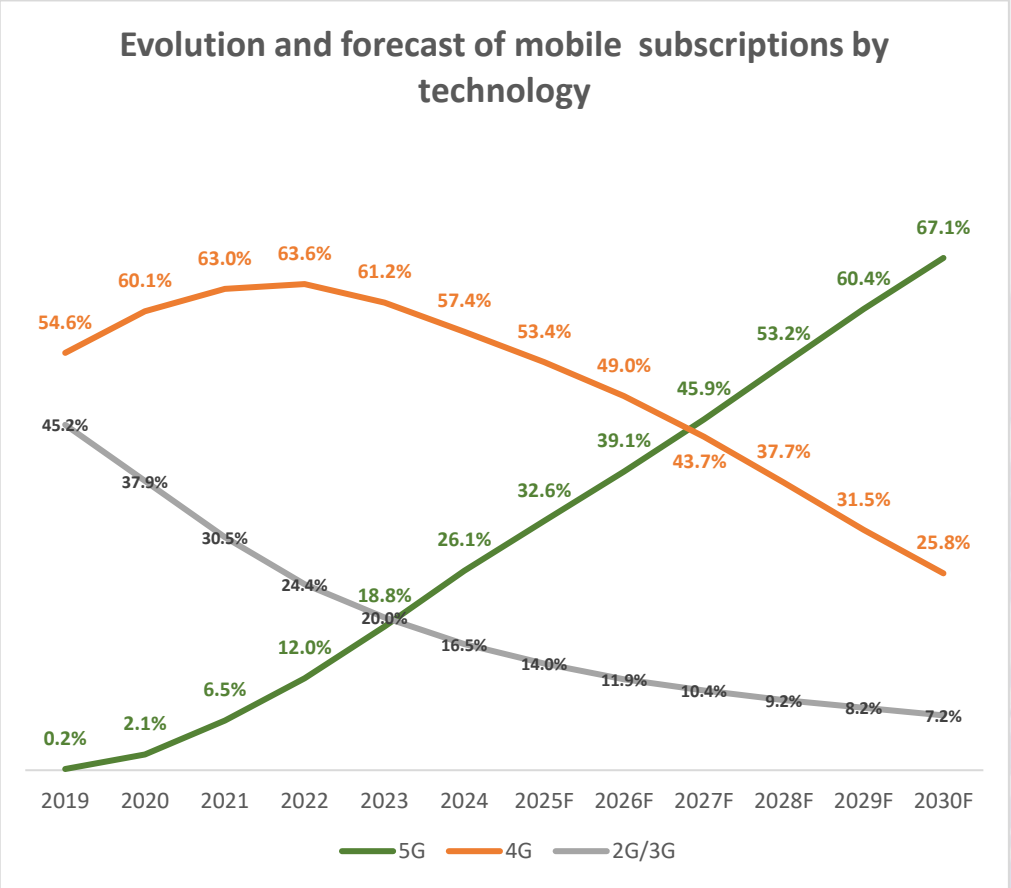- Under planning

Source: Huawei Intelligence

Global 5G Evolution and Forecast

5G is the fastest growing mobile technology, set to surpass 4G by 2028 and reach 67% of global mobile connections by 2030.
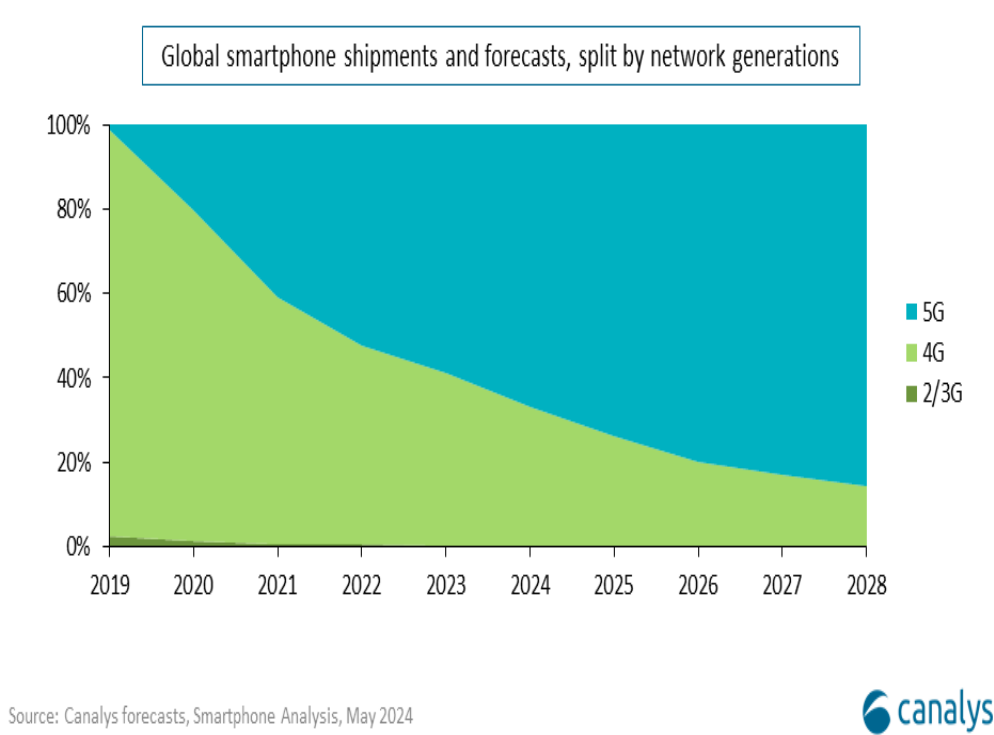
- By 2028, 5G adoption will surpass 4G adoption;
- Global 5G subscriptions are forecast to reach 6.3 billion and make up **67% of all mobile subscriptions in 2030.**

- Following launch of 5G in 2019, number of 5G connections worldwide surpassed 1.5 billion at the end of 2023 (4 years), making it the **fastest growing mobile technology to date.**
- It took 10 years for 3G to reach the same milestone and more than five years for 4G.

Evolution and forecast of mobile subscriptions by technology

5G — 4G — 2G/3G

Number of 3G, 4G and 5G connections globally since launch
Billion

3G   4G   5G   5G (forecast)

Source: GSMA Intelligence

Global 5G Handset Landscape: Penetration and ASP

By 2028, 85% of every smartphones shipped worldwide will be 5G ENABLED; With the significant increase in the penetration rate of 5G smartphones and steady growth in low end shipments, the overall ASP of 5G smartphones is expected to fall noticeably.

Global smartphone shipments and forecasts, split by network generations

Legend: 5G, 4G, 2/3G

Source: Canalys forecasts, Smartphone Analysis, May 2024

2021	2022	2023	2024	2025F	2026F	2027F	2028F
39%	54%	59%	68%	74%	80%	83%	85%

4G and 5G smartphone ASP forecasts, excluding Apple

ASP (excluding VAT)

5G: 471, 432, 433, 431, 403, 379, 369, 361
4G: 173, 175, 170, 146, 136, 129, 124, 121

Source: Canalys forecasts, Smartphone Analysis, May 2024

Global smartphone shipments and forecasts, by network generations and price bands

Price bands: Below US$100, US$100 to US$199, US$200 to US$299, US$300 to US$399

Legend: 5G, 2/3/4G
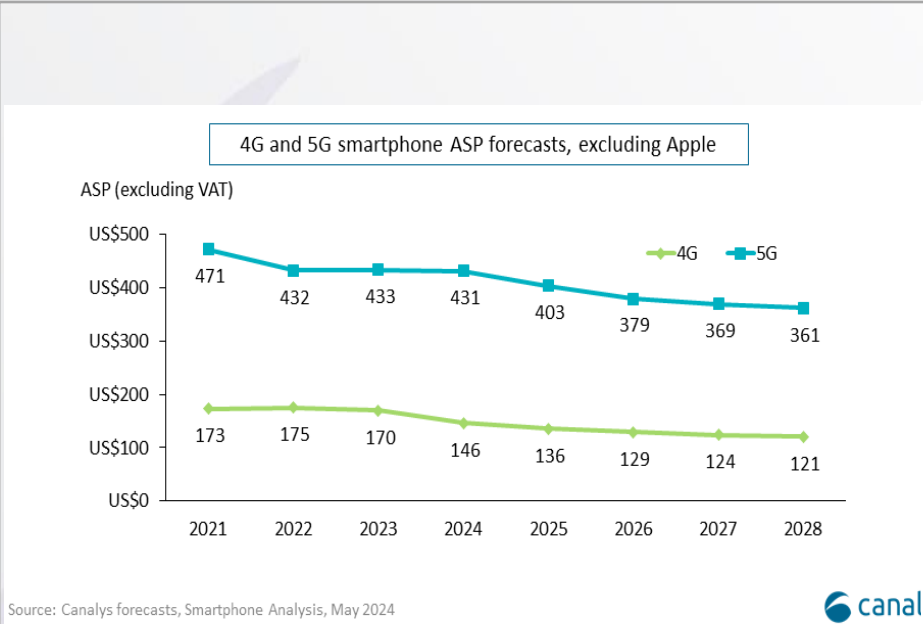
- **The ASP (Average Selling Price) of 5G handset expected to further go down.**

- Although the ASP for 5G handsets stand at $403, **entry level models start from as low as $100**.
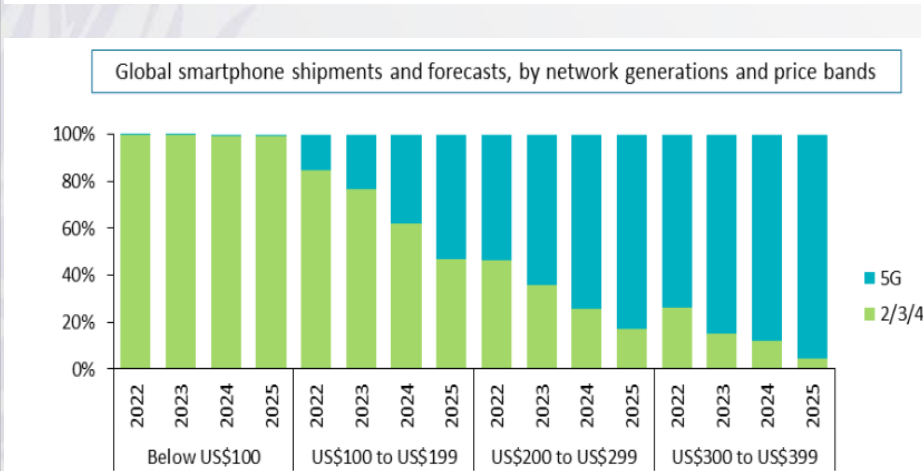
- 5G is now standard in mid- and high-end smartphones as **chipset makers gradually phase out 4G support.**

Service Grades Basis 5G Use Cases

5G service grades—eMBB, URLLC, and mMTC—align with distinct use cases, enabling everything from high- speed streaming to real-time automation and massive IoT connectivity.

eMMB
10 GBPS

5G
Use cases

mMTC
1 mn connections/km2

URLLC
1 ms

Use Case	Popular Spectrum Band
eMMB	n78 (3.3-3.8GHz); n41(2.5-2.7GHz)
mMTC	n28 (700 MHz)
URLLC	N258 (26GHz)

Summary of 5G Use Cases

Human to Human   Human to Machine   Machine to Machine

Extreme Mobile Broadband (eMMB)
- Virtual reality / Augmented reality
- Video calling Virtual meetings
- Fixed Wireless
- UHO Video
- Video Monitoring
- Mobile Cloud Computing

Massive Scale Communication (mMTC)
- Wearable
- Social Networking
- Smart Home / Smart Cities
- Health care Monitoring
- Vehicle to infrastructure
- Industrial Automation

Ultra-Reliable Low Latency Service (URLLC)
- Public Safety
- Remote Surgery
- Vehicle to pedestrian (V2P)
- Vehicle to Vehicle (V2V)

5G FWA Momentum

5G FWA commercialization shows good momentum and has the potential to be a bigger success story

5G fixed wireless access (FWA) has emerged as an important use case in the consumer and enterprise segments, complementing operators' enhanced mobile broadband (eMBB) offerings.

As of December 2024, 146 operators in 72 markets had launched 5G FWA services, while a further 21 operators in 16 markets have announced plans to launch 5G FWA services in the coming years.

With 11.6 million 5G FWA connections at the end of 2024, the US is the world's largest 5G FWA market, followed by India.

5G FWA penetration in select markets

Percentage of fixed broadband connections

2030 ▬ (red)
2024 ▬ (black)

Market	2024	2030
Austria	18%	33%
Australia	9%	21%
India	4%	20%
US	9%	16%
UK	7%	16%
Bulgaria	5%	15%
Germany	8%	15%
Italy	7%	14%
Switzerland	5%	13%
Poland	6%	13%
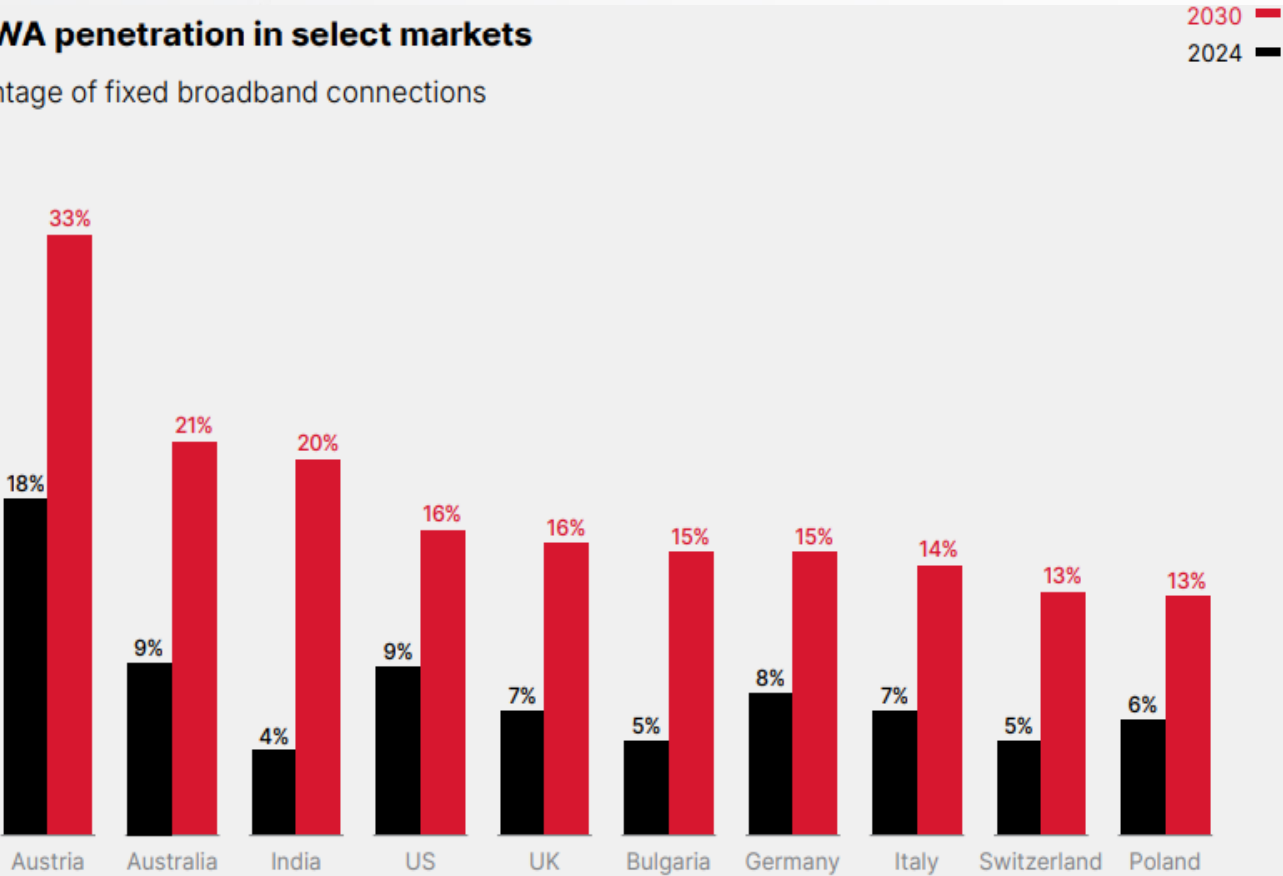
Source: GSMA Intelligence

Adopting 5G is not just an upgrade—it's essential to stay relevant, connected, and future-ready.

1

The world is rapidly moving to 5G

Delaying adoption risks being digitally cut off from global networks and innovation.

2

Legacy technologies are fading

Devices for 2G/3G/4G will become increasingly irrelevant and unsupported; equipment will be harder to source and maintain in the future.

3

Operational challenges will grow

Issues with roaming, handset compatibility, & network lifecycle will intensify for non-5G networks as manufacturers shift production towards 5G & Beyond solution
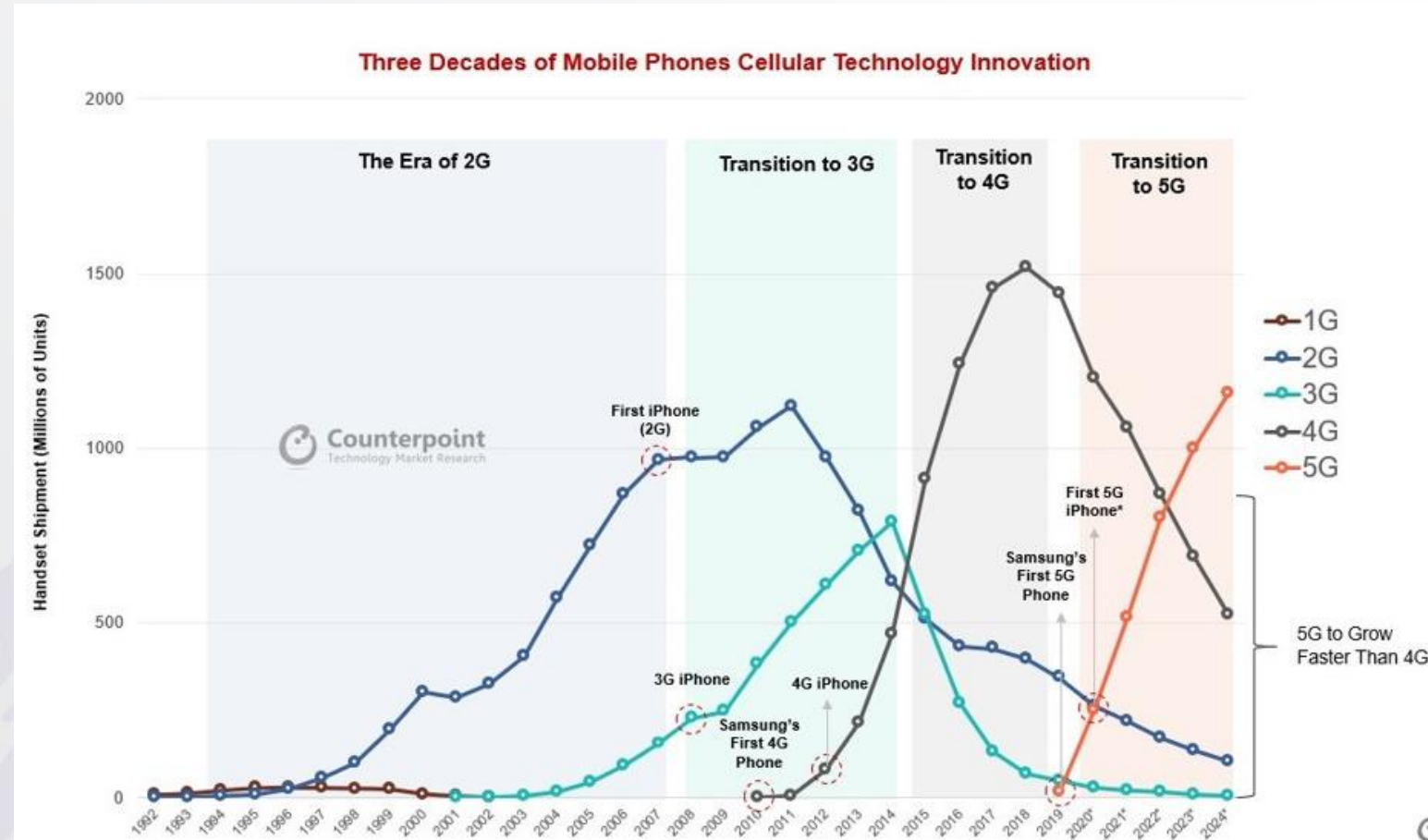
Three Decades of Mobile Phones Cellular Technology Innovation

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5G Evolution Path | Global leading Operator evolution NSA -> NSA/SA on demand

	Phase1	Phase2	Phase3
China Mobile, China unicom中国联通, 中国电信 CHINA TELECOM, LG, SoftBank	NSA ⟹ NSA/SA	⟹ SA	
U+, AIS, true, SFR, T··, orange, Telefónica, vodafone	NSA ⟹	NSA/SA on demand	⟹ SA
STC, etisalat, ooredoo, zain	NSA ⟹	NSA/SA on demand	⟹ SA
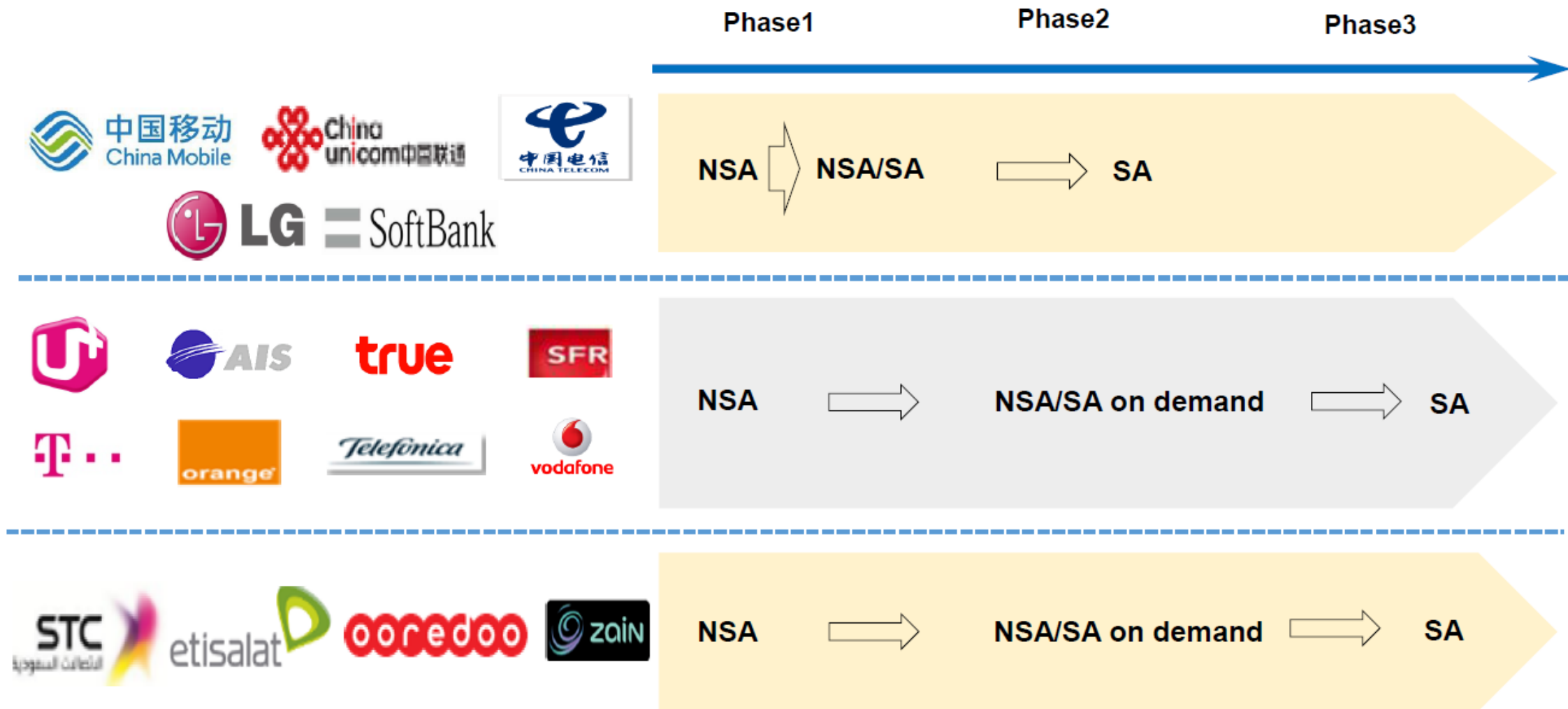
NSA -> NSA/SA on demand (toB) ->SA is mainstream 5G evolution path chosen by global leading Operators

5G NSA vs SA on Demand vs SA Deployment Models

Aspect	NSA (Non-Standalone)	SA On-Demand	SA (Standalone)
Core Network	Uses 4G LTE core (EPC); 5G is added on top for data.	Uses 4G core but activates 5G NR dynamically when needed.	Uses a full 5G core (5GC) for both control and data.
Radio Access	5G New Radio (NR) for data; 4G for signaling.	5G NR activated on-demand; otherwise uses 4G.	5G NR used for both data and control.
Latency	Medium latency, limited by 4G core.	Similar to NSA; slightly improved under 5G activation.	Very low latency, ideal for real-time use cases.
Speed & Capacity	Better than 4G but limited by 4G backbone.	Higher than NSA during active 5G sessions.	Highest speed and network capacity.
Deployment Cost	Low, reuses existing 4G infrastructure.	Moderate; requires upgrades but less than SA.	High, needs complete 5G core and infrastructure.
Coverage	Broad, leverages 4G network for coverage.	Broad, uses dynamic spectrum sharing.	Initially limited, expands as network grows.
Use Cases	Enhanced Mobile Broadband (eMBB).	eMBB and selective IoT/data-heavy cases.	Full 5G potential: eMBB, URLLC, and massive IoT.
Pros	Fast and low-cost rollout; smooth transition from 4G.	Flexible use of existing resources; efficient spectrum use.	Full-featured 5G: slicing, low latency, advanced IoT support.
Cons	Not full 5G; limited by LTE core capabilities.	Transitional; performance varies with demand.	Expensive short term; complex to deploy and manage initially.

Global 5G Frequency Bands Deployment

While 3.5 GHz is the most widely adopted mid-band and 700 MHz leads in low-band usage, only a few countries have commercially deployed high-band (mmWave) 5G, with most still in testing or early deployment stages.

Country	Low (<1Ghz)	Mid (2.5-2.7GHz)	Mid (3.3-3.8GHz)	High (mmWave)
USA	■	■	■	■
Canada	■	■	■	Trials/tests for future deployment
United Kingdom	■	■	■	Trials/tests for future deployment
New Zealand			■	Trials/tests for future deployment
Japan	■		■	■
South Korea			■	■
Singapore	■		■	■
Malaysia	■		■	Trials/tests for future deployment
Philippines	■		■	Early stages of deployment
Indonesia		■		
Bhutan			■	
Thailand	■	■		Limited deployment
India	■		■	■

Thailand AIS 5G Network Deployment Strategy

5G Coverage Strategy

- NR2600 coverage is designed for key cities and dense areas. To provide 5G **continuous coverage** and **improve** overall 5G user experience, anchoring with L1800/L2100 for initial stage

- NR2600+NR700 to realize **T+F coordination** to extend 5G coverage and to fulfill nationwide **5G population coverage**

Frequency Band

Anchoring Layer for NSA

LTE Coverage — L1800/L2100 ⟵

5G 2600MHz SA/NSA

NR Coverage — NR2600 ⟵

LTE/NR Extra Coverage — LNR700

Distance
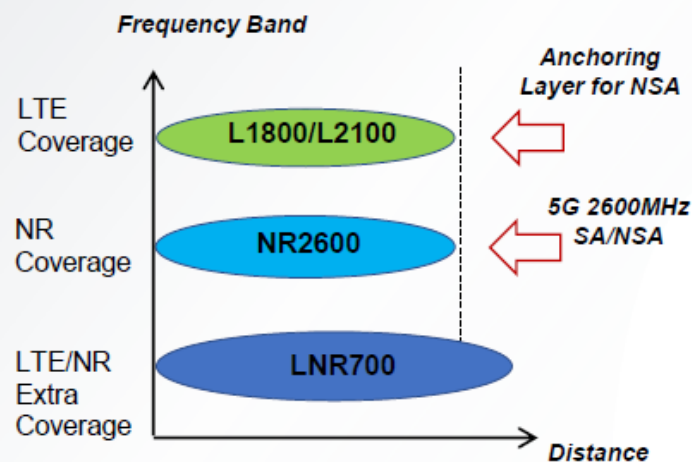
Capture 4G Traffic

- 2600 4G handset penetration = 60%

- The number of high-load (congested) 4G cells continues to rise with increasing data traffic trends. Use 4G Capex to invest in 5G ready Massive MIMO equipment for 2600M able to realize LNR dual-usage (1) to **increase 4G capacity** (2) deploy NR2600 to **offload 4G traffic** (3) Deploy **DSS**

Value 1: 4G Traffic Relief

4G 1.8GHz → 5G 2.6GHz

Value 2: 5G Increase DOU

24 — 4G DOU   35 — 5G DOU

Source: AIS Live NW data, Aug, 2022

3-sector vs 2-sector cost analysis 5G

	RRU 2600 4T8R	AAU 2600 64T64R	
	3-sector with 65° beam	2-sector with 110° beam	
Capacity	X	2.67 X	⬆
Cost	Y	0.92 Y	⬇

AAU 2-sector has more capacity with lower cost
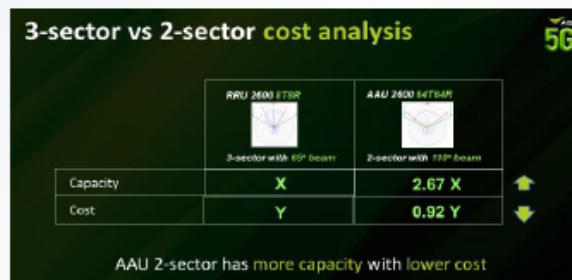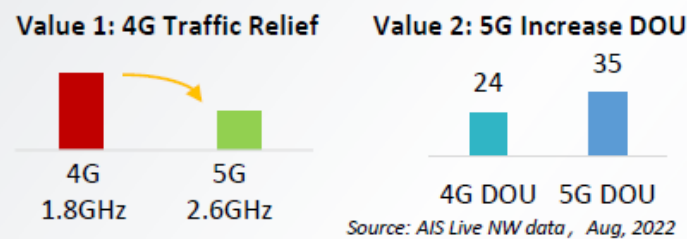
Leadership in 5G

- Utilizing on 3rd Party crowdsourcing data - Ookla to perform competition analysis based on signal strength and signal quality: (1) able to identify areas that are poorly perform as compared to competitor and do upgrade/enhancement accordingly (2) continue to lead in 5G user experience for solid 5G branding

- Promote 5G use cases:
- (1) Work with Government to promote 5G for smart city, health care ,smart agriculture, etc.
- (2) 5G trial project with Hospital, factories, etc

Thailand chose the 2600 MHz band for 5G because **the 3500 MHz band was occupied by satellites, early 5G device use was very low** with <1% 5G handset penetration on AIS, and **2600 MHz offered better device support and more cost-effective rollout** amid economic and investment uncertainties.

Operator Wise Bands in India

In India, Jio uses 700 MHz, 3300 MHz, and 26 GHz bands for 5G, while Airtel and Vodafone Idea use only 3300 MHz and 26 GHz.

Technology	Frequency Band	Reliance Jio	Bharti Airtel	Vodafone Idea (Vi)	BSNL
2G (GSM)	900 MHz		6 MHz	10 MHz	6.2 MHz
	1800 MHz		7 MHz	10 MHz	
3G (UMTS)	2100 MHz			5 MHz	5 MHz
4G (LTE)	850 MHz (Band 5)	5–10 MHz			
	1800 MHz (Band 3)	5–10 MHz	5–10 MHz	5–10 MHz	
	2300 MHz (Band 40)	20 MHz	20 MHz	10 MHz	
	2500 MHz (Band 7)			10 MHz	20 MHz
5G	700 MHz (n28)	10 MHz			
	3300 MHz (n78)	100 MHz	100 MHz	50 MHz	
	26 GHz (n258)	1000 MHz	800 MHz	250 MHz	

5G Applications in India

From smart cities to healthcare, agriculture, education, and entertainment, 5G has transformed various sectors in India. Most of these cases are driven by subsidiaries of telecom operators themselves.

Sector	Use Cases	Applications	Spectrum Band Used
Manufacturing	Industrial automation, predictive maintenance, Automated Guided Vehicles(AGVs)	Bosch Smart Factory (Jio), Aditya Birla (Airtel), Jio Managed Warehouse, Jio Digital Twin	3.5 GHz (C-band), mmWave (26 GHz)
Healthcare	Remote surgery, telemedicine, connected ambulances during transit	Airtel 5G Ambulance, Jio Remote Healthcare	3.5 GHz, mmWave
Agriculture	Smart irrigation, real-time monitoring, precision farming	JiioKrishi	700 MHz, 3.5 GHz
Education	AR/VR classrooms, virtual labs, remote learning	Jio Glass, Airtel XR Labs	3.5 GHz, mmWave
Transport & Logistics	Fleet management, smart ports, traffic monitoring	Airtel Smart Port, Jio Logistics Suite	3.5 GHz, mmWave
Energy & Utilities	Smart grid, asset monitoring, fault detection	Jio Smart Utility Platform, BSNL + PowerGrid	700 MHz, 3.5 GHz
Retail	Smart shelves, AR shopping, inventory tracking	JioMart AR trials, Airtel Smart Retail	3.5 GHz, mmWave
Smart Cities	Surveillance, traffic control, pollution monitoring	Airtel Smart City (Bhubaneswar), Jio Smart Surveillance	700 MHz, 3.5 GHz
Media & Entertainment	4K/8K streaming, AR/VR concerts, cloud gaming	JioCinema 5G, Airtel Xstream	3.5 GHz, mmWave
Financial Services	Secure banking, ATM video monitoring, fraud detection	Jio & Airtel (HDFC, SBI trials)	3.5 GHz

5G in Agriculture

Jio Business — Jio TRUE 5G

India is an agriculture-dominated country. When technology is used for the upliftment and benefit of our farmers we see true growth.

Here's what we can do with 5G-enabled IoT and smart sensors

- Monitor soil quality to optimize crop yield
- Ensure adequate water supply through smart irrigation
- Monitor crop produce and crop health
- Observe living conditions behavior of livestock
- Recognize behavioral changes in sick animals
- Accurately predict weather conditions
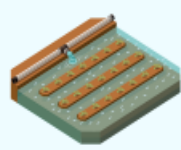
With 5G-enabled AI and AI-powered drones we can

- Track grazing flocks over long distances
- Identify areas of weed/pest infestation
- Spray large areas of crops with weedicide /pesticide
- Survey large areas of farmlands for security threats
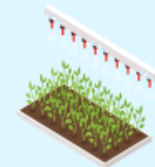
5G-enabled autonomous farming can help to

- Remotely operate tractors with minimal human intervention
- Install AI-enabled smart irrigation systems
- Use autonomous weeding systems with lower error rate
- Optimize value chain communication

5G-enabled software makes precision farming a reality

- Select best combination of crops based on soil condition
- Regulate water amounts depending on type of crop using AI
- Receive drone alerts when certain crops are ready for harvesting
- Detect and get alerted to soil and crop health, contamination and more with smart sensors
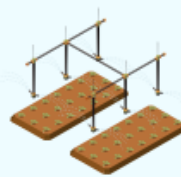
Jio True 5G makes this possible because of

- Ultra-reliable low latency communication (URLLC) of less than 10 milliseconds
- Capacity of up to 1 million devices per square kilometer
- Symmetrical bandwidth of up to 20Gbps

Jio True 5G is poised to improve agriculture by increasing yields and preventing the spread of diseases

5G Spectrum Bands: L2600 Vs 3500

L2600 for better coverage and LTE-to-5G transition, and L3500 for high-speed, high-capacity pure 5G deployments. Long term, L3500 will give competitive advantage in terms of network experience.

	L2600 (2600 Mhz)-LTE Band 7	L3500 (3500 Mhz)-C Band
Technology Support	☑ Supports both 4G LTE and 5G NR	☑ Purely used for 5G in many deployments
Coverage	☑ Better coverage and indoor penetration	✗ Shorter range, weaker indoor coverage
Speed	✗ Good but not as fast as L3500	☑ Very fast (ideal for 5G speeds)
Deployment Maturity	☑ Well-established LTE ecosystem	✗ Newer, evolving ecosystem
5G Device Support	☑ n41 band has significant 5G devices support	☑ Broader 5G device support
Network Capacity	✗ Moderate	☑ **High** (handles more users/data)
Network Use Case	☑ Good for LTE coverage and transitional 5G deployments	☑ Ideal for high-speed 5G applications
Refarming Flexibility	☑ Can be refarmed from LTE to 5G	✗ No legacy use; dedicated for 5G
Infrastructure Needs	☑ Can be transitioned to NR from LTE	✗ Needs **new 5G NR radios** designed for 3500 MH
Cost to deploy	✗ Less expensive compared to L3500	✗ More expensive than L2600 (need more tower+ equipment)

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Nepal Spectrum Policy 2080

As per the Radio Frequency Policy 2080 BS (2023 AD), following spectrum has been identified to be used for mobile services. A policy of technology neutrality will be adopted. Bundled 700 and 2600 is offered.

S. N.	Frequency Band	Duplexing		Frequency Range	Available Bandwidth	Minimum Bandwidth	Maximum Bandwidth
1	700 MHz		UL	703 - 748 MHz	2x45 MHz	2x5 MHz	2x15 MHz
			DL	758 - 803 MHz			
2	800 MHz		UL	847 - 862 MHz	2x15 MHz	2x5 MHz	2x15 MHz
			DL	806 - 821 MHz			
3	850 MHz	F D D	UL	824 - 834 MHz	2x10 MHz	2x5 MHz	2x10 MHz
			DL	869 - 879 MHz			
4	900 MHz		UL	880 - 915 MHz	2x35 MHz	2x5 MHz	2x10 MHz
			DL	925 - 960 MHz			
5	1800 MHz		UL	1710 - 1785MHz	2x75 MHz	2x10 MHz	2x20 MHz
			DL	1805 - 1880MHz			
6	2100 MHz		UL	1920-1980 MHz	2x60 MHz	2x10 MHz	2x20 MHz
			DL	2110-2170 MHz			
7	2300 MHz			2300-2400 MHz	100 MHz	20 MHz	100 MHz
8	2600 MHz	TDD		2500-2690 MHz	190 MHz	20 MHz	100 MHz,
9	3700 MHz*			3300-4200 MHz	900 MHz	100 MHz	200 MHz
10	26 GHz			24.25-27.50 GHz	3.25 GHz	400 MHz	1000 MHz

*Satellite Frequency Band (Fixed Satellite Service) को प्रयोगलाई समेत ध्यानमा राखी प्रयोग गर्नुपर्नें ।

- ➢ For rural & deep coverage
- ➢ 800 already allocated to NT
- ➢ Handset penetration **n28 (4.86%) > n20(800)(3.59%)**

- ➢ Can run both 4G/5G in initial stage
- ➢ Good device penetration after C-band
- ➢ No any FSS (fixed satellite service) hassles

Base Price (MN NPR)	Per MHz	Annual Cost
700	13.5Mn	405Mn
2600	5.5Mn	550Mn

Data Demand in Nepal

Data demand is growing exponentially across the world and is expected to grow by more than 2X in next 5 years. Demand for data will also rise progressively in Nepal for which 5G will be a must to efficiently meet this future demand.

GB/Data subs per month

Mobile data consumption per smartphone worldwide is set to **Double** by 2030.

While the current global average stands at approximately 20 GB, Nepal is projected to reach this level within the next five years fueled by increasing digital adoption, growing use of streaming and gaming apps and increased smartphone penetration.

Current 4G network capacity

Global values: 20 (2024), 24 (2025F), 28 (2026F), 32 (2027F), 37 (2028F), 42 (2029F), 45 (2030F)

Nepal values: 6 (2024), 8 (2025F), 10 (2026F), 12 (2027F), 15 (2028F), 18 (2029F), 21 (2030F)

Years: 2024, 2025F, 2026F, 2027F, 2028F, 2029F, 2030F

Legend: ■ Global ■ Nepal

5G Handset Readiness in Nepal

Nepal's demand side is ready for 5G, driven by rising smartphone imports, growing 5G handset adoption, and affordable mid-range devices.

5G Smartphone Import Trend in Nepal, Mn

Year	Smartphone Import	5G Smartphone Import	5G Smartphone Import Share
2024	1.84	0.63	34%
2025F	2.02	0.81	40%
2026F	2.23	1.00	45%
2027F	2.45	1.22	50%
2028F	2.69	1.56	58%
2029F	2.96	1.90	64%
2030F	3.26	2.22	68%

Legend:
- Smartphone Import
- 5G Smartphone Import
- 5G Smartphone Import Share in Nepal [% of smartphone imports]

5G Handset Base, Mn [Market]

Year	5G Handset Base	% of addressable population
2024	3.2	16%
2025F	4.0	20%
2026F	5.0	26%
2027F	6.2	32%
2028F	7.8	39%
2029F	9.7	49%
2030F	11.9	59%

Legend:
- 5G Handset Base
- % of addressable population

Key Assumptions

- Assuming 10% increase in smartphone import in Nepal annually, taking into consideration smartphone import trends (9.2% increase in first 8 months of 2025)
- 5G Smartphone imports forecasted to reach 68% of all smartphone imports by 2030, taking into consideration:
  - global 5G smartphone penetration
  - 2G and 3G shutdown
  - Gradual handset replacement and network expansion

Along with the consumer side readiness, consumer use cases are also relatively mature for Nepal.

Enterprise and IoT driven use cases are still in early stages of ecosystem development and not commercially viable yet with undeveloped business models.

	Spectrum considered	Readiness
Extreme Mobile Broadband (eMMB)	n78 (3.3 – 3.8 GHz) n41 (2.5 – 2.7 GHz)	🟢 High
Massive Scale Communication (mMTC)	n28 (703-8-3MHz)	🔴 Low
Ultra-Reliable Low Latency Service (URLLC)	n258 (24.25-27.5GHz)	🔴 Low

Summary of 5G Use Cases

Nepal is ready for 5G and delay in 5G rollout will result in Nepal being left behind in terms of overall development

1

Nepal is demand-ready for 5G, with rising smartphone imports, growing adoption of 5G-capable devices, and increasing data usage which is expected to increase further in the years to come.

2

Affordable 5G smartphones are widely available, making next-gen connectivity accessible to a broad segment of users

3

5G is essential to support Nepal's digital growth in areas like education, healthcare, innovation, and public services.
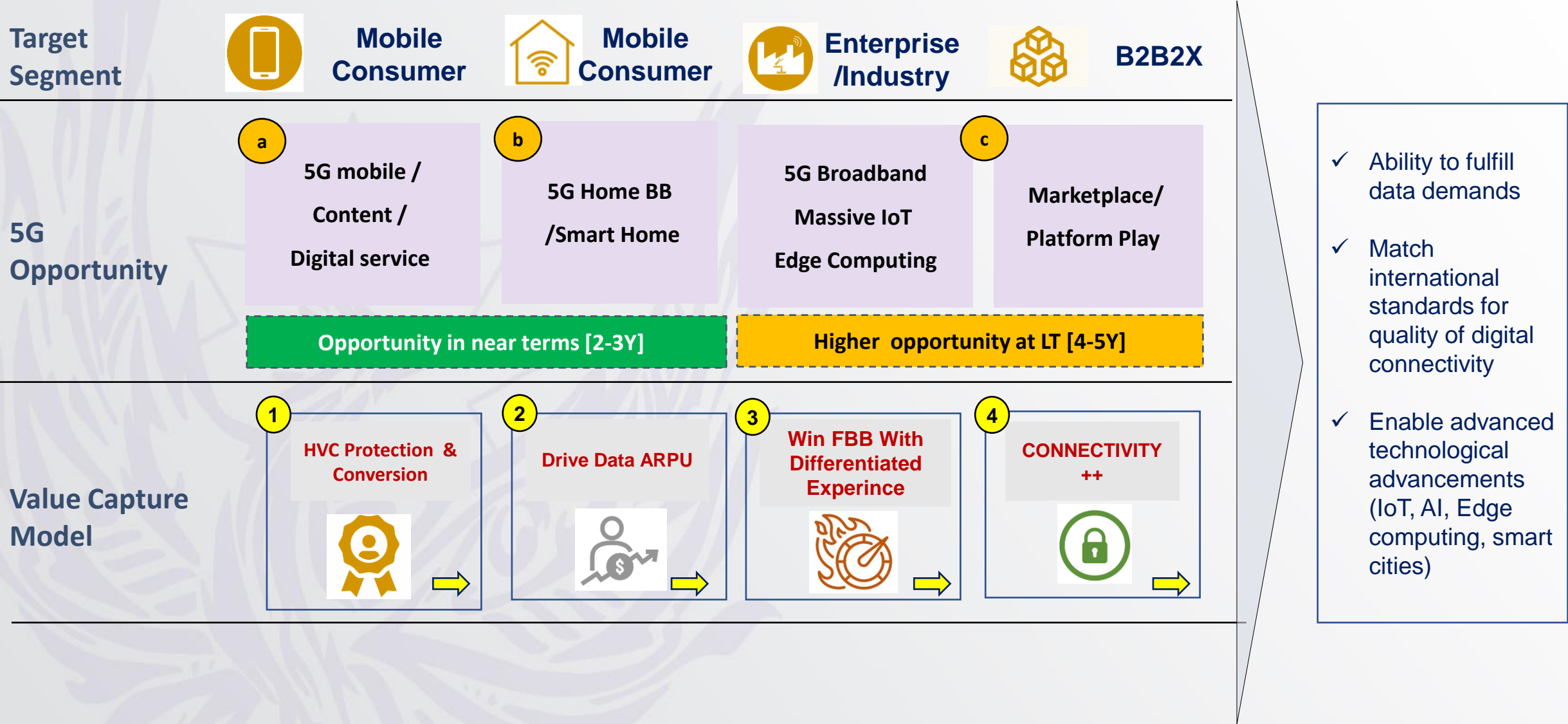
4

Further **delays in 5G rollout risk leaving Nepal behind regional peers** in terms of technological advancement and overall socio-economic development.

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2	Global 5G Spectrum Utilization Scenario and Use Cases
3	Nepal 5G Readiness Scenaro
4	5G Business Case for Nepal Operators

Nepal: 5G STRATEGY FRAMEWORK
Capture value via segmented approach can be the right focus for Nepal

Target Segment

📱 **Mobile Consumer** 🏠 **Mobile Consumer** 🏭 **Enterprise /Industry** 📦 **B2B2X**

5G Opportunity

a	b	c	
5G mobile / Content / Digital service	5G Home BB /Smart Home	5G Broadband Massive IoT Edge Computing	Marketplace/ Platform Play

Opportunity in near terms [2-3Y] | **Higher opportunity at LT [4-5Y]**

Value Capture Model

1 HVC Protection & Conversion →

2 Drive Data ARPU →

3 Win FBB With Differentiated Experince →

4 CONNECTIVITY ++ →

- ✓ Ability to fulfill data demands
- ✓ Match international standards for quality of digital connectivity
- ✓ Enable advanced technological advancements (IoT, AI, Edge computing, smart cities)

Revenue Opportunity Estimation

Monetization opportunity for 5G are limited with hardly any increment for mobile use case, low feasibility and readiness for enterprise leaving mainly FWA as the driver.

	Mobile (As in Business Model)	**Home**	**Enterprise**
Target Segment	Existing User Base	Existing mobile base + FBB users	Airport, factories, healthcare etc [URLLC]
Readiness			
Methodology for monetization	• Speed Tiered plans • Bundled content (HD/4K, gaming, VR)	• Alternative to fiber • Ability to quickly expand in underserved areas	• Private network • Network slicing • IoT & Edge
Consideration for Success	• 5G Handset Penetration (Currently 13%) • Users willing to pay for higher speed tiers (Currently >20GB users are <5%) • Incremental price possible • Countries have rarely been able to monetize in this approach	• High speed FWA Connections • FWA connection capacity per site: 220 • Monthly price has to be competitive compared to other ISPs • Content/IPTV bundling • Ability to capture market share from fiber	• Sectors with scope mature to automation stage • Companies are willing to increase spend on ICT & train staff • Policies and ecosystem for IoT & smart infrastructure in place
Per site inc. Revenue estimation	Minimal	2.1Mn	On Demand (unlikely in immediate future)

Deployed only per demand, additional mmWave spectrum may be required

* All estimations per operator per site

Tier Prioritization

Tiers of micro markets were created based on highest feasibility and impact of 5G deployment.

Parameters Considered for Tier Scoring

Micromarket type	**Site density**	**5G handset penetration**	**RGB per site**	**Data usage per sub**	**4G utilization**
Metropolitan > Sub-metropolitan > Municipality > Gaupalika	Number of sites per sqkm area	Preferred >15%	Preferred >2000	Preferred >15 GB	>80% indicating the need to upgrade

Tier	No of MMs	% of RGB	# Sites	5G handset %	MMs
Tier 1	2	8%	400	25%	Kathmandu, Lalitpur
Tier 2	8	7%	250	19%	Bharatpur, Birgunj, Bhaktapur, Thimi, Budanilkantha, Kirtipur, Tokha, Mahalaxmi
Tier 3	16	13%	550	17%	Pokhara, Janakpur, Biratnagar, Kalaiya, Tarakeshwor, Hetauda, Dharan, Simara, Suryabinayak, Banepa, Dhulikhel, Chandragiri, Gokarneshwor, Nagarjun, Thaha
Tier 4	51	10%	400	13%	
Nation-wide	**753**	**100%**	**4450**	**13%**	

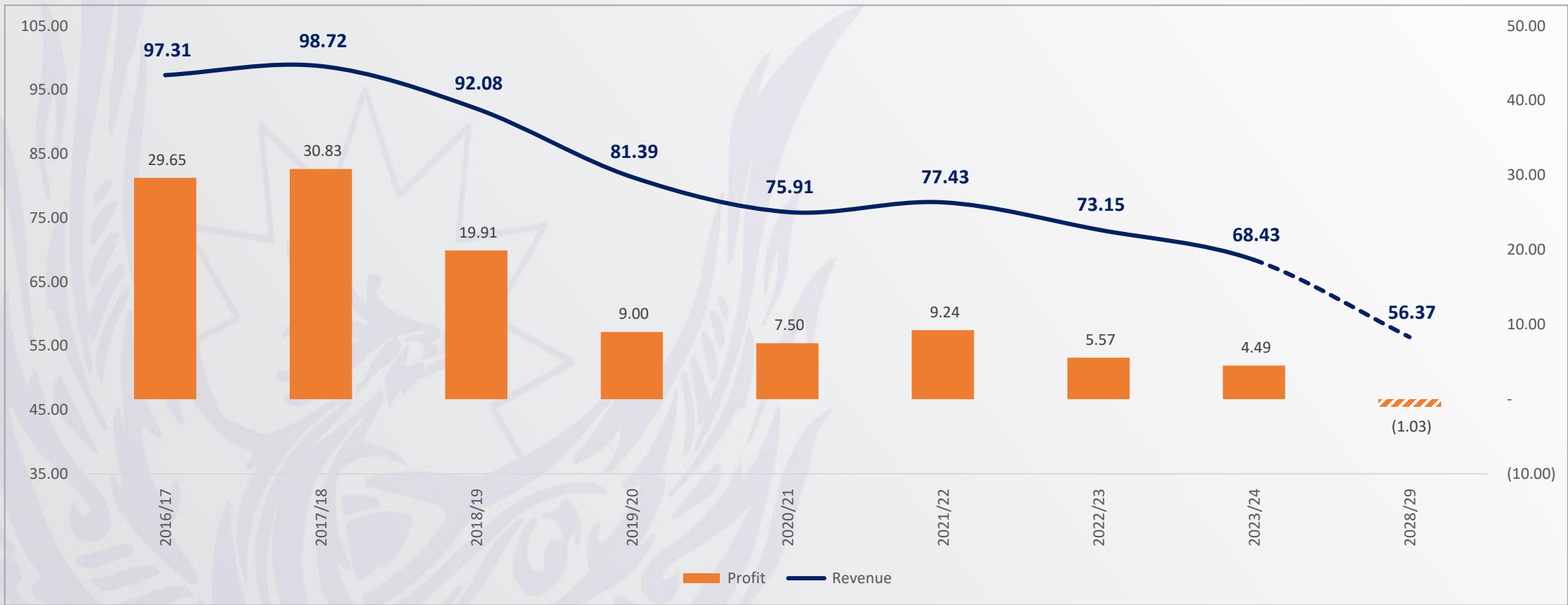# Tier-wise Cost & Revenue Estimation (Single Operator)

Total cost of deployment per operator will be ~46Bn. Free cash flow of 51Bn is required to be generated from business per operator to make this feasible.

	# Sites	Deployment	CAPEX (Mn NPR)	OPEX (5 Years) (NPR Mn)				Revenue (5 Years) (NPR Mn)			Profit/Loss
				Spectrum: 700 (15MHz x 2)	Spectrum: 2600 (100MHz)	Annual Maintenance Cost	Total cost	Mobility	Home	Total Revenue	
Per Site	1		700: 6.5Mn 2600: 14Mn Mix: 20.5Mn	2,025	2,750	6	4,781	0.15	11	10.65	(4,791)
Tier 1	400	700+2600	8,200	2,025	2,750	2,460	7,235	60	4,200	4,260	(11,175)
Tier 2	250	700+2600	5,125	2,025	2,750	1,538	6,313	38	2,625	2,663	(8,775)
Tier 3	550	700+2600	11,275	2,025	2,750	3,383	8,158	83	5,775	5,858	(13,575)
Tier 4	400	700	2600	2,025	2,750	780	5,555	60	-	60	(8,095)
Nation - wide	4500	700+2600 until Tier 3, rest 700	46,050	2,025	2,750	13,815	18,590	675	12,600	13,275	(51,365)

- Base rate considered for Spectrum
- Tier 1-3 to have 2600 +700 in all sites and rest to have 700 only (FWA use case minimized since BW offering will drop considerably & supply chain & maintenance costs will shoot up after Tier 4)
- Additional costs like cost of CPE in FWA, Royalty & RTDF, Marketing and other OPEX elements for new business not considered

Nepal Telecom Industry Revenue & Profit Simulation

The current state of Nepali Mobile industry is already at a stressed top-line and bottom-line with a downward trajectory projected to reach an unsustainable state. Additional losses from 5G is not sustainable financially.

Chart data:

Year	Profit	Revenue
2016/17	29.65	97.31
2017/18	30.83	98.72
2018/19	19.91	92.08
2019/20	9.00	81.39
2020/21	7.50	75.91
2021/22	9.24	77.43
2022/23	5.57	73.15
2023/24	4.49	68.43
2028/29	(1.03)	56.37

Legend: Profit, Revenue

Subscription based weekly/monthly pack model is the only option to grow the industry and sustain mobile industry. This opens up opportunity to reinvest into a 5G Digital Future for Nepal.

	Move	Impact	Industry Impact	
Starting Point	Revenue depends on small deno packs and Voice Pay As You Go	Continuous decline (-3Bn to -4Bn YoY)	Unable to reinvest – slow death	
Today	Simplified portfolio with Sadhain On	Moderate management of revenue decline	Constrained investment, struggle to maintain	
Industry Restructuring	Weekly / Monthly subscription-based model	~ **40%** growth in 5 years	5G Future	

Solution for 5G

All 3 entities (2 operators) and government have to come together to make 5G and future technologies possible in Nepal.
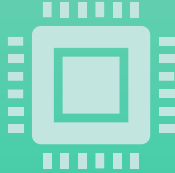
Business Case for Industry Restructuring

| Market 2PL	Past	Trending	Future As Is	Future with Industry Restructuring
	2016/17	2022/23	2028/29	2028/29
Revenue	97,307	73,147	56,372	96,816
EBITDA	59,678	35,620	19,082	58,028
PAT	29,646	5,587	(-1,025)	18,482
PAT %	30%	8%	(-2%)	19%
CAPEX	18,988	11,584	6,201 (?)	18,395
CAPEX Intensity	20%	16%	11%	19%
Taxes and Fees	43,821	34,100	21,812	43,300

1 **1 operator will require ~45 Bn** free cash flow from business and industry (2 player would require ~90 Bn)

2 **As Is Business** will never be able to generate cash flow required for 5G.

3 **Subscription model will take ~6-7 years** to generate the cash flow (not investment friendly, high uncertainty)

4 **Other Options for speeding up 5G Rollout:**

* Free spectrum & Custom duty concession

* Network Sharing

Network Sharing Options

Multi-Operator RAN and Infra sharing can be feasible solution with considerable impact to reduce costs for realizing nationwide 5G rollout. MoCN and Neutral host are most efficient but are either not allowed or does not currently exist.

	Passive Sharing	Multi-Operator RAN (MORAN)	Multi-Operator Core (MOCN)	Spectrum Sharing	National Roaming	Neutral Host
Explanation	Sharing non-electronic infrastructure (towers, power, sites)	Operators share RAN (antennas, base stations) but use separate spectrum and core.	Sharing RAN and spectrum while keeping separate core networks.	Two or more operators share spectrum dynamically or statically.	Operators allow users to roam on each other's networks when unavailable.	Independent company owns and manages infrastructure for multiple operators.
Feasibility	High	Medium	Low (Disallowed in spectrum policy)	Low (Disallowed in spectrum policy)	Medium	Low (unavailable in Nepal)
Savings	~10-15% (Capex/Opex)	~30-40% (Capex)	~40-50% (Capex/Opex)	~20% on spectrum cost	~10-15% Opex	~30-40% Capex

What can the government do to support?
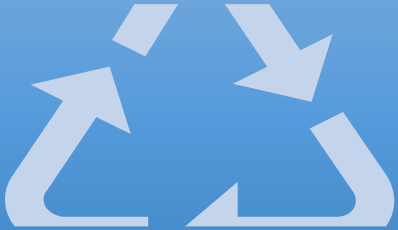
Industry-wide Subscription based model implementation

- Implementation of India Model (Subscription based model)
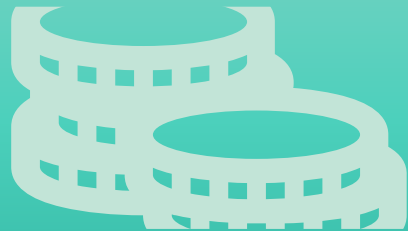
Waiver on Spectrum Fees & Custom fees & Tax Rationalization

- Spectrum fees at base rate is NPR 955 Mn per Year which is not feasible – Allow fees waiver until X% Pop Coverage is reached
- Allow 100% waiver on custom duty for 5G Equipment
- Tax rationalization to remove sector specific taxes

Infra Sharing modality and policies

- Allowing Multi-operator Infra sharing can help reduce costs by 30-40% for both operators

Clarity on License to operate post 2029

- Since 5G is a long-term investment with high timeline for monetization, investment is not feasible with unclear license period

5G Business Case in a nutshell

Without **industry level interventions and support from government**, a full-scale 5G rollout is **financially unsustainable** under current or even improved market conditions

1

Massive Investment Need, with nationwide rollout requiring ~NPR 46 Bn in CAPEX per operator over 5 years, with negative returns across all tiers; cumulative loss projected at NPR **-51 Bn**.

2

Unviable Under Current Model, under the "as-is" scenario, the current business model will not generate sufficient free cash flow to fund 5G with negative PAT

3

Even Restructured Industry Struggles, as PAT with restructured industry is projected ~9Bn per operator (best case), which means it would take ~6 years just to generate the required capex through internal free cash flow.

4

Government and Ecosystem Support is essential, to make the 5G Business Case work

Ncell

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धन्यवाद