Mobile broadband enabling digital India

Skill India

AADHAAR

DigiLocker

BHIM — BHARAT INTERFACE FOR MONEY

Swasth India — Health for all

India leapfrogging to being among

Largest
Subscriber Base

Highest
data Consumption

Lowest price per GB
(1/4th of cost in China)

Use technology to differentiate & leapfrog into future

India's best in class 4G network – scale & performance

- Highest amount of spectrum deployed in 4G network

- More than 200K 4G sites

- India's only network with peak speed of 500Mbps

- First 4G with carrier aggregation & LAA

- First network with wide scale Massive MIMO
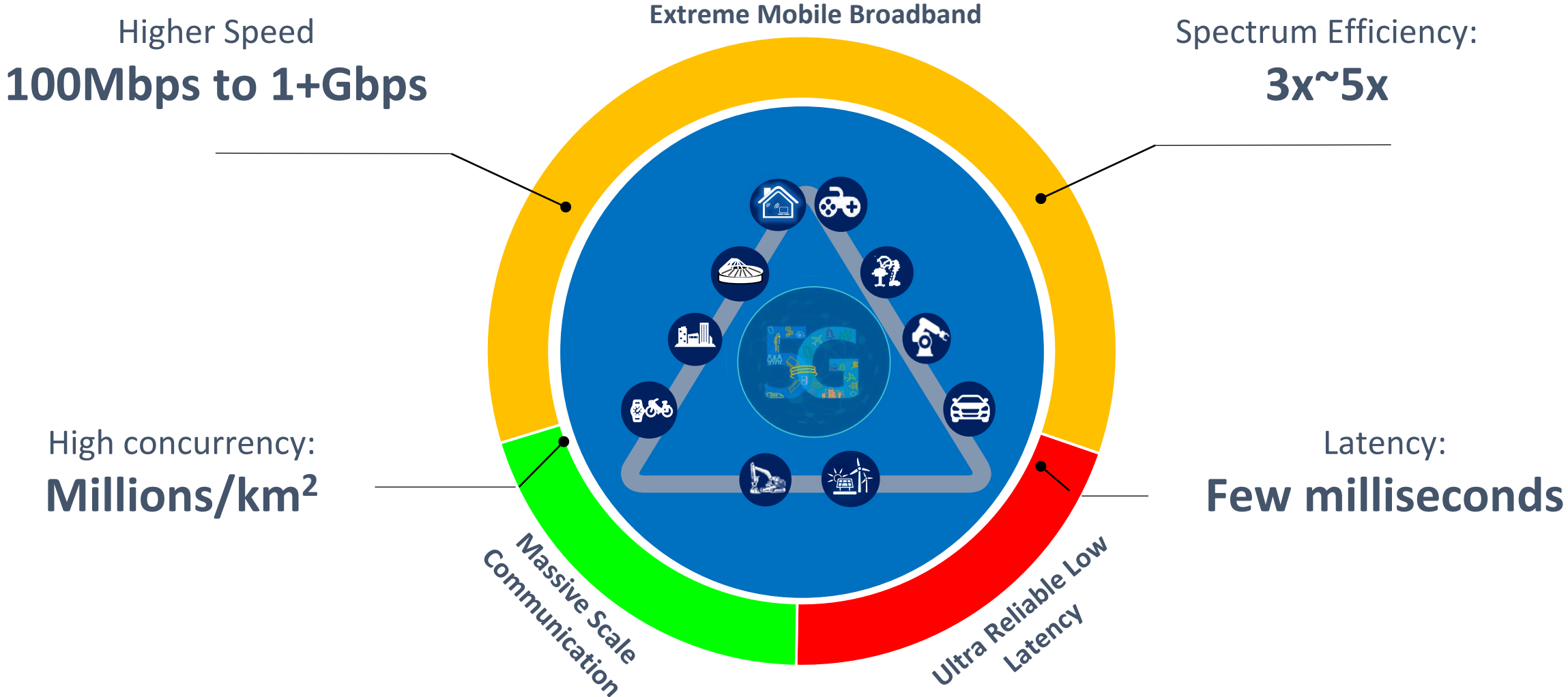
- First network with open vRAN deployment
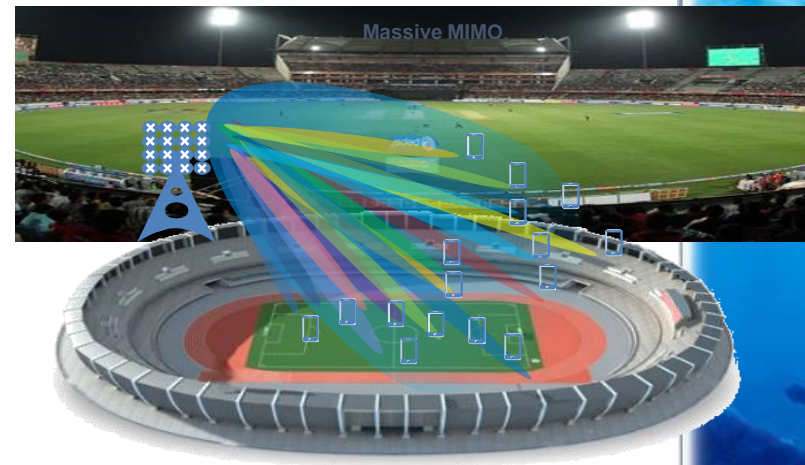
4G network ready to deploy 5G network

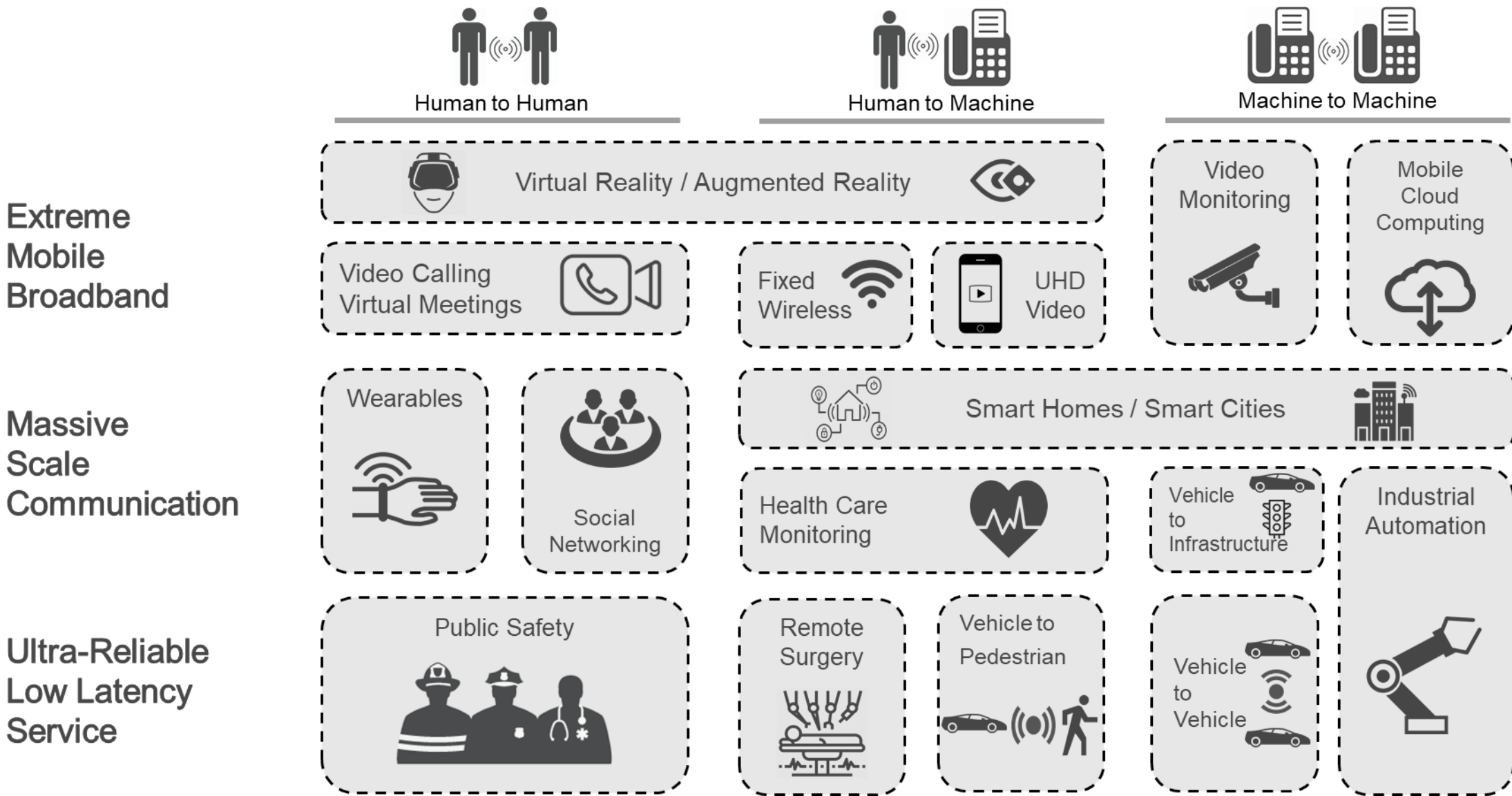# Delivering best in class customer experience

Rated as India's best mobile broadband network

5G will set the stage for Industry 4.0

Higher Speed
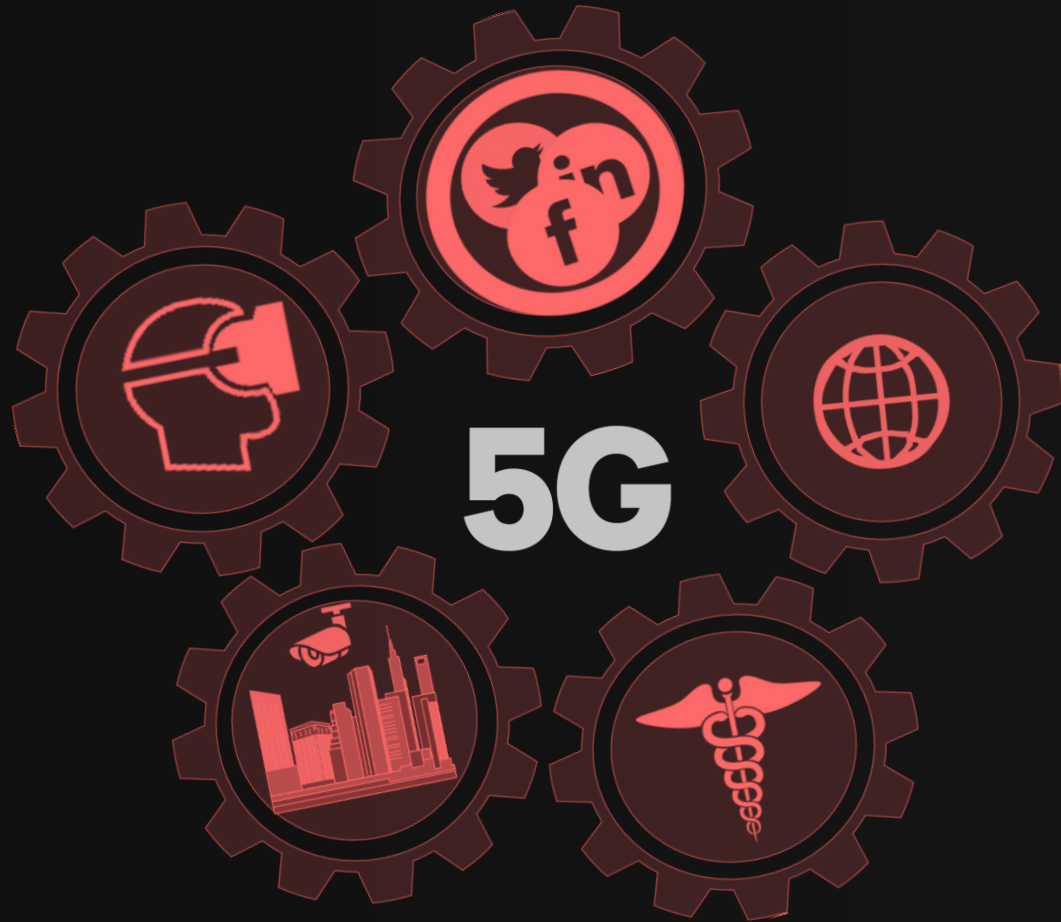**100Mbps to 1+Gbps**

Spectrum Efficiency:
3x~5x

Extreme Mobile Broadband

High concurrency:
Millions/km²

Latency:
Few milliseconds

Massive Scale Communication

Ultra Reliable Low Latency

OUR TIME IS NOW

Several use cases in the long term

Human to Human | **Human to Machine** | **Machine to Machine**

Extreme Mobile Broadband

Virtual Reality / Augmented Reality

Video Calling Virtual Meetings

Fixed Wireless

UHD Video

Video Monitoring

Mobile Cloud Computing

Massive Scale Communication

Wearables

Social Networking

Smart Homes / Smart Cities

Health Care Monitoring

Vehicle to Infrastructure

Industrial Automation

Ultra-Reliable Low Latency Service

Public Safety

Remote Surgery

Vehicle to Pedestrian

Vehicle to Vehicle

Spectrum: Critical for 5G networks

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4G		5G

High Band (2300MHz)

Enhanced Mobile Broadband

mmWave (24GHz – 39GHz)
Super Data Layer

400MHz - 800 MHz assignments

Mid band (1800/2100MHz)

Coverage layer

Sub 6GHz (3GHz – 6GHz)
Coverage & base capacity Layer

atleast 100MHz assignments

Sub-GHz (850/900MHz)

Coverage for Machine type Applications

Sub GHz
Rural & deep coverage Layer

10MHz-40MHz
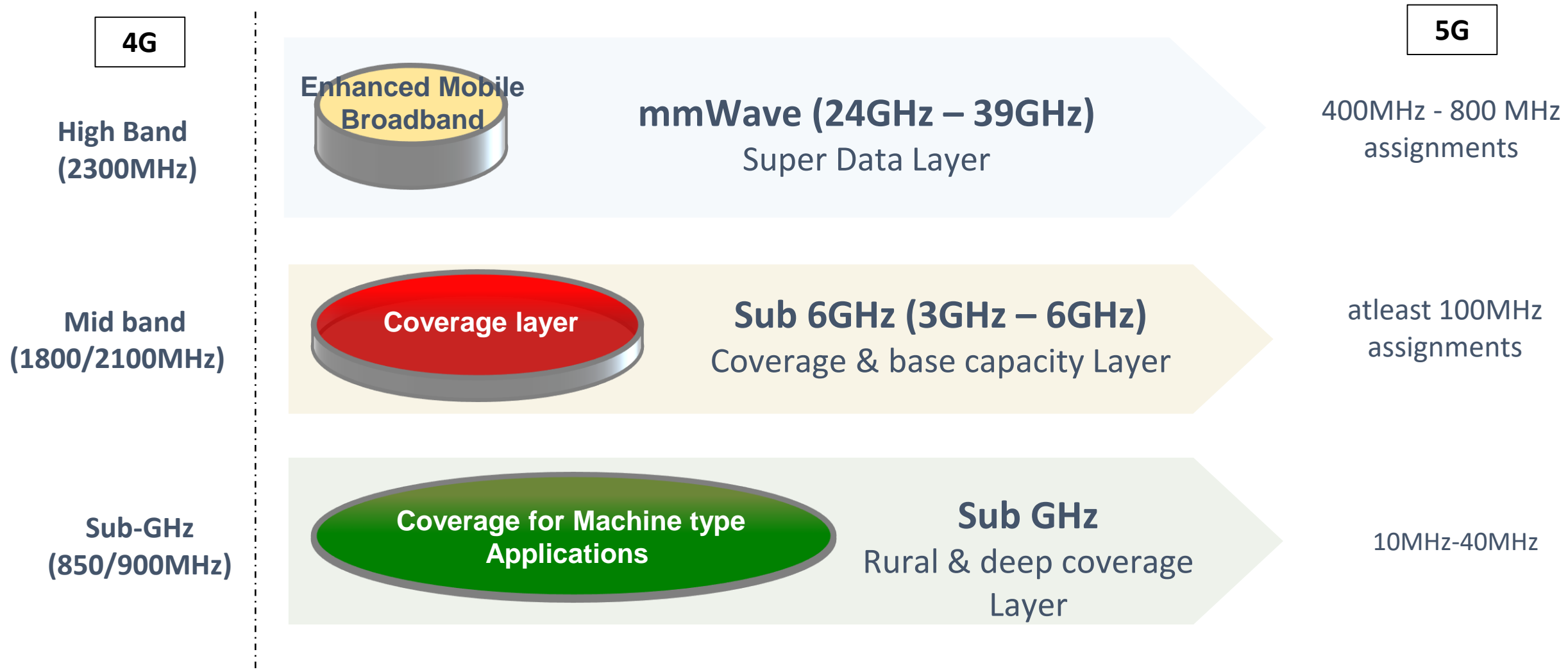
Need sufficient spectrum in all three bands must for 5G success

Success factors for 5G in India

5G: Three key building blocks

Network

Devices

Applications

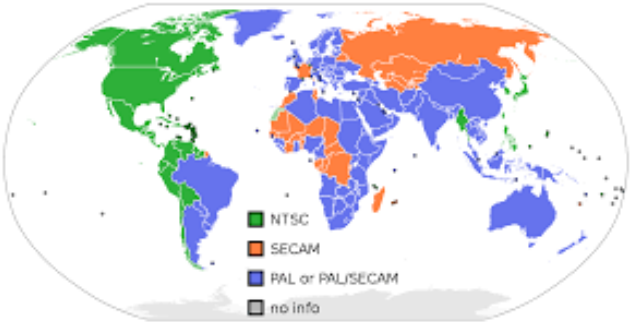| AR/VR Media |
| :---: |
| Surveillance |
| Industrial Robotics |
| Remote Surgery |
| Cloud Gaming |
| Drone Delivery |

Globally harmonized standards

Affordable devices

Apps for local use cases

Localized standards are not sustainable
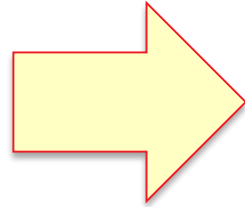

Standardized by digital streaming

Standardized by 3GPP

Islands of technology / standards fail to get global economies of scale

open ecosystem thrives on global standards

Open Standards

Open Ecosystem

Open & globally harmonized standards drive open ecosystem
Common smartphone / infrastructure drives cost down for services (e.g. 2G & 4G)

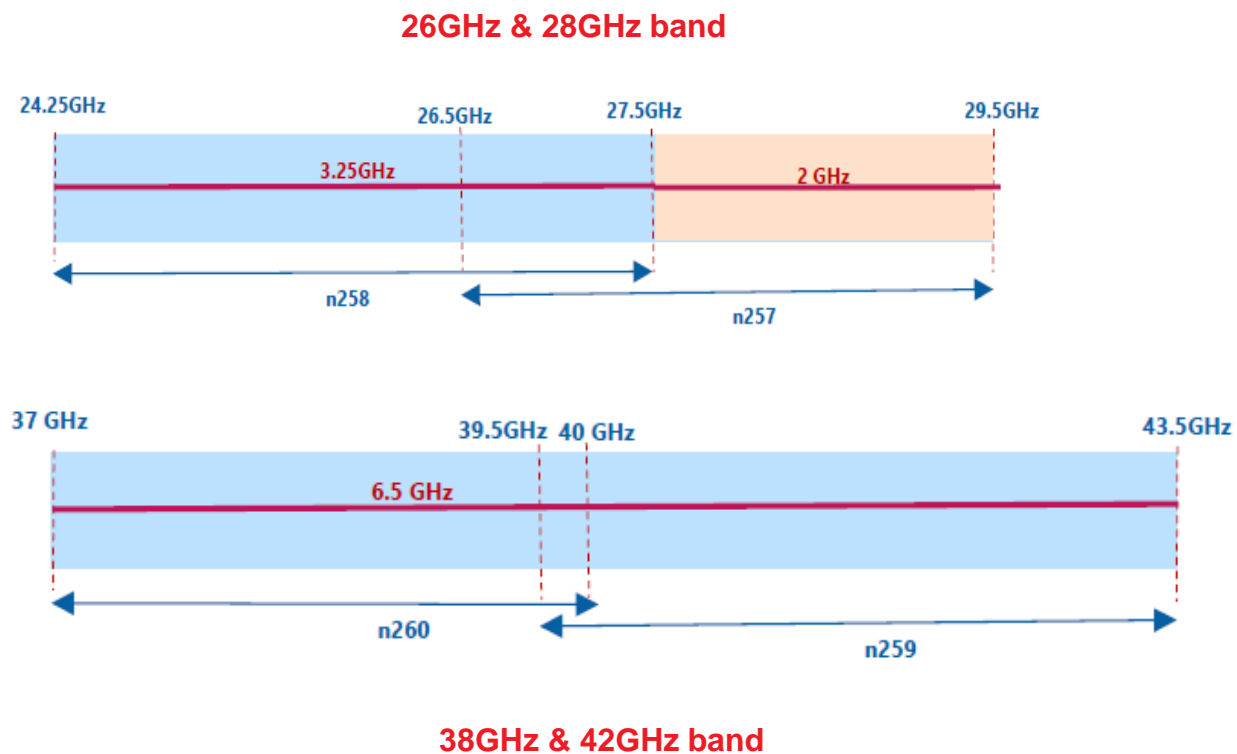# Spectrum allocation being done across the globe

* Planned

		mmWave	Sub-6GHz	Sub-GHz
USA		1,600 MHz	800 MHz	35 MHz (600MHz band)
China		8,000 MHz*	460 MHz	-
Korea		2,400 MHz	280 MHz	-
Japan		1,600 MHz	700 MHz	-
Australia		3,250 MHz	300 MHz	
India		To be identified	175MHz	To be identified

Current spectrum is abysmally low & reserve price is abnormally high

mmWave: Critical for scaling 5G networks

mmWave : Contribution to India's economy

Agriculture, 11%

Healthcare, 3%

Information & Communication, 12%

Manufacturing, 20%

Retail, 11%

Other Sectors, 44%

$150 Billion

26GHz & 28GHz band

24.25GHz

26.5GHz

27.5GHz

29.5GHz

3.25GHz

2 GHz

n258

n257

38GHz & 42GHz band

37 GHz

39.5GHz

40 GHz

43.5GHz

6.5 GHz

n260

n259
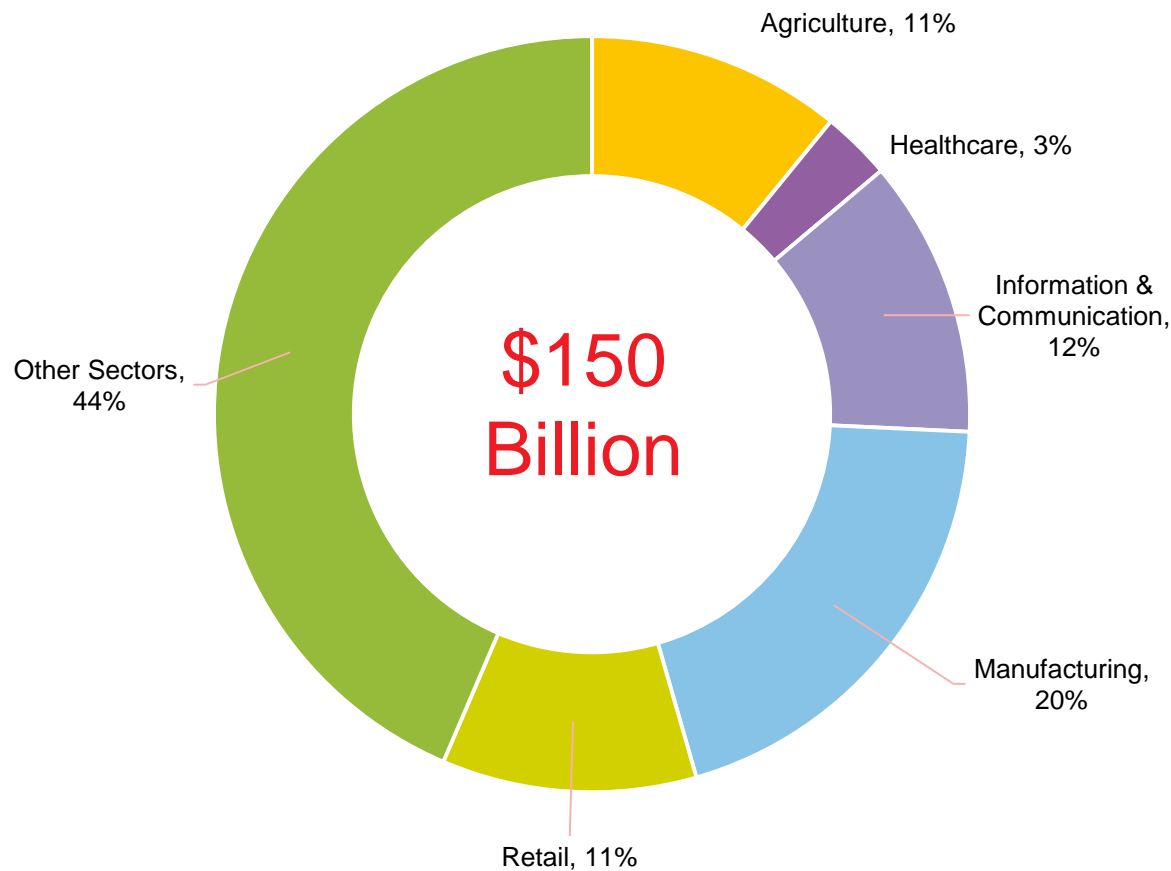
India needs 4GHz to 6GHz of spectrum in mmWave

Connectivity: Accelerate fiber rollouts for 5G

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1.5 million **BTSs**	**0.5 million** **Towers**
1.5 million km **Fibre**	**25%** **Towers connected** **with fibre**

Need ROW & instant govt. permissions, unbundling fiber assets
Allocation of e-band spectrum for "Wireless fiber"

Source: GSMA

Building local applications for digital India

#1 Fixed Wireless Access

Broadband Access to
160M Indian Households

#2 Cloud Services

4K Infotainment, AR/VR Education &
Immersive Experience

#3 Digital Sky

Drone for Crop Analysis,
Smart Irrigation, Logistics, Survey

#4 Wireless eHealth

Bringing Specialized Healthcare to
Rural India

#5 Smart Manufacturing

Increased economic output

#6 Tele-Operated Driving

Automated mining

#7 Reshape Broadcasting

Mobile connected camera &
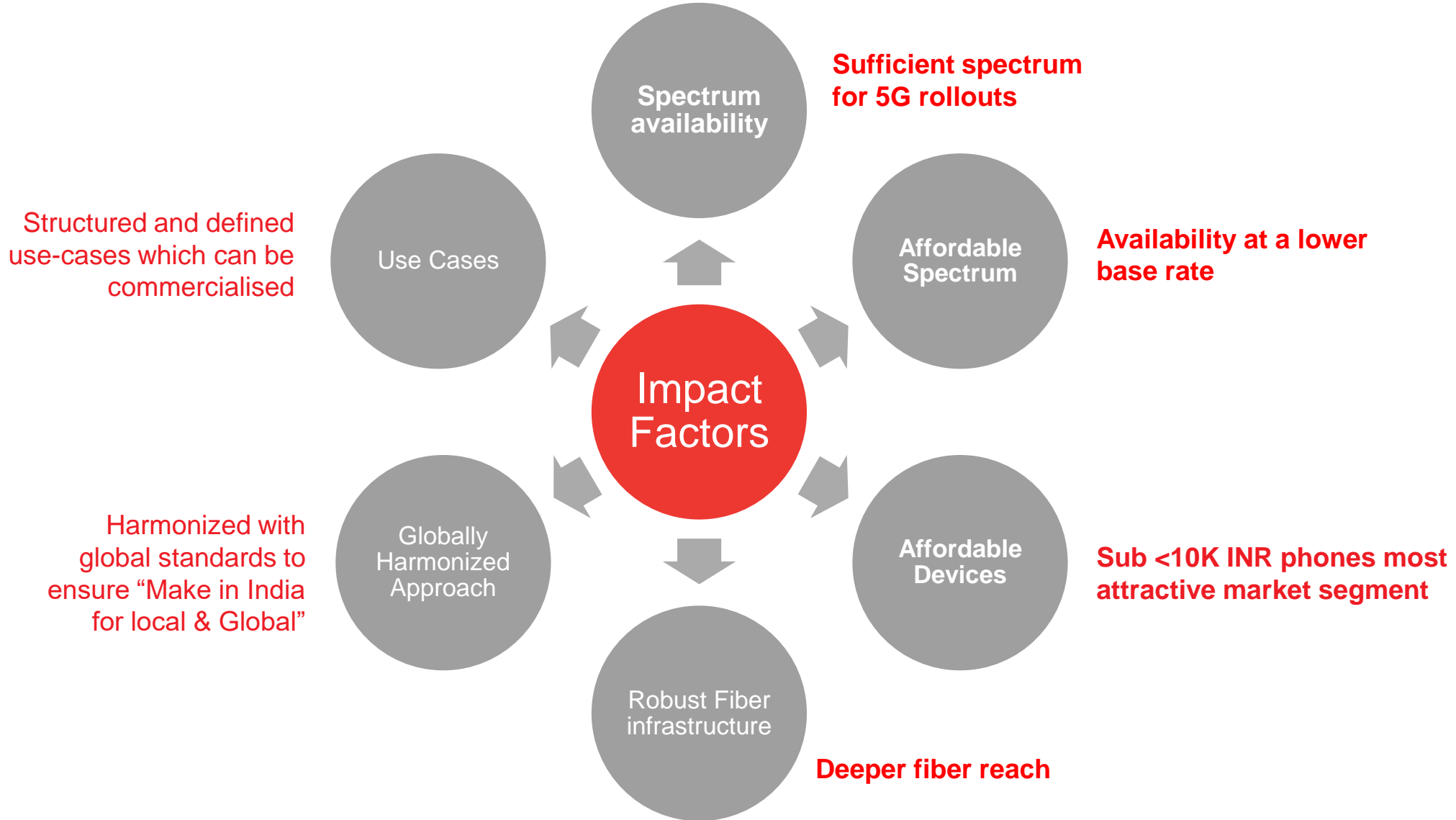alternative for satellite vans

#8 Smart City

100 Cities, Smart Utilities by
Connectivity and Digitalisation

Need applications & use cases to leverage 5G capabilities

5G in India | Critical success factors

Sufficient spectrum for 5G rollouts

Spectrum availability

Availability at a lower base rate

Affordable Spectrum

Structured and defined use-cases which can be commercialised

Use Cases

Impact Factors

Sub <10K INR phones most attractive market segment

Affordable Devices

Harmonized with global standards to ensure "Make in India for local & Global"

Globally Harmonized Approach

Robust Fiber infrastructure

Deeper fiber reach

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Thank You