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Communications, Space &
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Spectrum: The Road to the Future

Welcome Breakfast



Spectrum: The Road to the Future

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Spectrum: The Road to the Future

Welcome

Jawad Abbassi
Head of MENA
GSMA



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Spectrum: The Road to the Future

Opening

Amir A. Algibreen
Group Chief Regulatory
and Compliance Officer, stc



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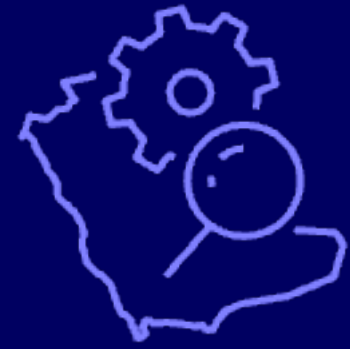
Spectrum: The Road to the Future

Keynote

Dr. Mohammed Al-Otaibi
Deputy Governor for the
Radio Spectrum Sector, CST



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Saudi Arabia Spectrum Management Overview

Effective collaboration among government and industry is a key factor in Saudi Arabia's leadership



Identify more spectrum for IMT in NFP



Release 1100 MHz for IMT use




Shaping the spectrum Outlook to meet market demand



Update the IMT regulations to be more fixable



COLLABORATION



98.6%
Internet Penetration Percentage
in Saudi Arabia

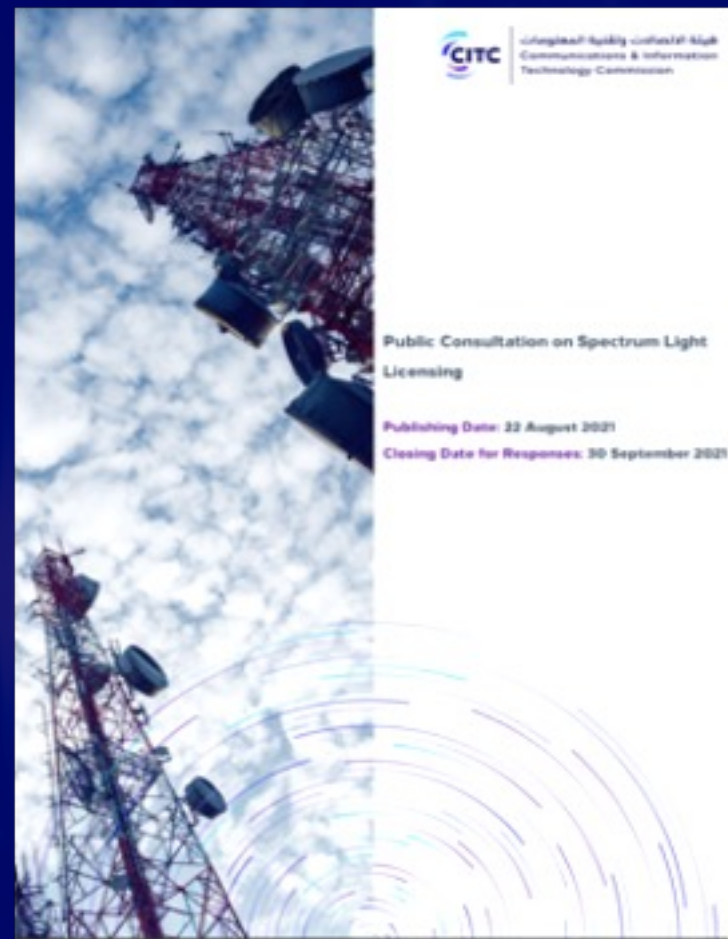


344.4 Mbps
Average Download Speed 5G

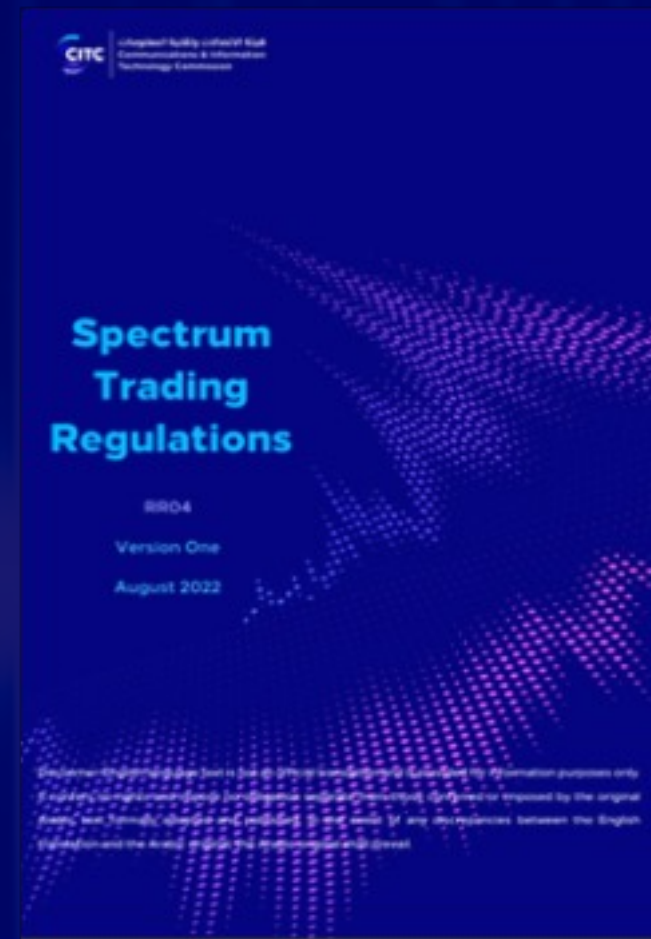


96.3%
Percentage of Government E-
Services Users

Proactive spectrum management to enable spectrum abundance



Light licensing



Spectrum Trading

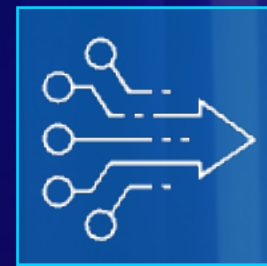
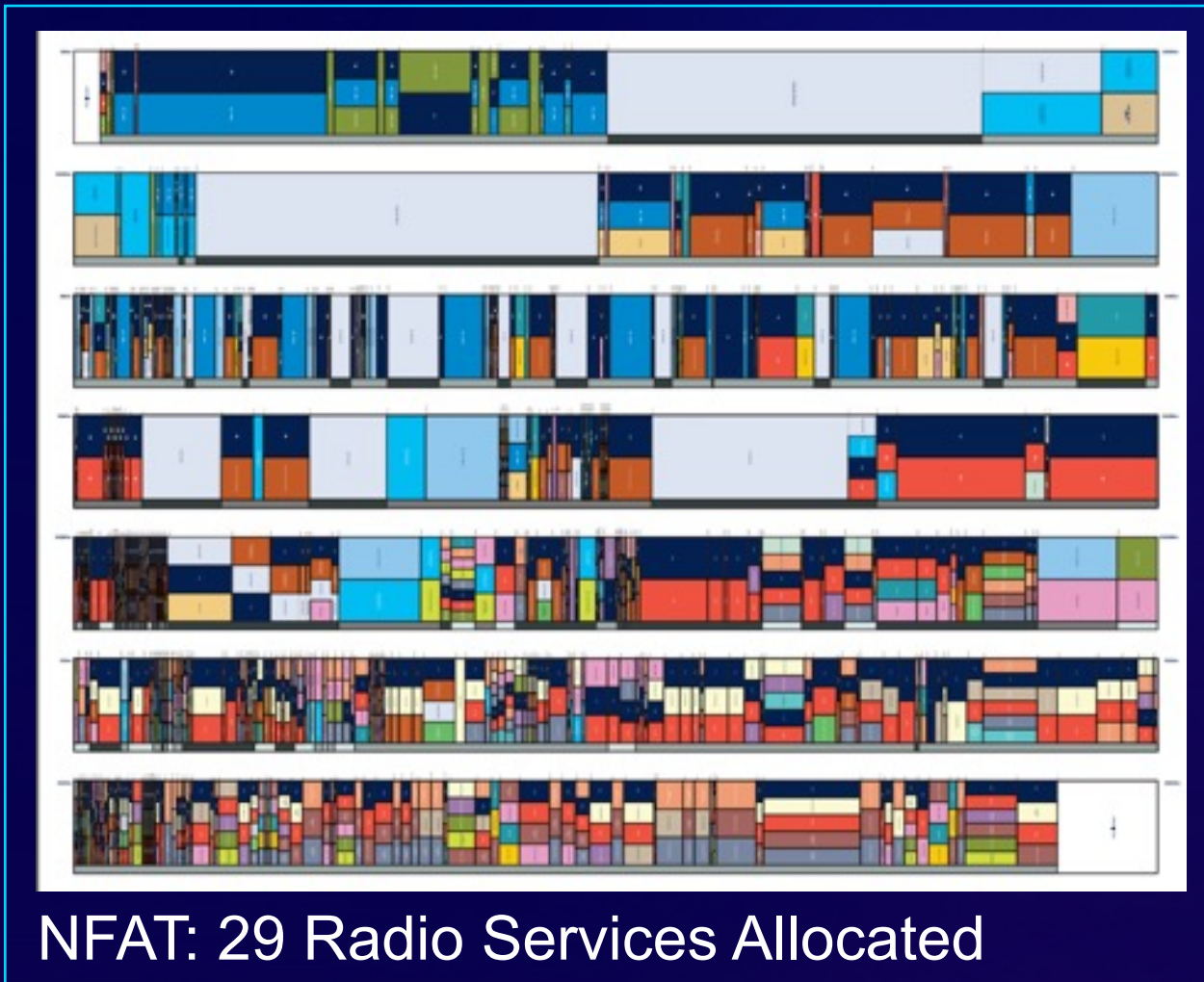


New Spectrum Outlook 2024-2026



Upcoming Spectrum Auctions

The methods of yesterday will not survive tomorrow



Future is wireless

Nearly every person, vehicle, building, appliance will be wirelessly connected.



29 billion wireless devices in 2030

6G, IoT, Space, WiFi, Sensors, VR, Metaverse



Exclusivity and Spectrum Crunch



Enable

Spectrum Sharing



Establish

the regulatory framework for Light (Shared) Licensing



Develop

the necessary infrastructure for Data-Driven Spectrum Management



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Thank You!



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Session 1

**Affordability
Starts with Spectrum
Auctions, Pricing and T&Cs**

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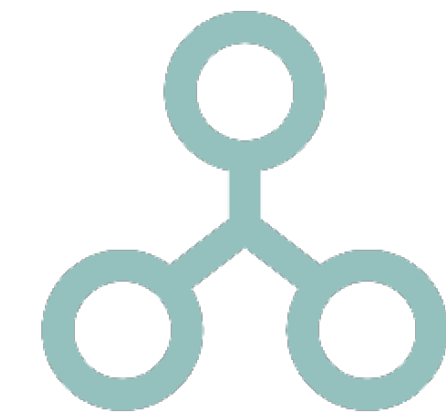
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Licensing Best Practice

Luiz Felipe Zoghbi
Spectrum Engagement Director
GSMA

GSMA™

The Mobile Market



2025

1.8bn connections



2025

of total connections

Excluding licensed cellular IoT

5,538,788,891

Unique mobile subscribers
Q2 2023

2.73%

Growth, year on year

Employment



2019

16m

Jobs directly supported by the mobile ecosystem

+14m indirect jobs

Mobile Industry Contribution to GDP

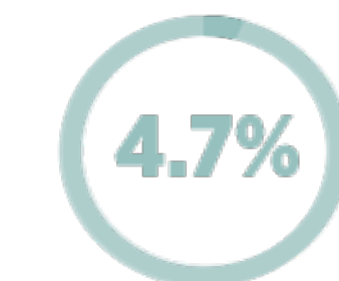


2019

4.1tn

2024

4.9tn



% of GDP



5G Revolution

Boundless
connectivity for all

Network
economics &
innovation

Enhanced
broadband

Industrial
transformation

Massive IoT & critical
communications

Ultra high speed
Ultra low latency
New applications

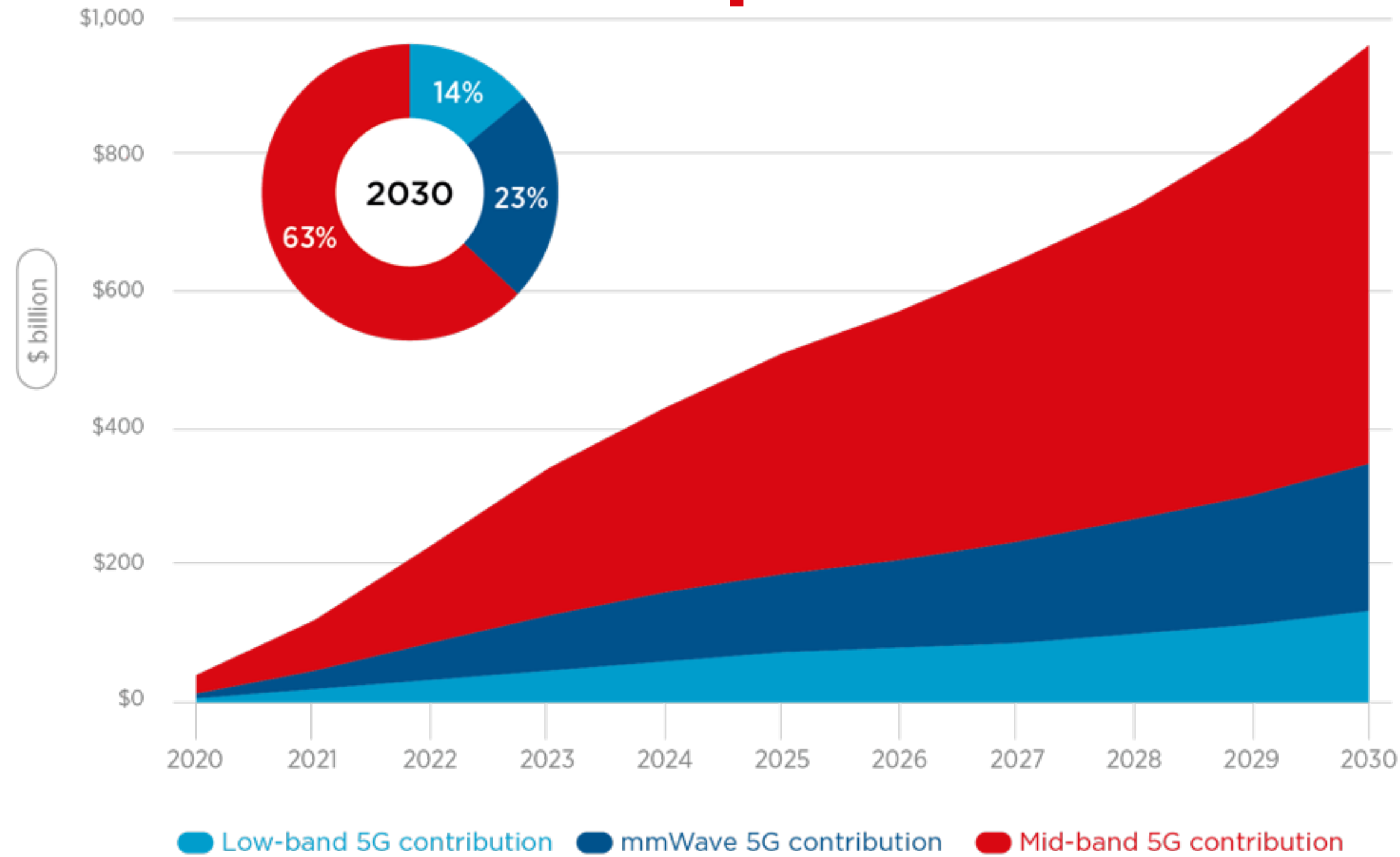


Economic power of 5G

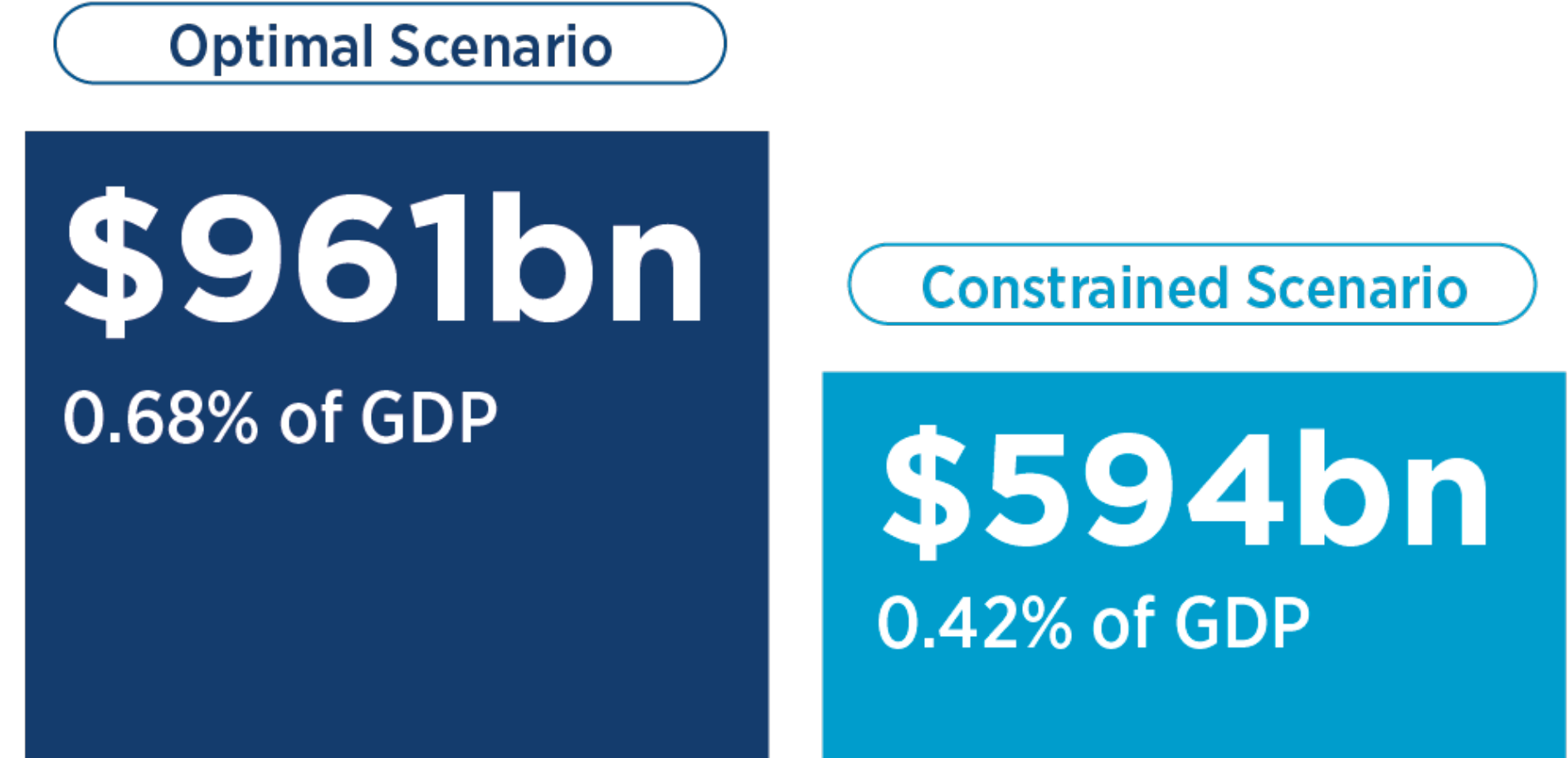


CAN IMPACT GLOBAL ECONOMY IN 2030 BY

\$961BN...

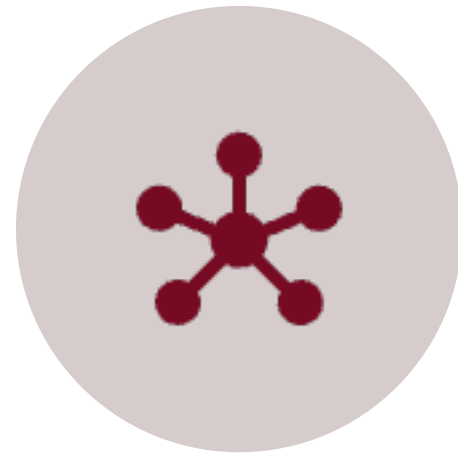


... BUT SPECTRUM CONSTRAINTS RESTRICT VALUE



The Socio-Economic Benefits of Mid-band 5G
GSMA Intelligence 2023

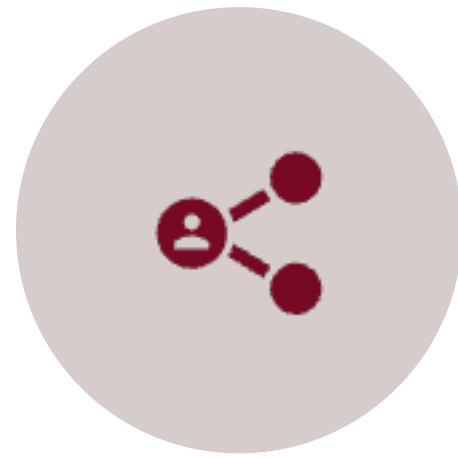
Common spectrum assignment objectives



Promoting the efficient use of spectrum



Supporting mobile service competition



Ensuring service continuity for end-users



Adopting a well-run, timely and legally robust process



Potentially other policy goals such as achieving wide coverage



In some cases, generating revenue to government

Spectrum Pricing Studies



229 operators

64 countries (34 high income | 30 middle and low income)

- Most comprehensive study to date on the impact of spectrum assignment policy on consumers.
- Econometric model that assesses the impact of spectrum cost on coverage, network quality and final prices for users.



Poorer
coverage

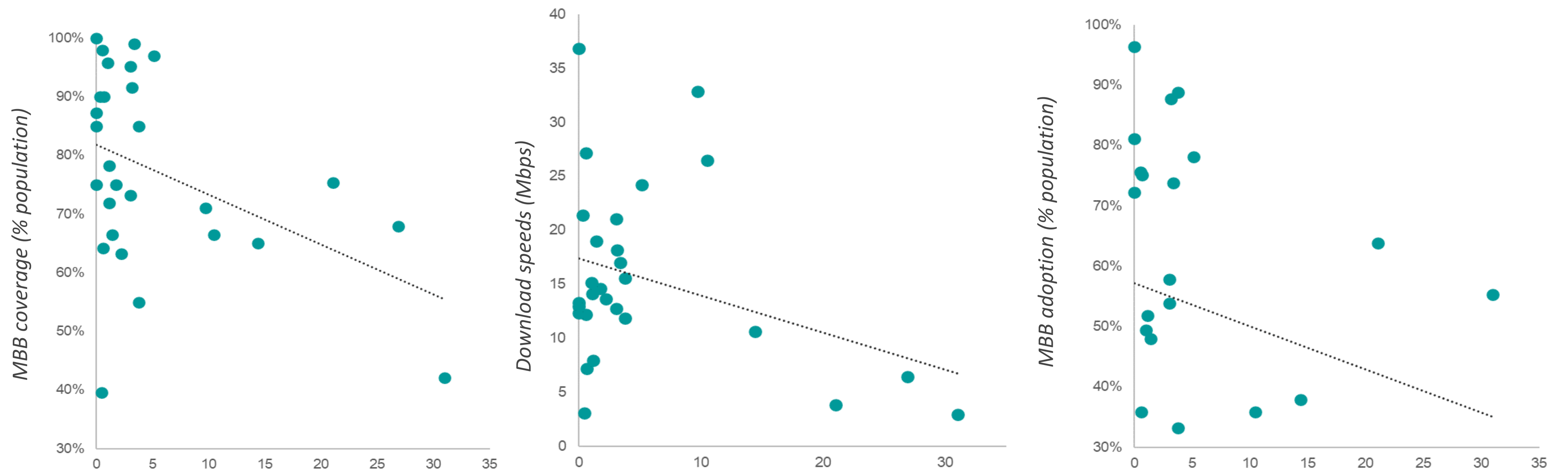


More expensive
services

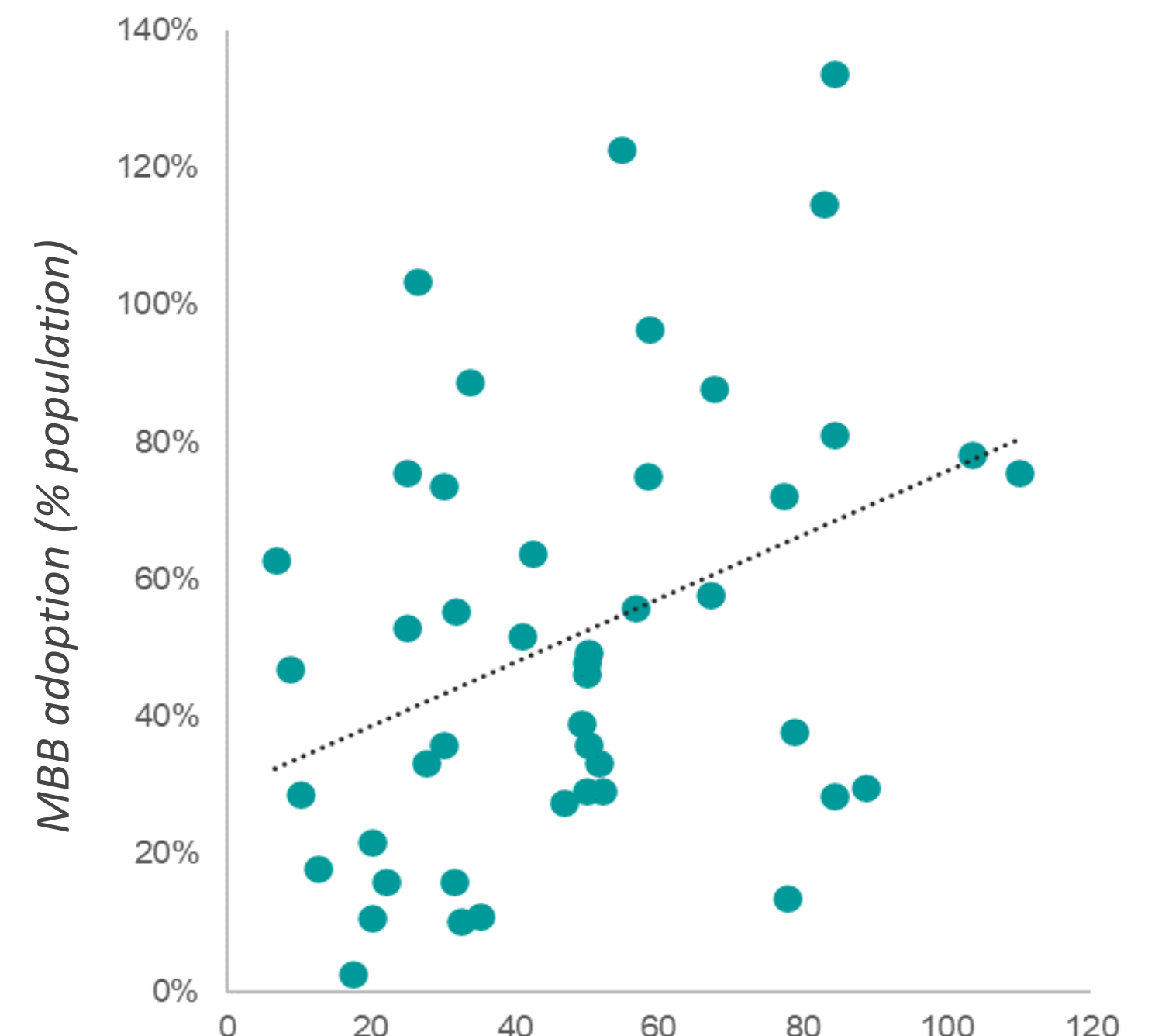
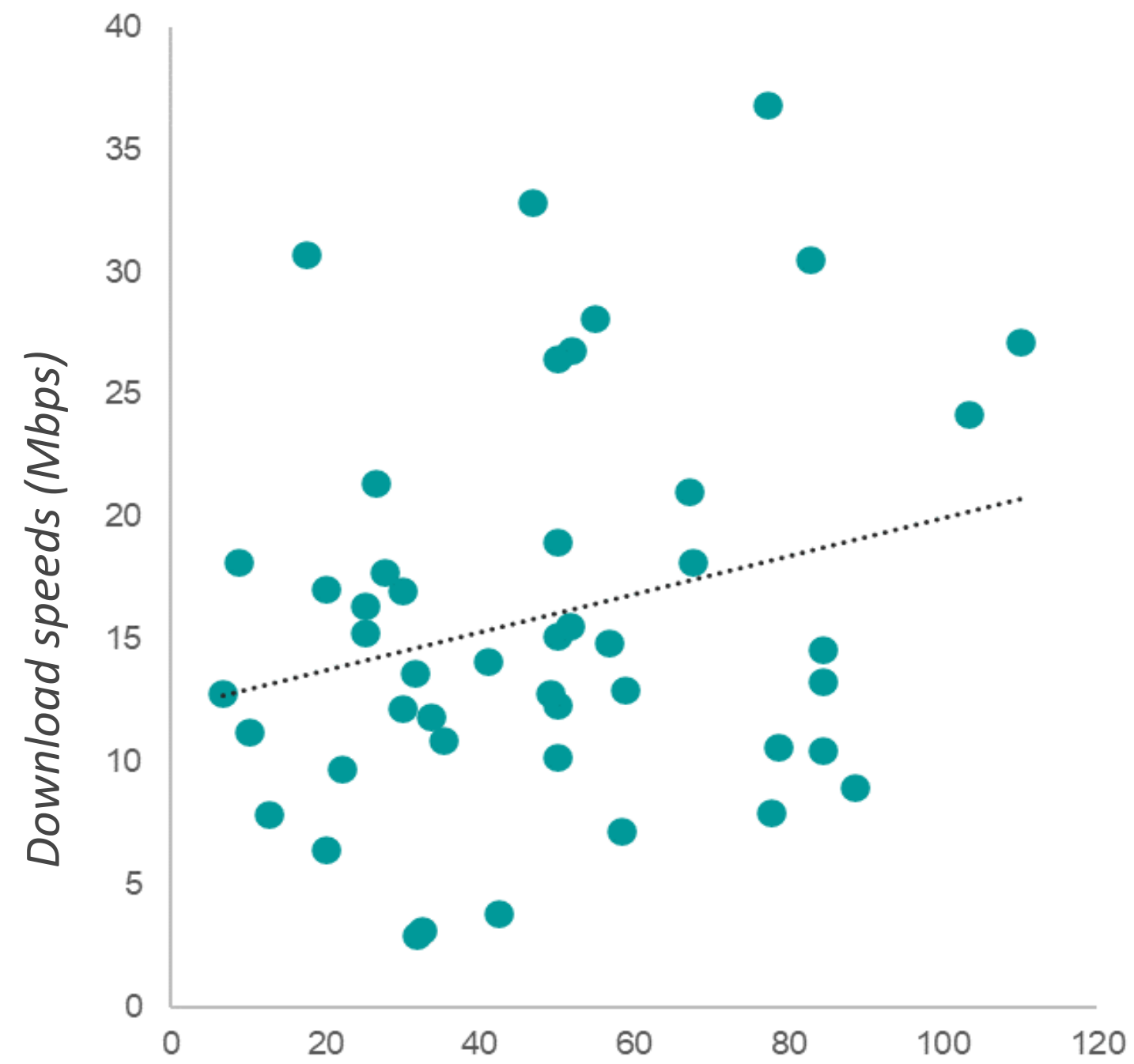
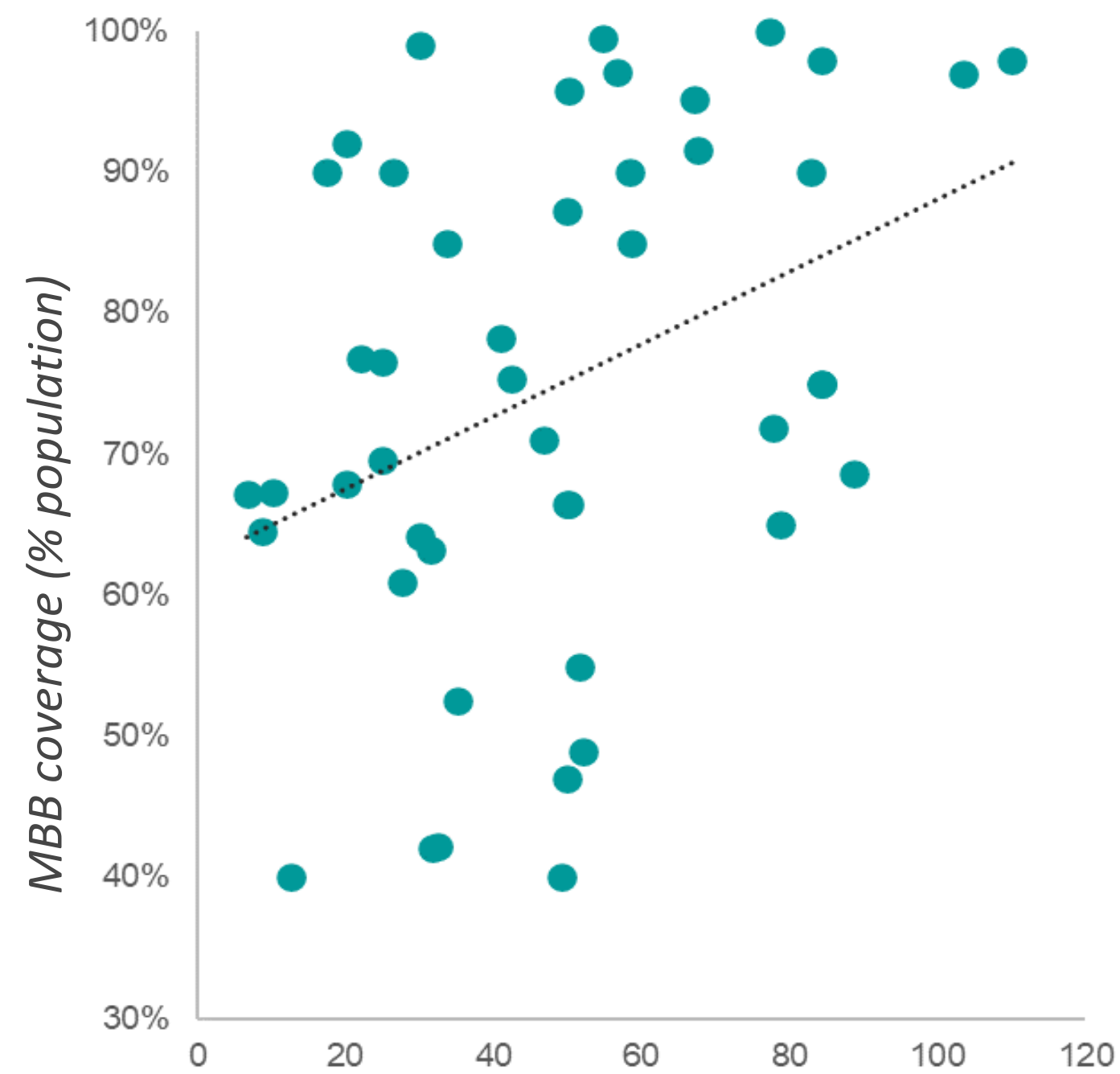


Slower
speeds

The Results - Prices



The Results - Also... Amount of Spectrum



What drives higher spectrum prices?



Demand and willingness to pay (market factors)

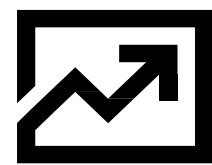
But also spectrum policies...



Very high (reserve) prices and/or fees



Limited supply of spectrum



Not publishing a spectrum roadmap

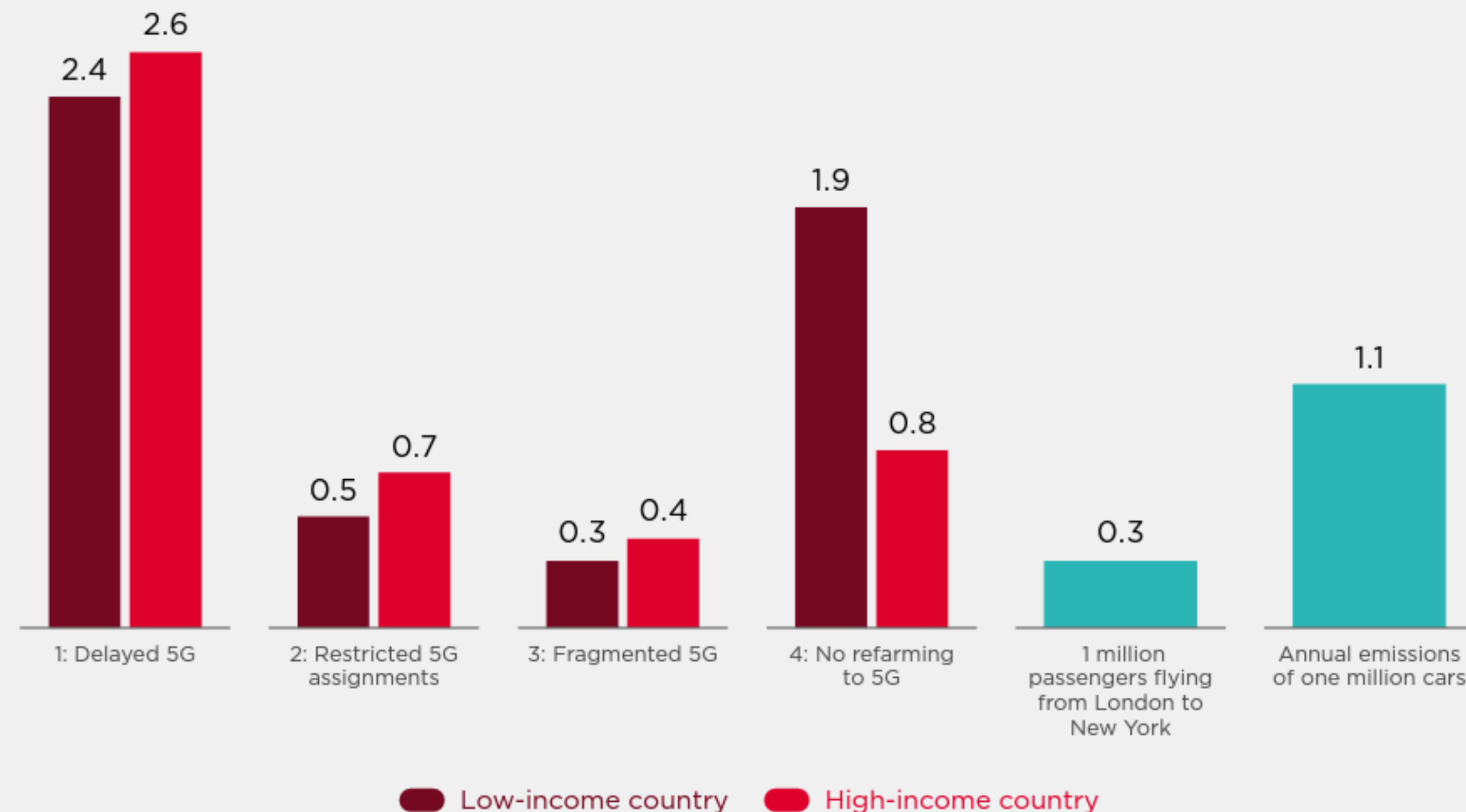


Award rules (such as auction formats)

Mobile spectrum-related emissions impact

Cumulative mobile sector emissions impact for the modelled scenarios over a 10-year period

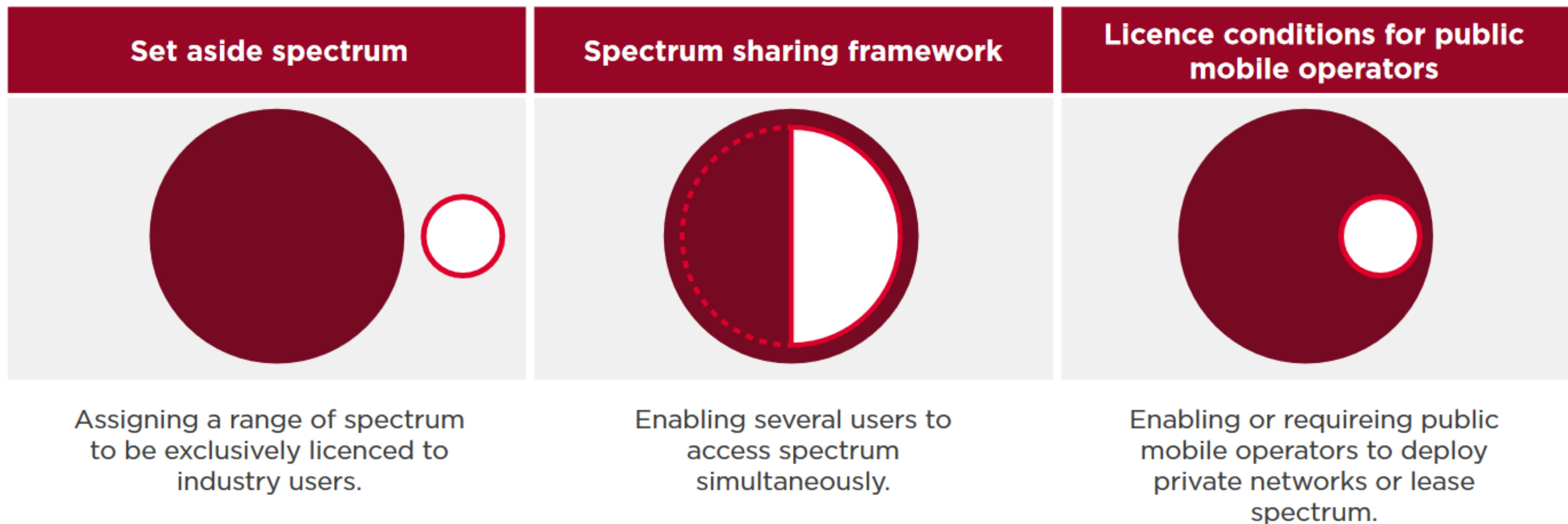
Cumulative emissions impact 2022-2031 (MtCO₂e)

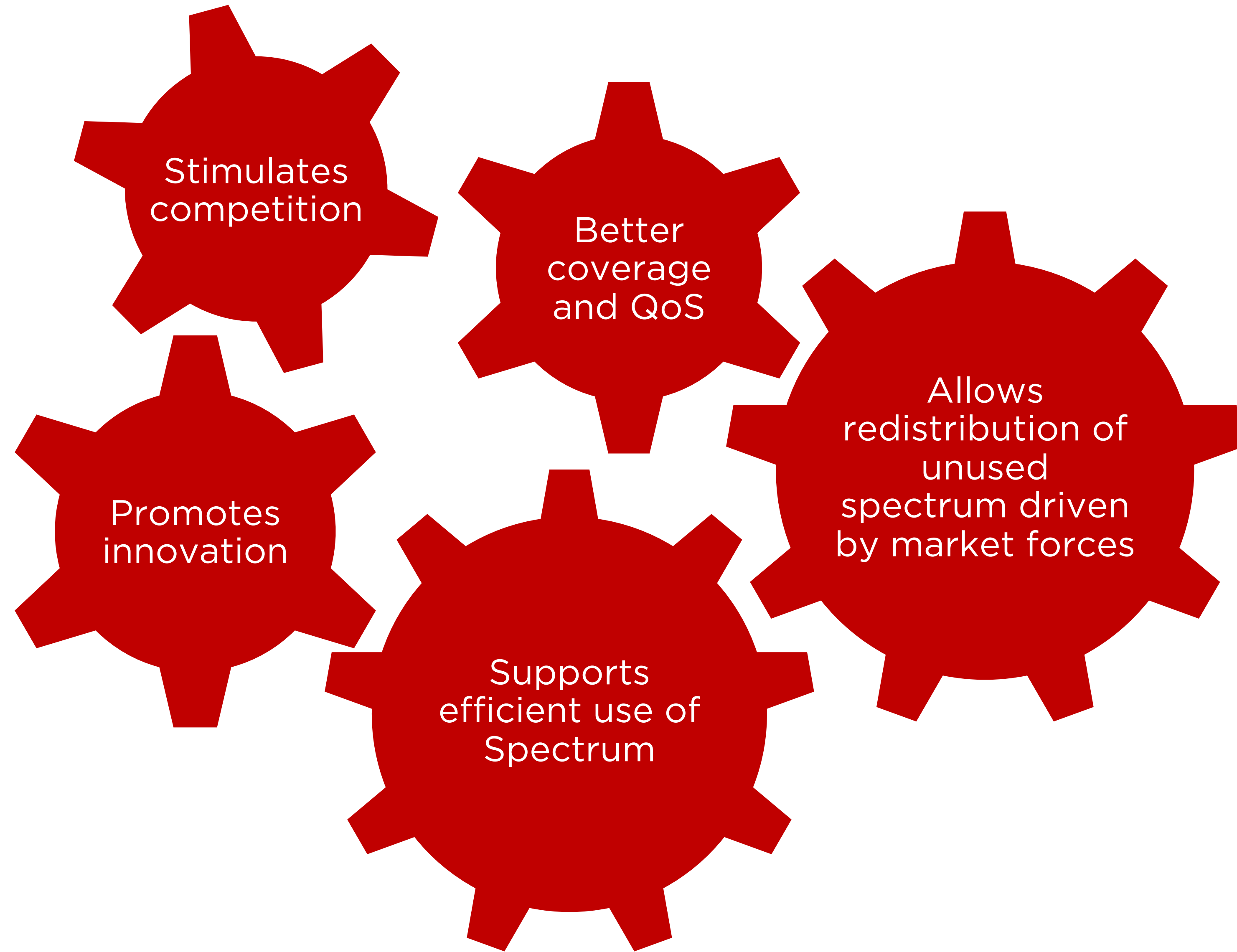


Source: GSMA Intelligence

Spectrum policy leading to efficient radio networks can maximise the economic benefits of mobile connectivity and reduce carbon impacts

Approaches on Spectrum for Industry





Sharing and Leasing

Lessons from the German Auction



A fourth operator joins and carve-out creates spectrum scarcity

High prices paid at auction



Imbalanced 3.5 GHz assets harm competition

Other regulators copy policy



Unknown efficiency of vertical carve-out

Saudi Arabia Overview



**Proactive spectrum
reallocation**



**Frequent best-practice
awards**



**Clear spectrum roadmap
for 5G**

Panel and Q&A

Moderator:

Luiz Felipe Zoghbi, Spectrum Engagement Director, GSMA

Panellists:

Abdullah Almutairi, Director of Planning and National Collaboration, CST

Abdulhadi Aboualmal, Vice President of Digital, E-space

Lee Sanders, Aetha Consulting



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Session 2

Spectrum Needs WRC-23 and Beyond The Bands and the Battles

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Shaping the future of mobile connectivity

The value of mid-bands in the
rollout and development of 5G

Dr. Leon Guo

Chief Solution Architect
Huawei 5G Product Line

GSMATM

Shaping the Future of Mobile Connectivity

The Value of Mid-Bands in the Continued Rollout and Development of 5G

Dr. Leon Guo
Chief Solution Architect, 5G Product Line
Huawei

May 23, 2023



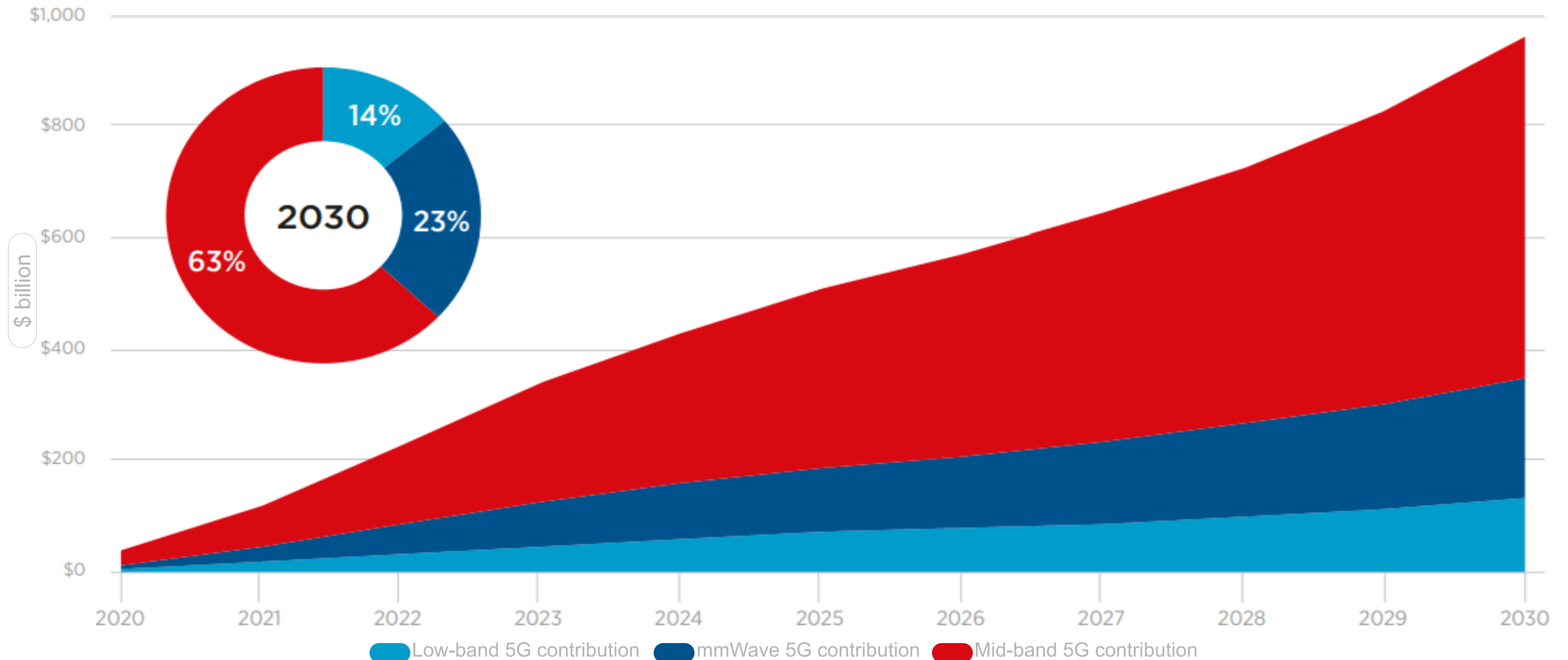
Mid-Band Spectrum Industry Insights

Technical Advantages

Success Cases

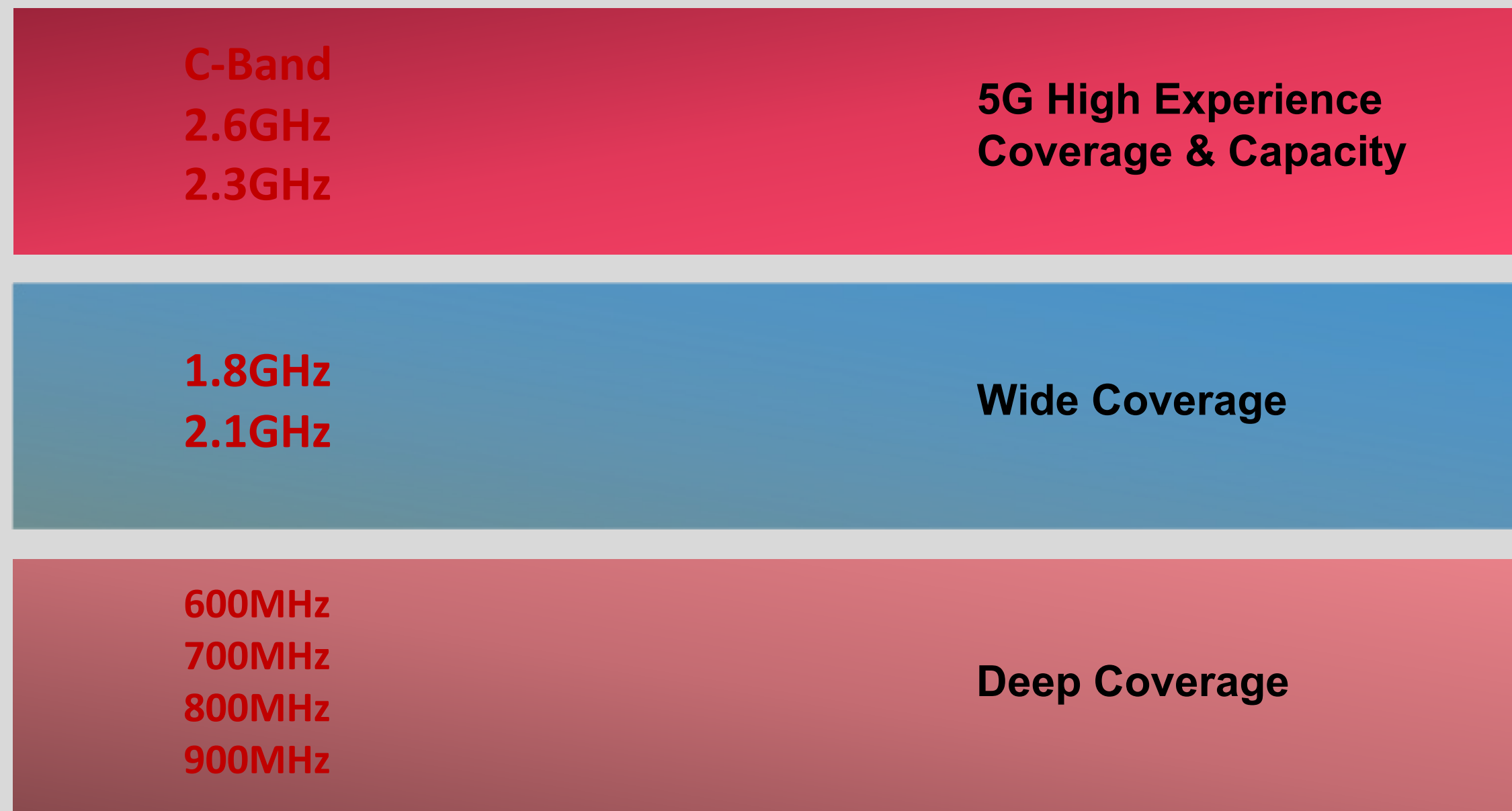
Mid-Band 5G Stimulates Unprecedented Global GDP Growth

- ◆ **5G** is expected to generate **\$960bn** in GDP on a global basis - **approximately 0.70%** of forecast global GDP by 2030
- ◆ **Mid-band 5G** contribution will represent **\$610bn (63% of total 5G benefits)** uplift to global GDP by 2030



Untapped Potential Within Mid-Bands

Spectrum at a Glance



- **Mid-bands** offer good mix of **coverage, capacity and large continuous bandwidth** for 5G services.
- **C-Band, 2.6 and 2.3GHz** are golden bands in this range.





















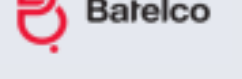


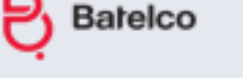






GSMA advocating for further release of mid-bands to mobile operators :

- Mid-bands typically offer a good mixture of coverage and capacity for 5G services.
- The 2.3 GHz and 2.6GHz bands should also be licensed to operators for 5G use.

*Source: 5G Spectrum, GSMA Public Policy Position – June 2022

GCC Current Spectrum Allocations in Mid-Bands

Released
Planned

	C-Band			2.6GHz			2.3GHz
 KSA	 100MHz • Extend to 150~200MHz each (2023)	 100MHz	 100MHz	 100MHz	 90MHz	 100MHz	
 KWT	 100MHz	 100MHz	 100MHz	• Considering B7 convert to B41			• Spectrum clearance
 UAE	 200MHz	 200MHz		 90MHz	 100MHz		
 QTR	 200MHz	 200MHz		• Country currently using B7 (FDD)			
 BRN	 100MHz	 100MHz	 100MHz	 50MHz	 40MHz	 50MHz	
 OMN	 100MHz	 100MHz	 100MHz				

- **C-Band: GCC countries are leading the world** with network deployments on this spectrum range.
- **2.6GHz: Most countries have already assigned with large bandwidth or considering.**
- **2.3GHz: Only STC has assigned, so more can be done with 2.3GHz** to maximize its untapped potential in order to drive 5G development and prosperity. (So this presentation will emphasize 2.3GHz Spectrum)

ME 5G Leads the Stride, Empowering Industries for Success

17
5G Networks

~45M
Population Coverage

30%+
User Penetration

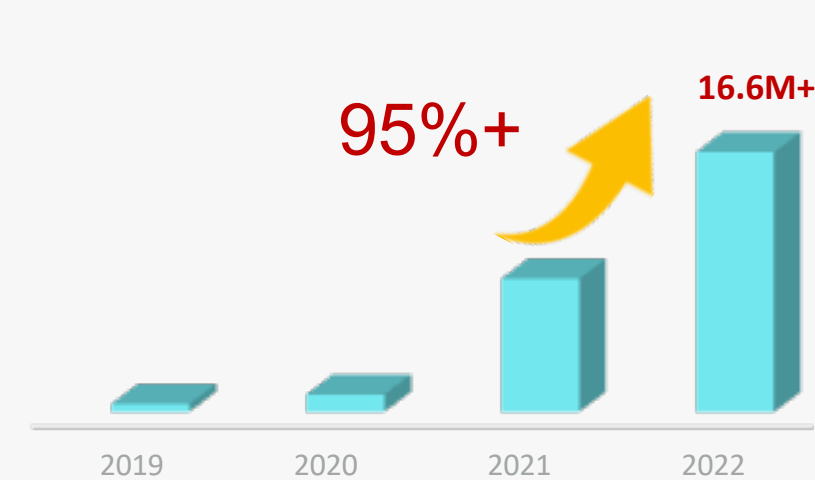
37%+
Traffic Penetration

Source: Huawei Market Insights 2022

5G ToC eMBB

Enable Personal Communication

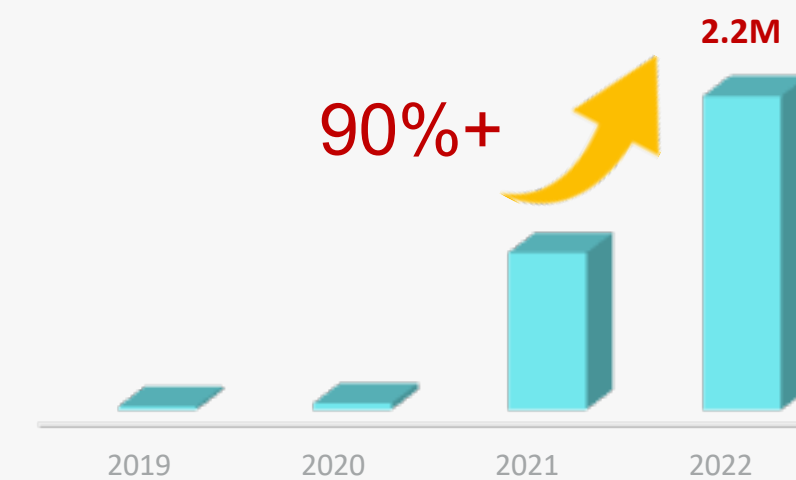
Billion Explosive Growth



5G ToH FWA

Enable Entertainment, Easy Access

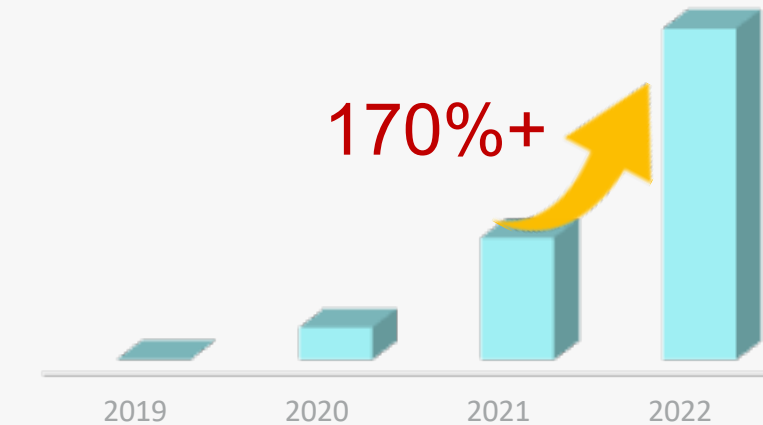
Low Cost and Short TTM



5G ToB Leased Line

Enable + X Applications

5~10X ARPU Increase



Going Further, 5G is Empowering Industry Digitalization in the Middle East



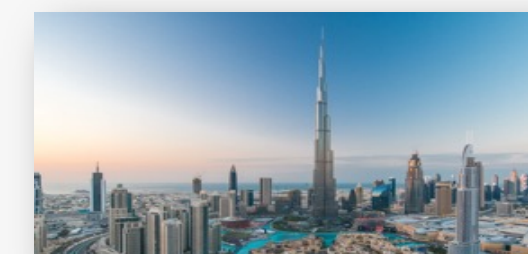
Logistics

NEW



Oil & Gas

NEW



Smart City

NEW



Safe City



Healthcare



Education

- **6** industries
- **20+** user cases
- **90+** regional ecosystem partners

Mid-Band Spectrum Industry Insights

Technical Advantages

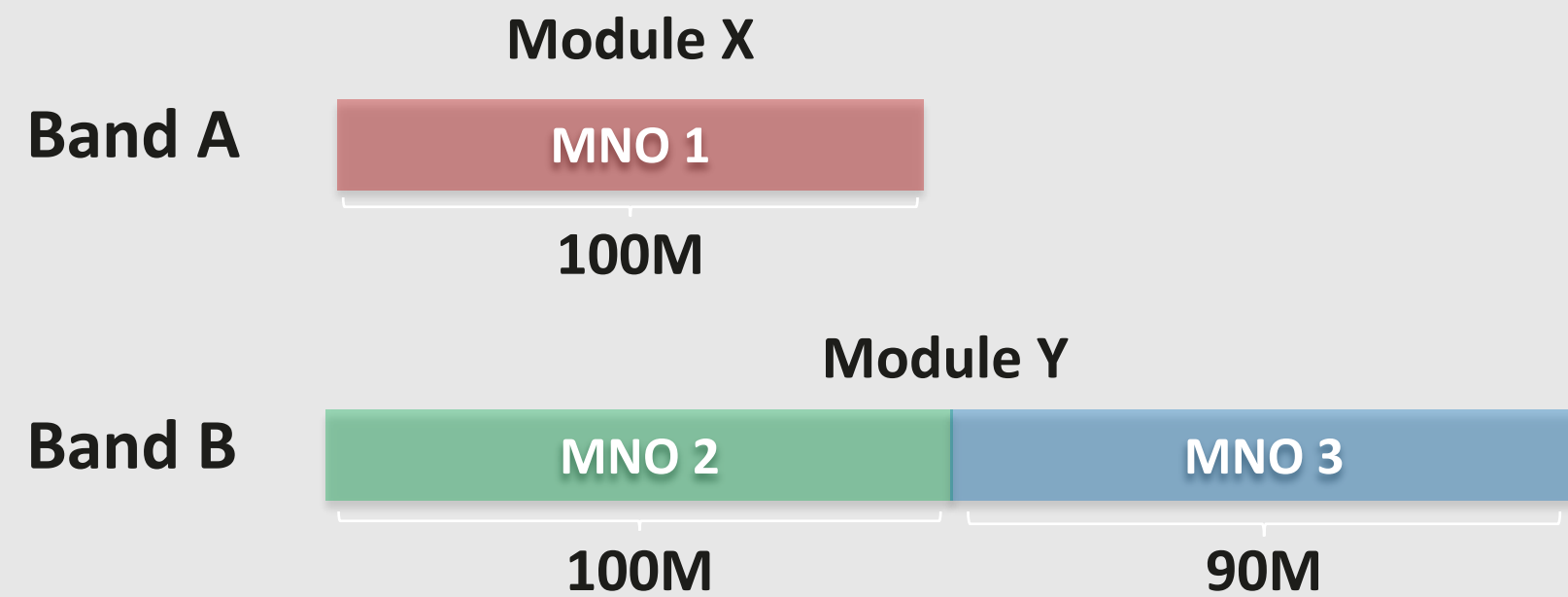
Success Cases

2.3 & 2.6GHz: Large Contiguous Bandwidth Achieves Higher Spectrum Utilization and Reduces Investment

◆ Large Contiguous Bandwidth: Reduces Module Investment

5G-Oriented Spectrum Allocation

With **large contiguous** spectrum, each operator gets **1** band, requiring only **1** module thereby reducing investment.



VS

Non 5G-Oriented Spectrum Allocation

With **fragmented** spectrum, each operator gets **2** bands, requiring **2** modules and increasing investment expenses.



◆ Large Bandwidth Advantages: Higher Capacity & Significantly Enhanced Experience

5G	100M	60M	40M	20M	Remarks
Channel utilization	98.3%	97.2%	95.4%	91.8%	
RB number	273	162	106	51	
Uplink single-user peak (Mbps)	379	222	146	69	DL:UL=4:1/64T 4layer 64QAM
Downlink single-user peak (Gbps)	1.84	1.06	0.69	0.29	DL:UL=4:1/64T 4layer 256QAM
Uplink cell peak throughput (Mbps)	760	446	295	140	DL:UL=4:1/64T 8layer 64QAM
Downlink cell peak throughput (Gbps)	5.94	3.48	2.26	1.01	DL:UL=4:1/64T 16layer 256QAM

Specific 3 Models (or Phases) Using Golden 2.3GHz Band For Building Leading Networks

LTE Coverage and Capacity Layer

- **Scenario:** 2.3G Release LTE Traffic
- **Value:** LTE High Exp. Fundamental Network



- No 5G License, 30M LTE@MM
- Total 4G Exp. 8.6Mbps => 17Mbps
- **Best 4G experience NW** in North Africa



- No 5G License, 40M LTE@MM + 8T
- Experience **2x**; 4G capacity expansion, Unleash Suppressed Traffic **90%**

LTE + NR, 5G Ready

- **Scenario:** Legacy Spectrum Large BW
- **Value:** Strengthen 4G and Lead 5G for Branding



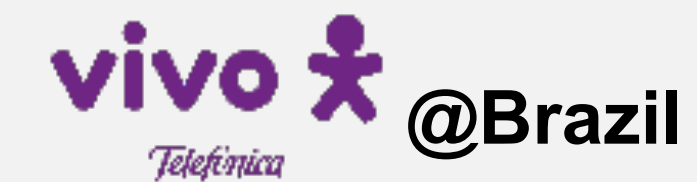
- Legacy Spectrum, 60M NR + 40M LTE@MM
- 3.5G + 2.3G, Experience & capacity



- No C-band spectrum; Legacy 2.3G 50M BW
- 30M NR + 20M LTE; 4G exp. **~3X** (MM Vs 8T)
5G exp. 2.3G **6X** vs 2.1G NR

NR for Rapid 5G Evolution

- **Scenario:** New Spectrum Large BW as 2nd Carrier
- **Value:** Competitive Exp., Capacity and Coverage



- New Spectrum, 40M NR@MM
- 3.5G + 2.3G, Experience leading, **P3 No.1**
- Peak 2.7Gbps, **5G City@ Rio de Janeiro**



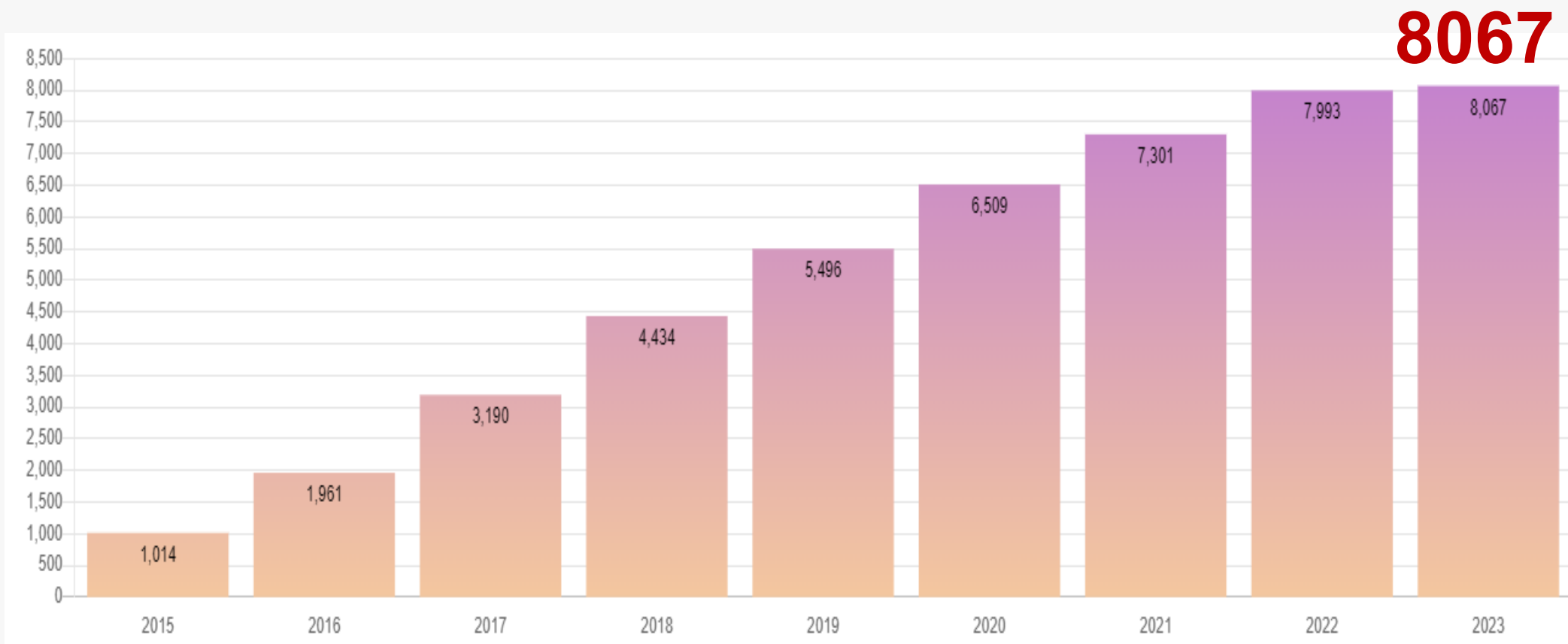
- New Spectrum (TBD), 100M NR@MM
- 3.5G + 2.3G, Experience & Capacity
- **Deep Coverage** w/ 2.3GHz High BW MM

2.3GHz NR Industry Increasing Momentum Towards Maturity

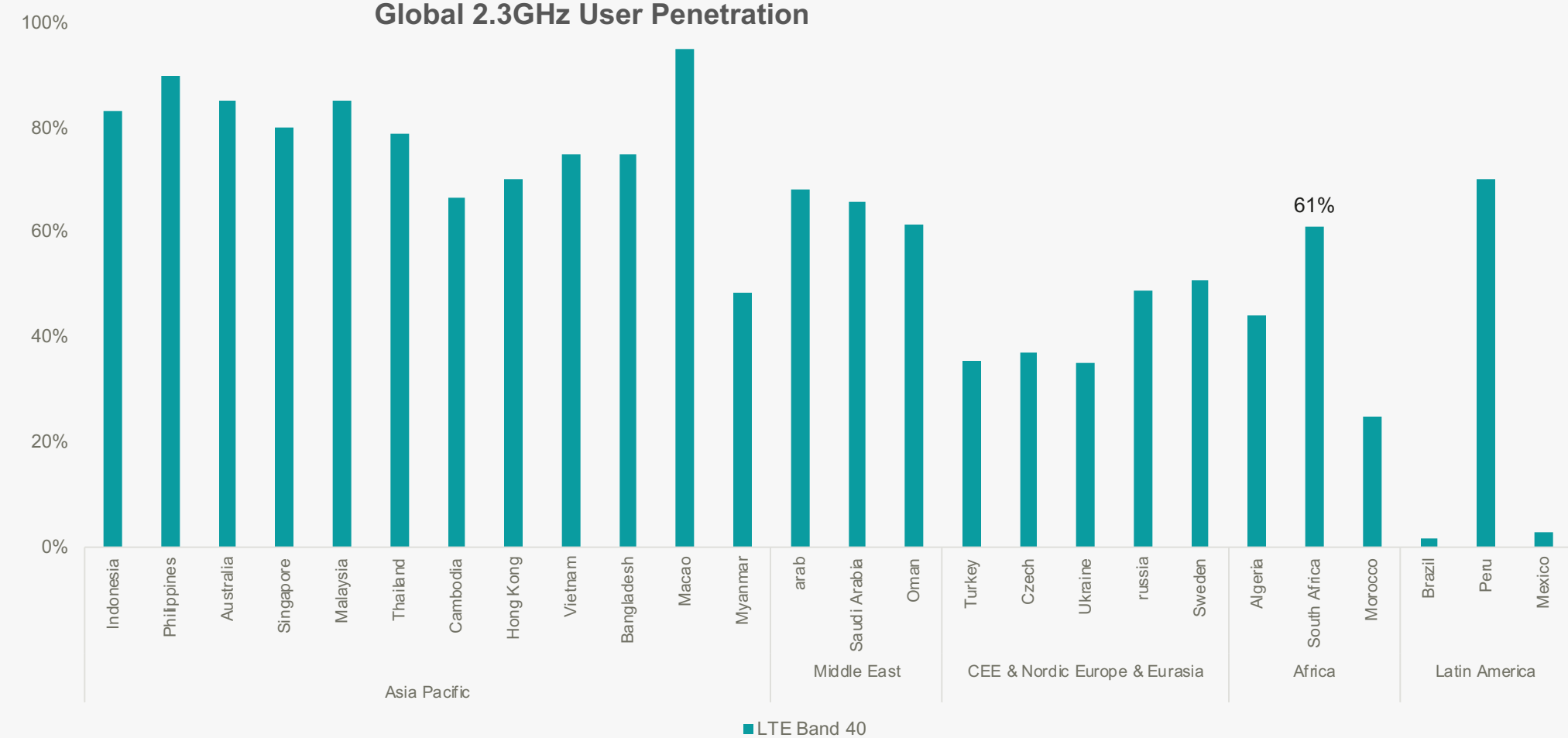
LTE Devices Supporting 2.3GHz (B40) Widely Available

Number of NR Devices Supporting 2.3G (N40) Increasing Rapidly

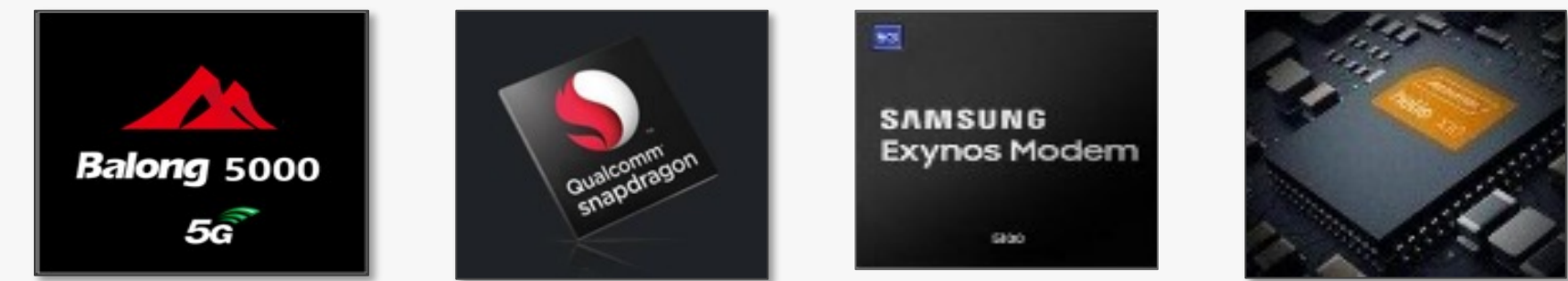
Growth in Announced LTE 2.3G (B40) Devices



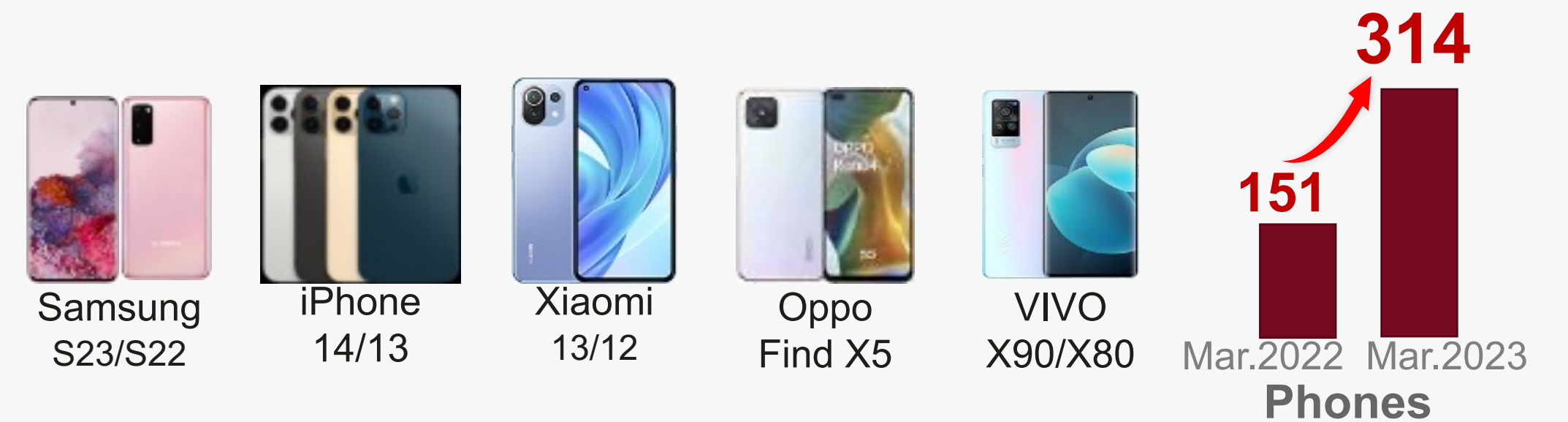
Global 2.3GHz User Penetration



Chipset Support for Band N40 Since 2019



562 5G Devices Support Band N40 as of March 2023



IOT Verified in Huawei Network



Source: GSA GAMBoD, Mar. 2023



Mid-Band Spectrum Industry Insights

Technical Advantages

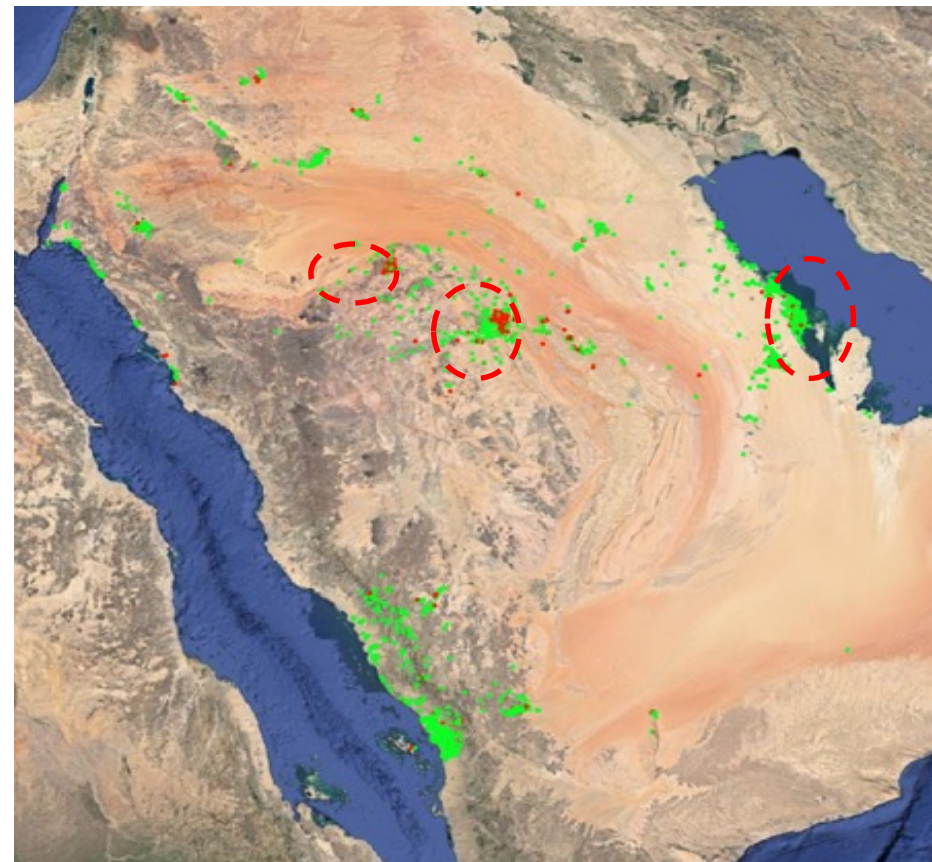
Success Cases

2.3GHz LNR: Improved Performance for 4G and 5G, in ME

2.3G LTE Wide Deployment with Large BW

- **Sites:** Continuous Coverage
- **BW:** LTE 4CC/5CC

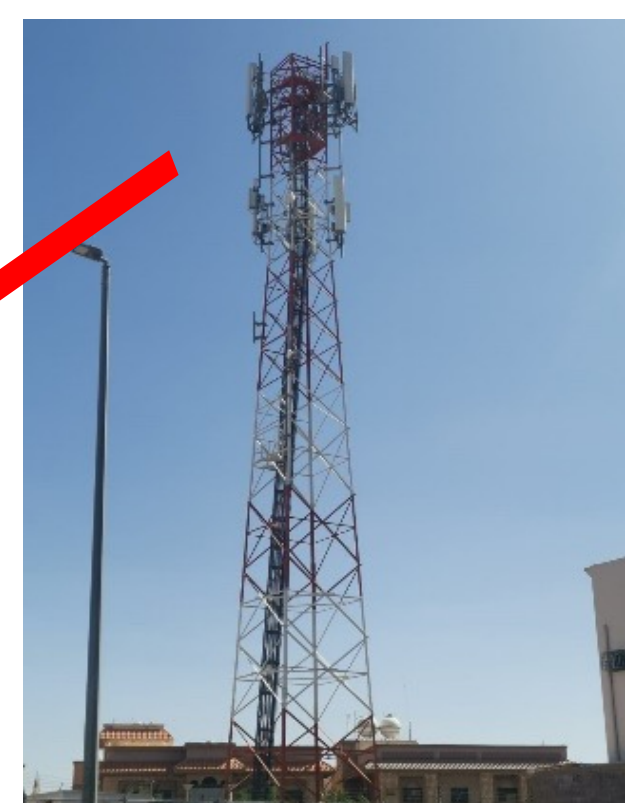
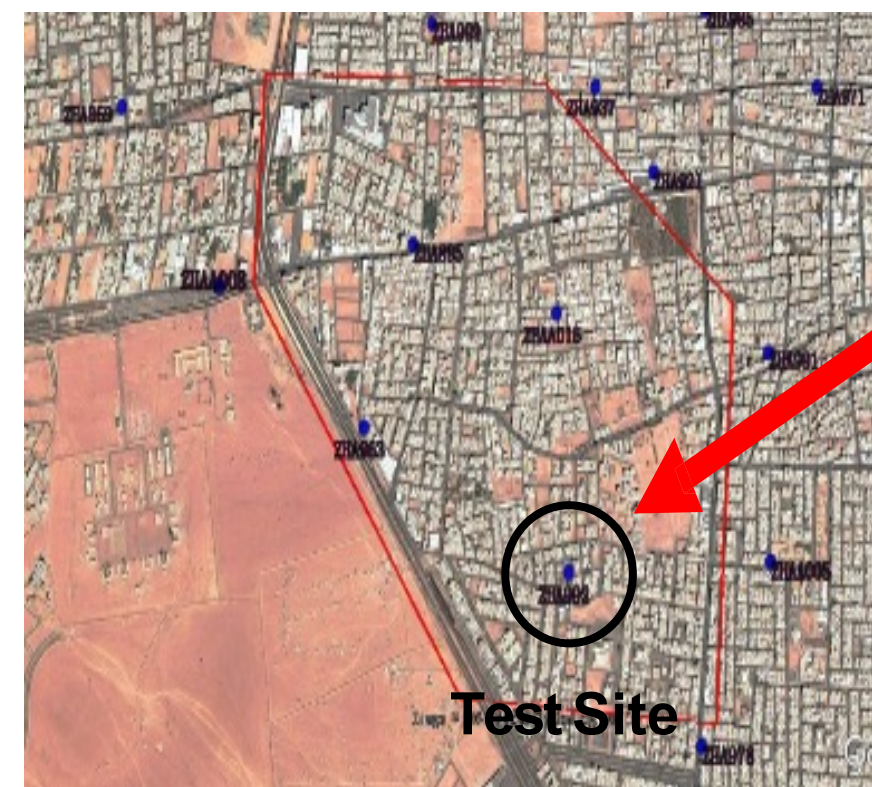
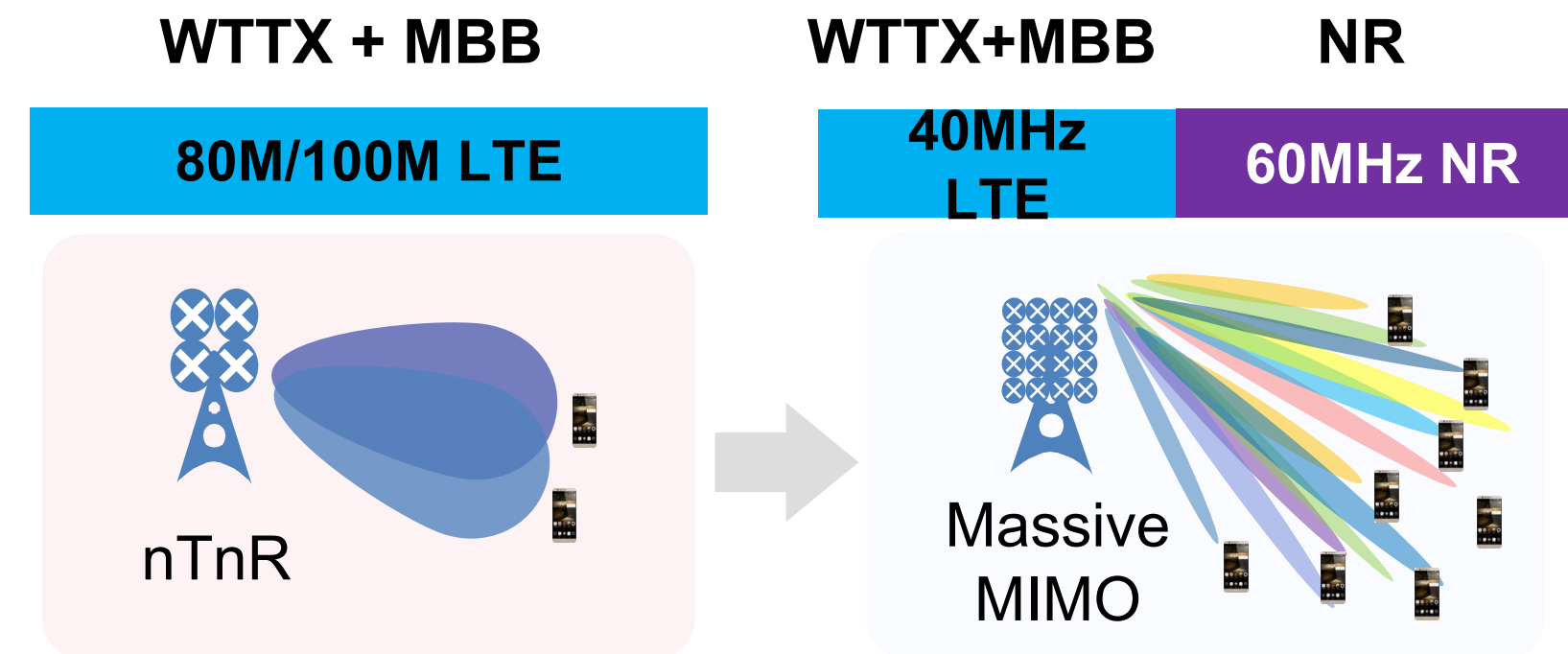
baity for your home
with the new baity fiber packages



2.3G Refarming Plan: LTE + NR (Trial)

Before: LTE (nTnR)

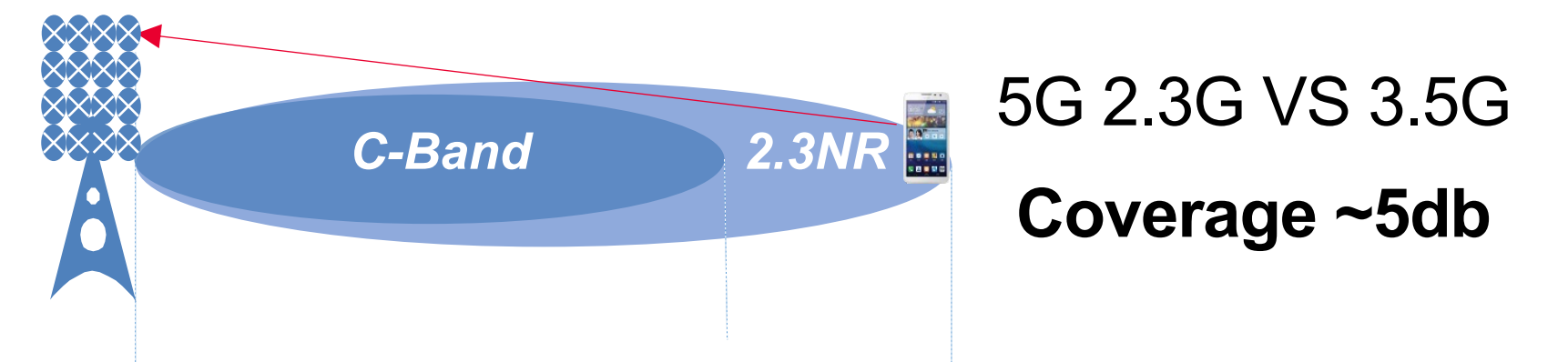
After: LTE+NR (MM)



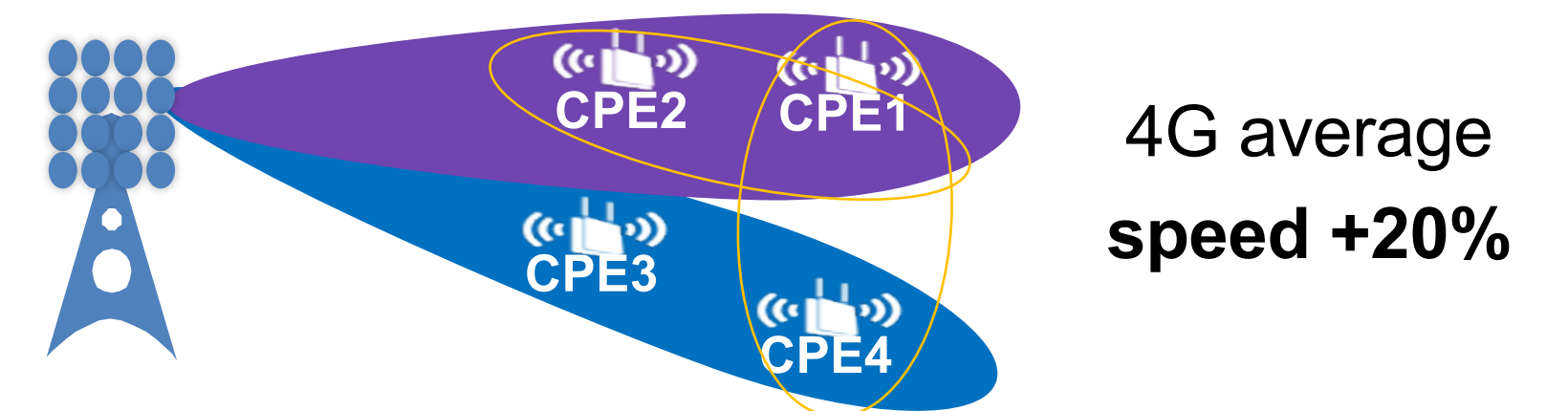
Field Test

2.3G Bring More Value for 4G and 5G

1) Enhance 5G coverage



2) Improve 4G coverage and speed



3) 2.3G + 3.5G CA improve 5G speed



5G Carrier Aggregation
DL 2.XGbps

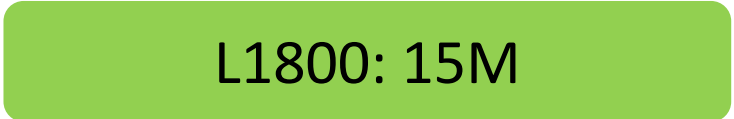
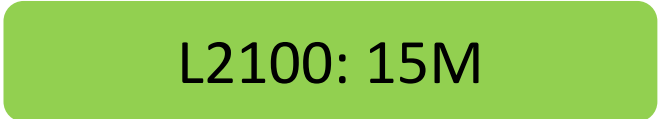
2.3G LTE: 2.3G + MM Achieve Best 4G Experience Network in NA

2.3G + Massive MIMO: decongests LTE traffic, significantly improving the user experience **8Mbps** → **17Mbps**

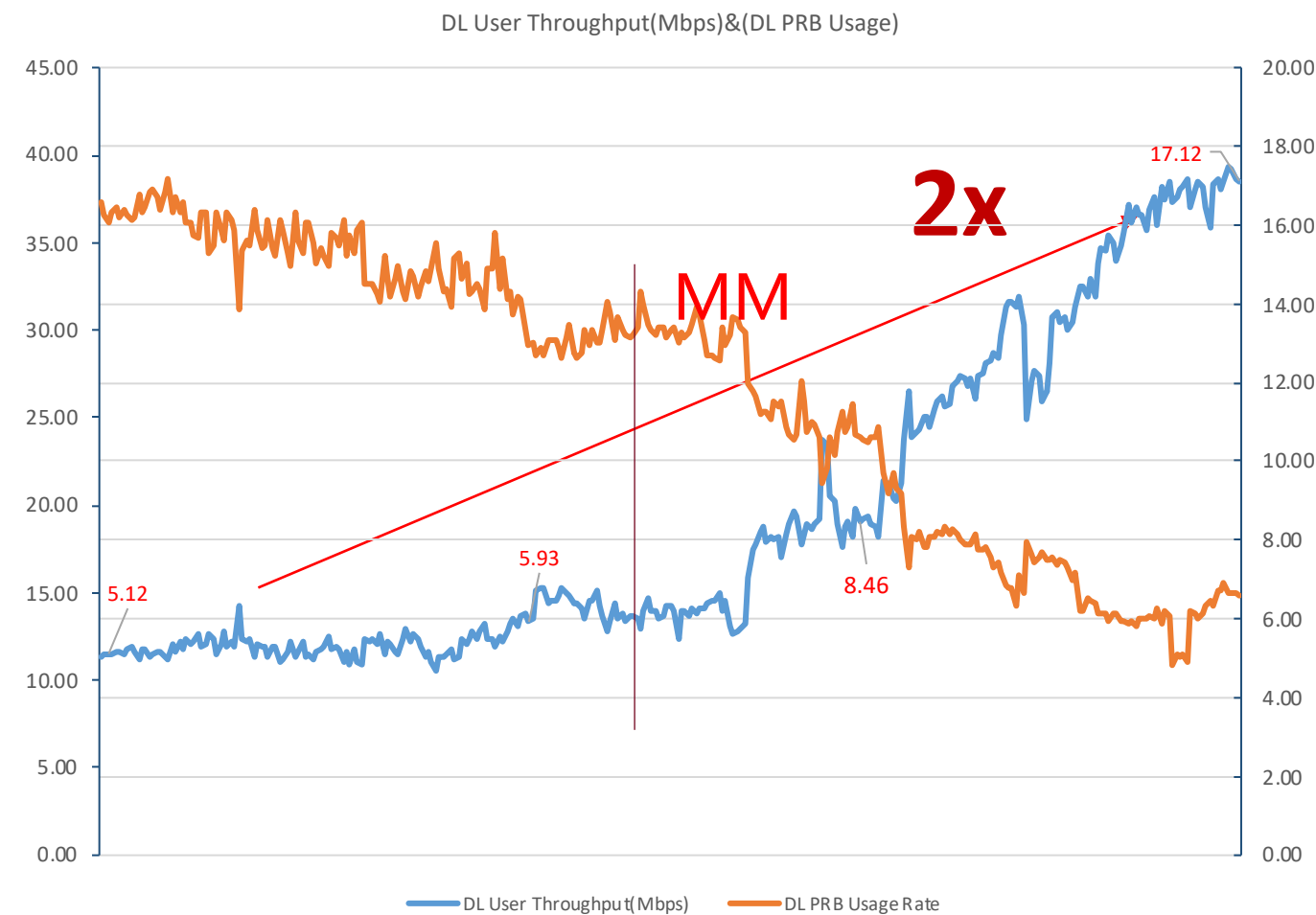
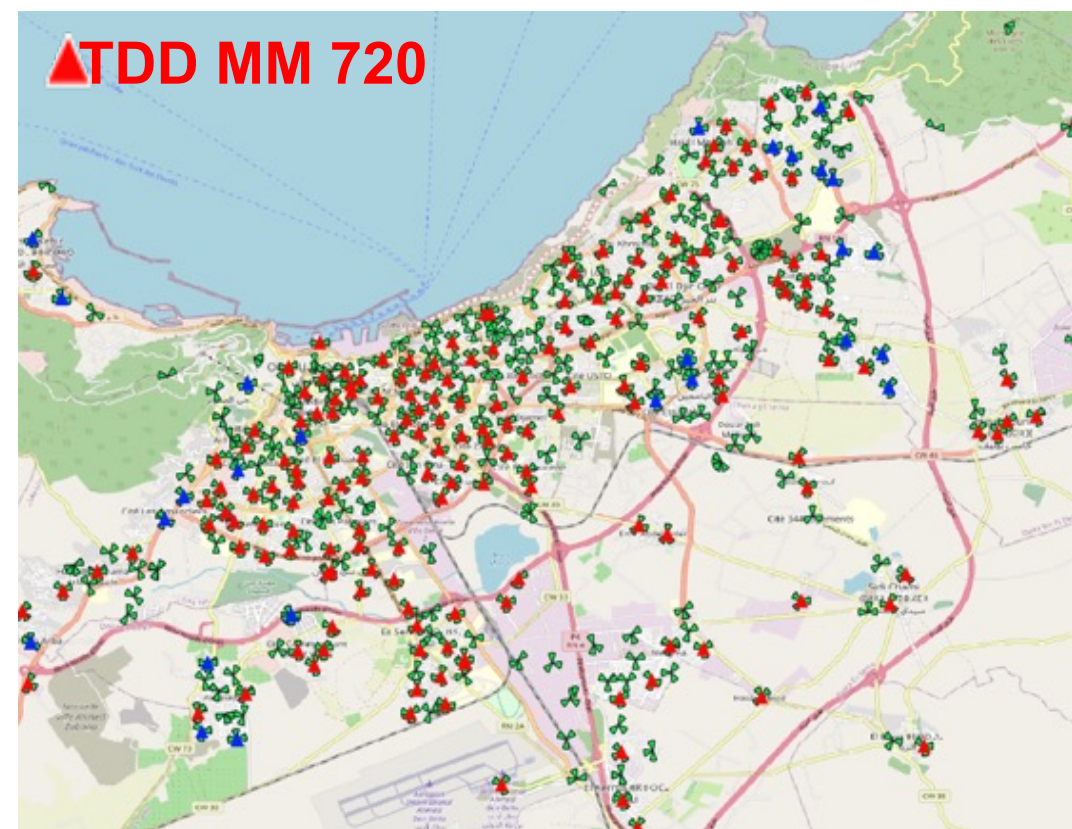
TDD (30M)



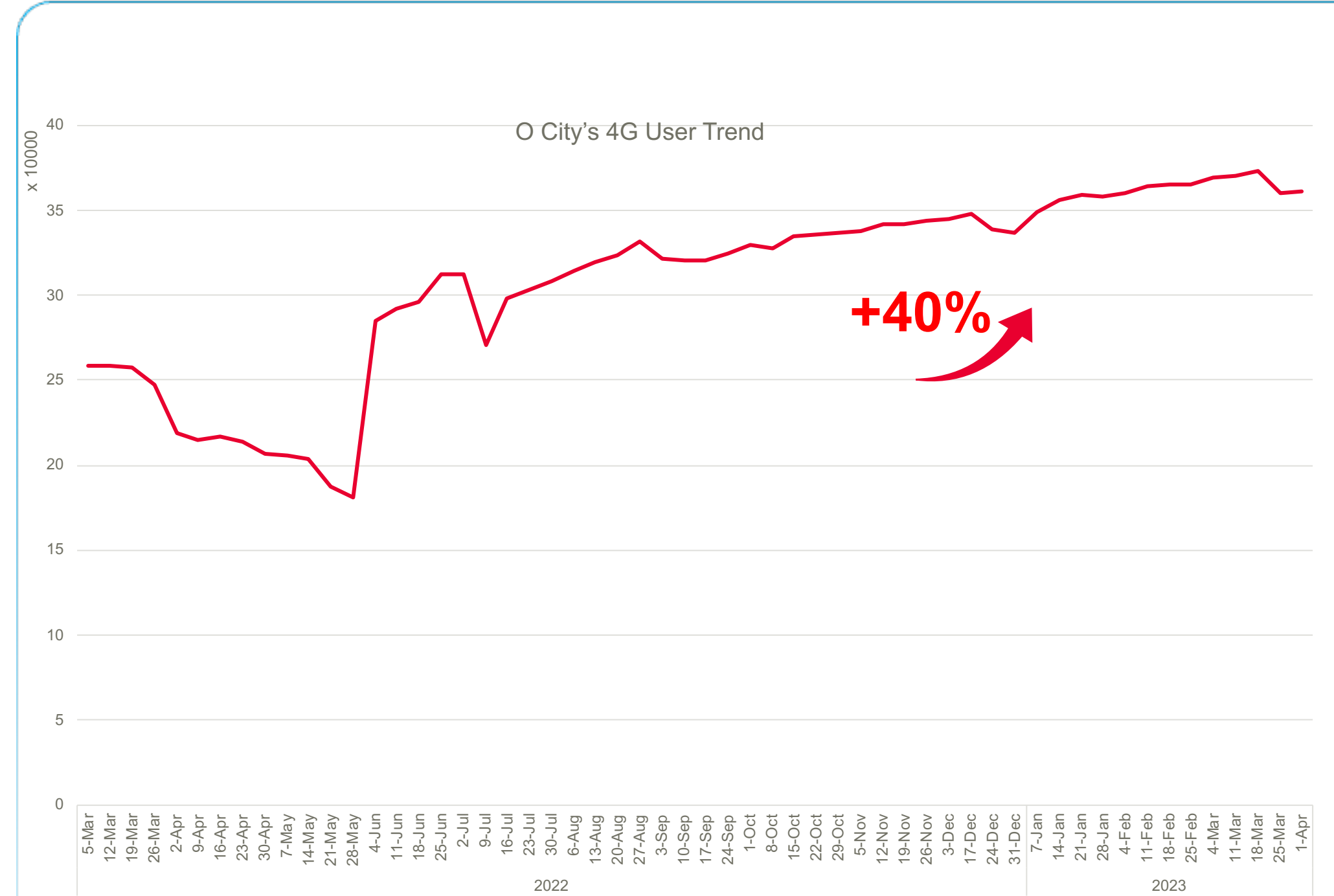
FDD (30M)



After deploying 2.3G + Massive MIMO, DL user throughput nearly doubles to **17 Mbit/s**.



The growth rate of 4G subscribers in O city (40%) is **3x** greater than the entire network (14%)



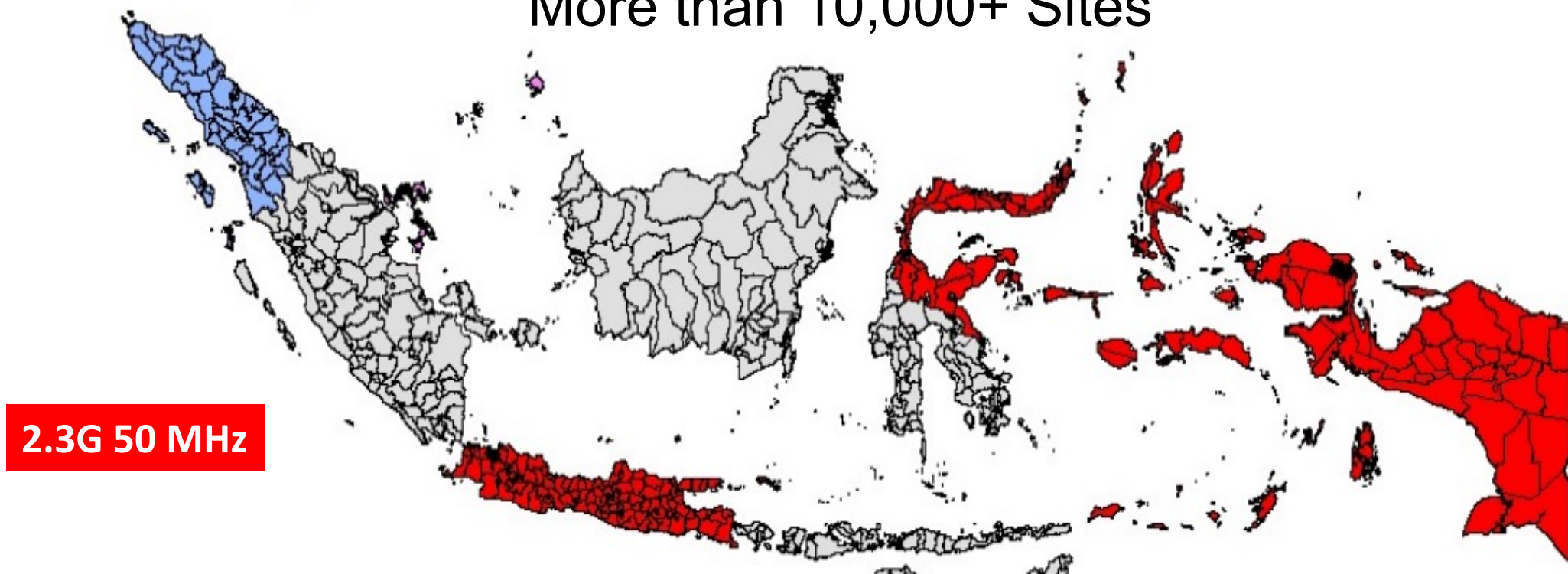
* In 2022, the growth rate of 4G subscribers on the entire ATM network is 14%, from GSMA.

Operator A has started to replicate O City's 2.3G successful experience on the entire network to build a 2.3G national-wide M-MIMO network.

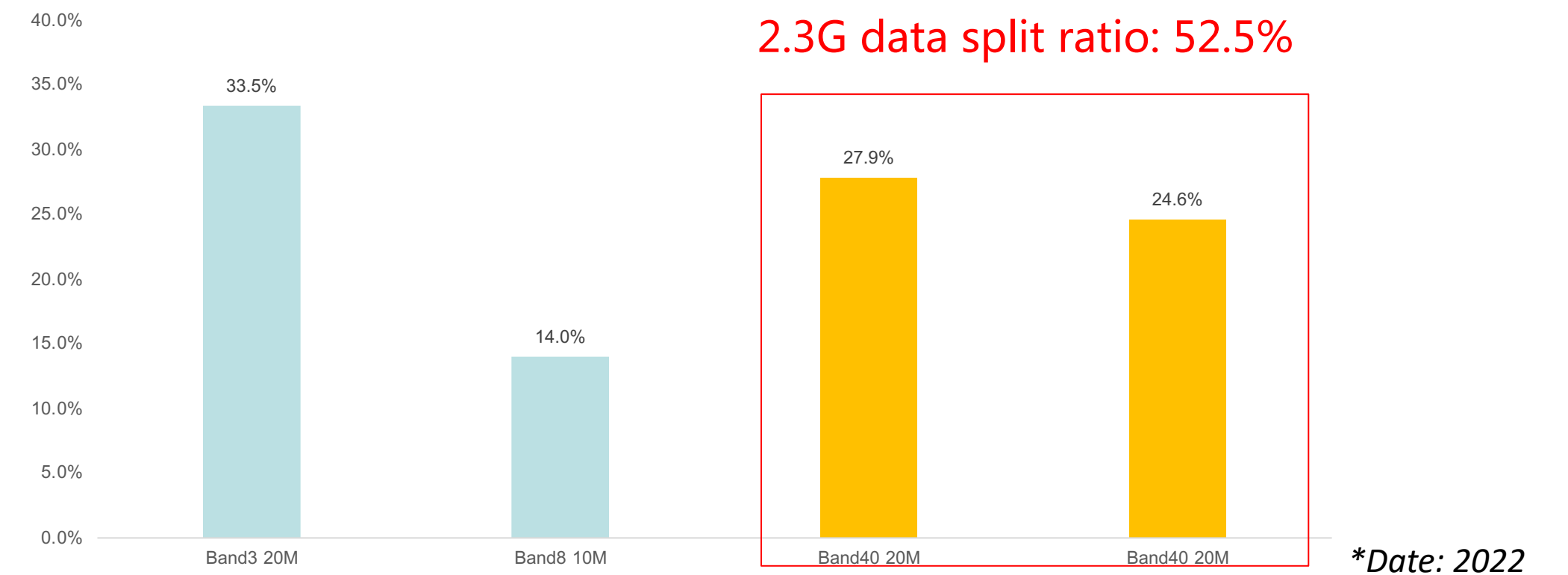
2.3G LNR: Unlocks 2.3GHz Network Potential in APAC

① 2.3GHz Widely Deployed with Large BW

More than 10,000+ Sites



② 2.3GHz Split Data Ratio 52.5%, as Main Capacity Layer



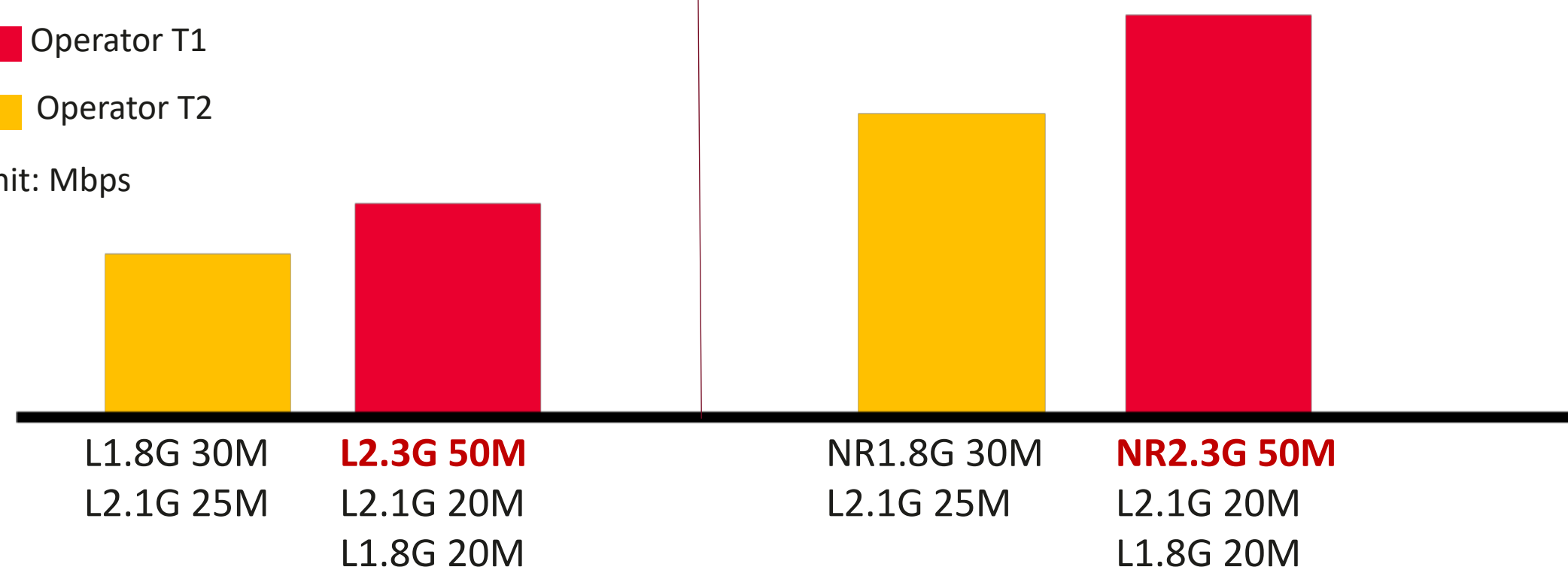
③ 2.3GHz Helps Ensure the Leadership of 4G/5G

4G Superior Experience

4G 2.3G

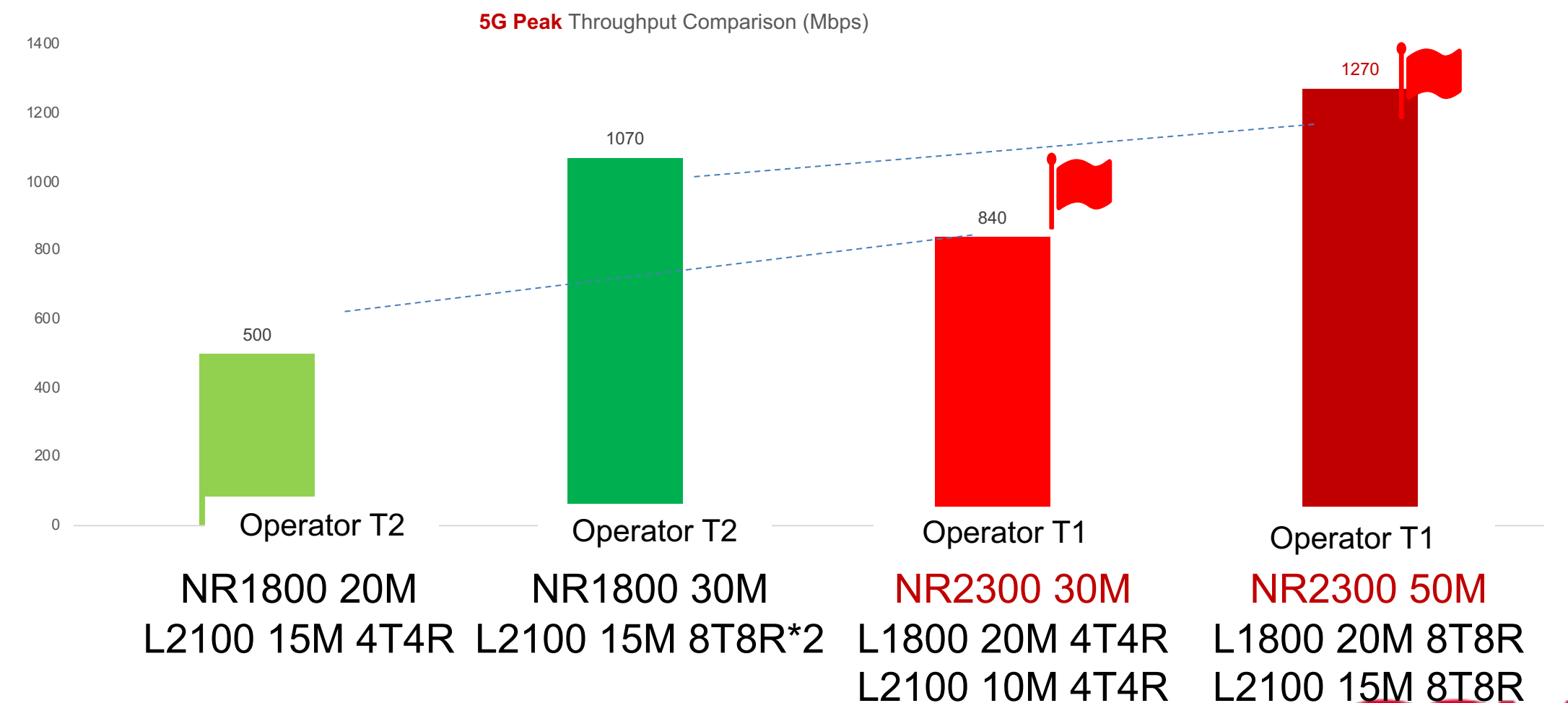
Operator T1
Operator T2

Unit: Mbps



5G Branding

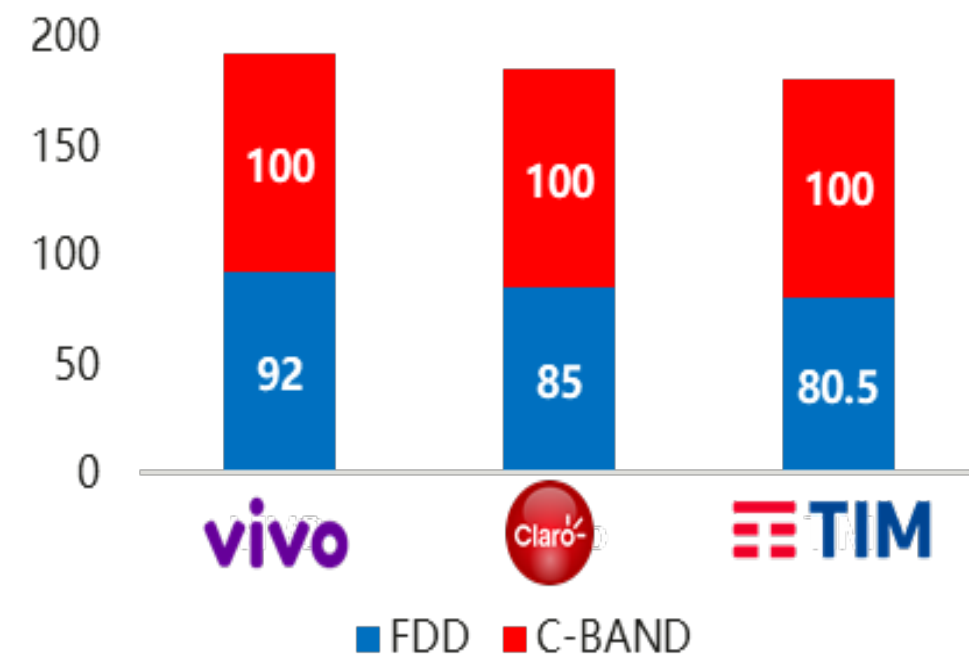
5G 2.3GHz in HVA



2.3G NR: 2nd Carrier for Rapid 5G Evolution, in LatAm

2.3GHz is the Key Spectrum for Leading Network

Similar 3.5G Spectrum



2.3G Spectrum

Region	50 MHz	40 MHz
III	Claro	VIVO
VIII	Claro	VIVO
IV	Brisanet	-
V	Claro	VIVO
VI	Claro	TIM(RJ)
VII	VIVO	TIM
IX	Claro	Algar

2.3G is competitive advantage for 5G experience

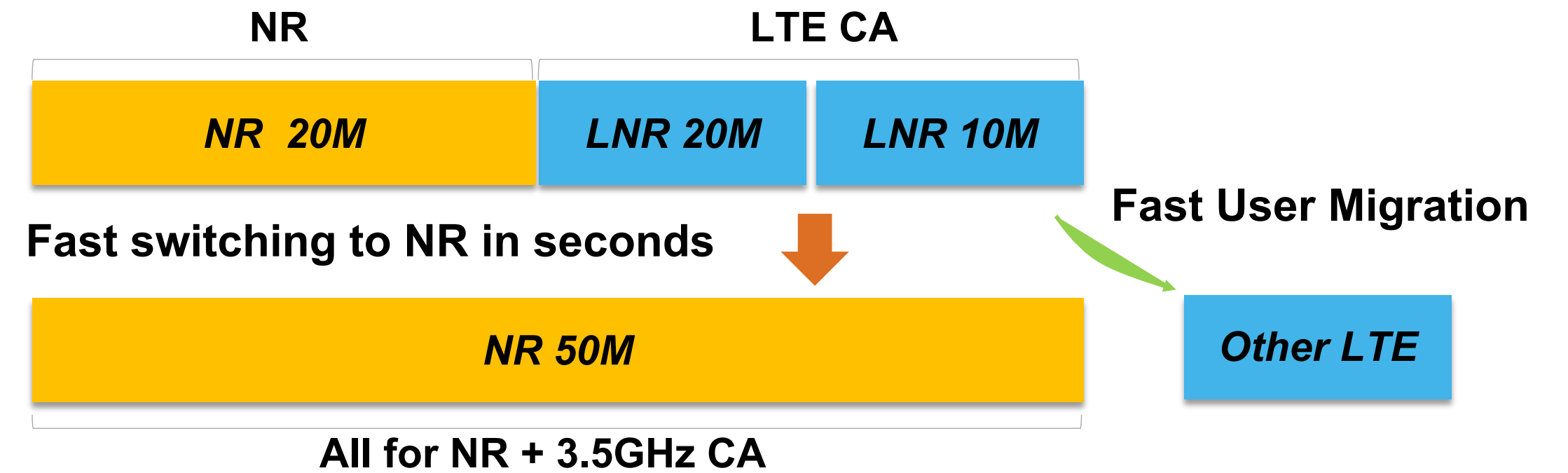
2.3G+3.5G 150MHz CA peak rate > 2.3Gbps



Source: Brasilia test

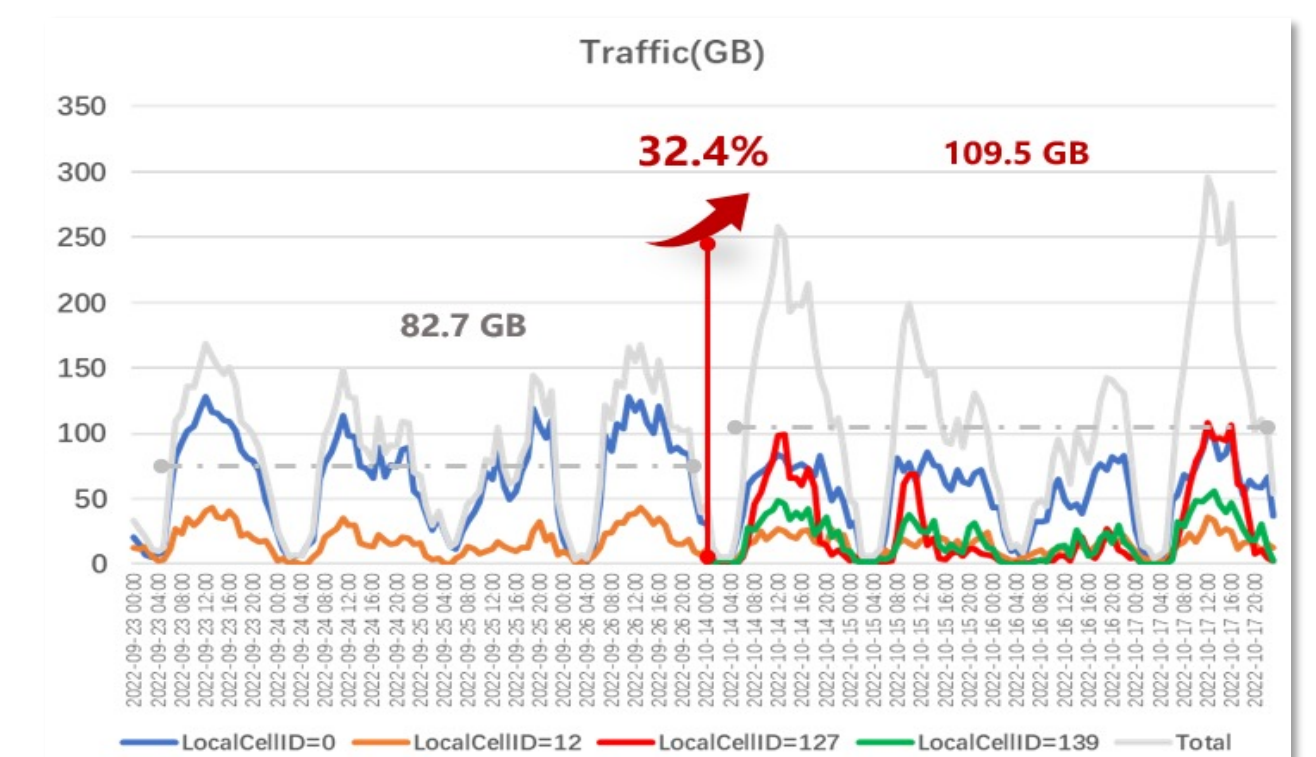
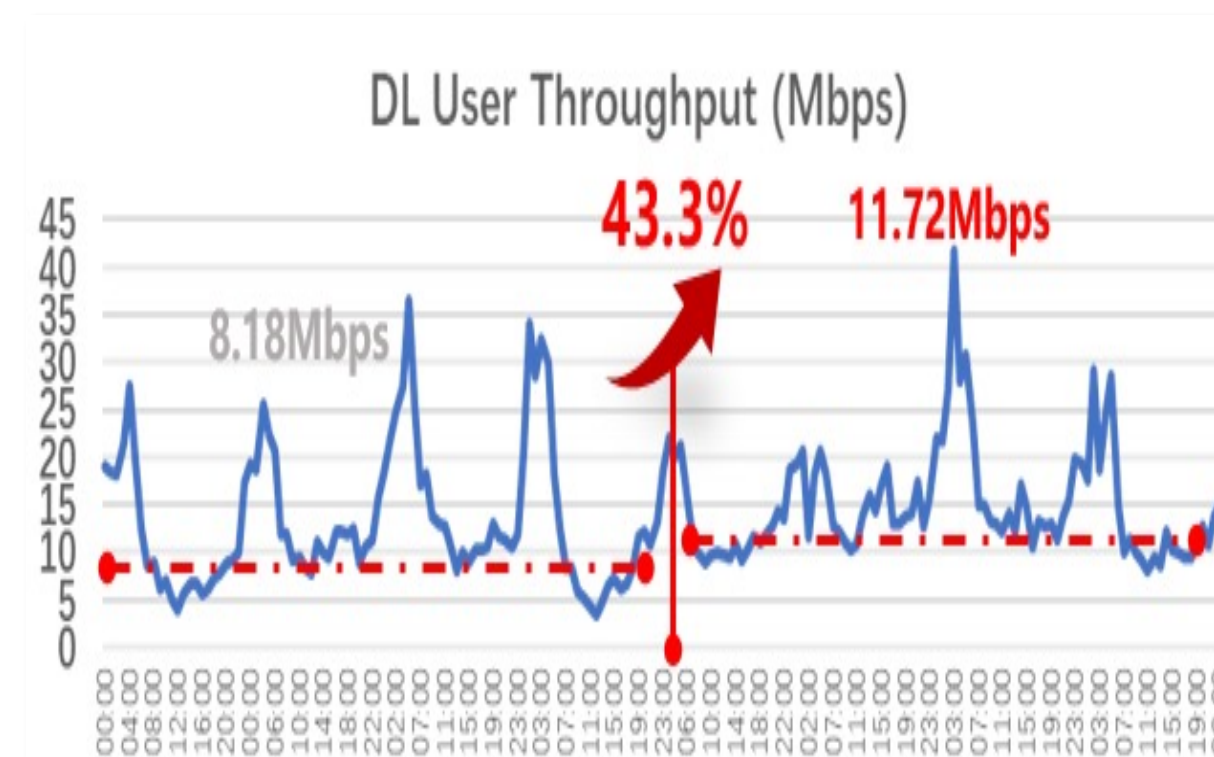
2.3GHz Maximizes Network Value of Operator C

TDD Carrier Duplex Maximizes 2.3G Spectrum Value



Offloads LTE congestion
improves LTE experience by 43.3%

Increases daily traffic by 32.4%
in a single sector



SUMMARY

In order to not only maintain, but to expand GCC's 5G leadership well beyond 2025:

- Mid-band 5G contribution will represent **\$610bn (63% of total 5G benefits)** uplift to global GDP by 2030.
- Mid-band spectrum offer a **good mix of coverage, capacity and contiguous bandwidth** for 5G services with 3.5, 2.6 and 2.3GHz being golden bands in this range.
- **GCC countries are leading the world with C-Band** network deployments, followed closely by 2.6GHz, yet **more can be done with 2.3GHz** to maximize its untapped potential in order to drive 5G development and prosperity.
- Middle East 5G is leading the stride and empowering Industries for **business success**.
- Large contiguous bandwidth provided by 2.3G/2.6GHz achieves **higher spectrum utilization & reduces investment**.
- Using 2.3GHz for **specific 3 models**, or phases, helps build leading networks, **from LTE to NR and beyond**.
- Ecosystem for **2.3GHz NR** gaining momentum towards maturity.
- Various **cases strongly support deploying networks on 2.3GHz** for enhanced performance and experience as well as 5G business success.

Thank you.

The role of Unlicensed Spectrum for Connectivity

David Redl

Broadcom

GSMA™

Spectrum Needs and the Future in WRC-23

Carol Sosa Leguizamón
Spectrum Policy Director
GSMA

GSMA™

WRC-23 IMT Agenda Items



Bands	470-960 MHz	3300-3400 MHz	3600-3800 MHz	4800-4990 MHz	6425-7025 MHz	7025-7125 MHz	10-10.5 GHz
Region 1	AI 1.5 (IMT)	AI 1.2 (IMT)	AI 1.2 (IMT)	AI 1.1 (IMT)	AI 1.2 (IMT)	AI 1.2 (IMT)	
Region 2		AI 1.2 (IMT)	AI 1.2 (IMT)	AI 1.1 (IMT)		AI 1.2 (IMT)	AI 1.2 (IMT)
Region 3				AI 1.1 (IMT)		AI 1.2 (IMT)	

5.5 bn mobile subscribers

1.5 bn 5G connections

As subscribers increase ...

5G needs space to grow

2023



2030

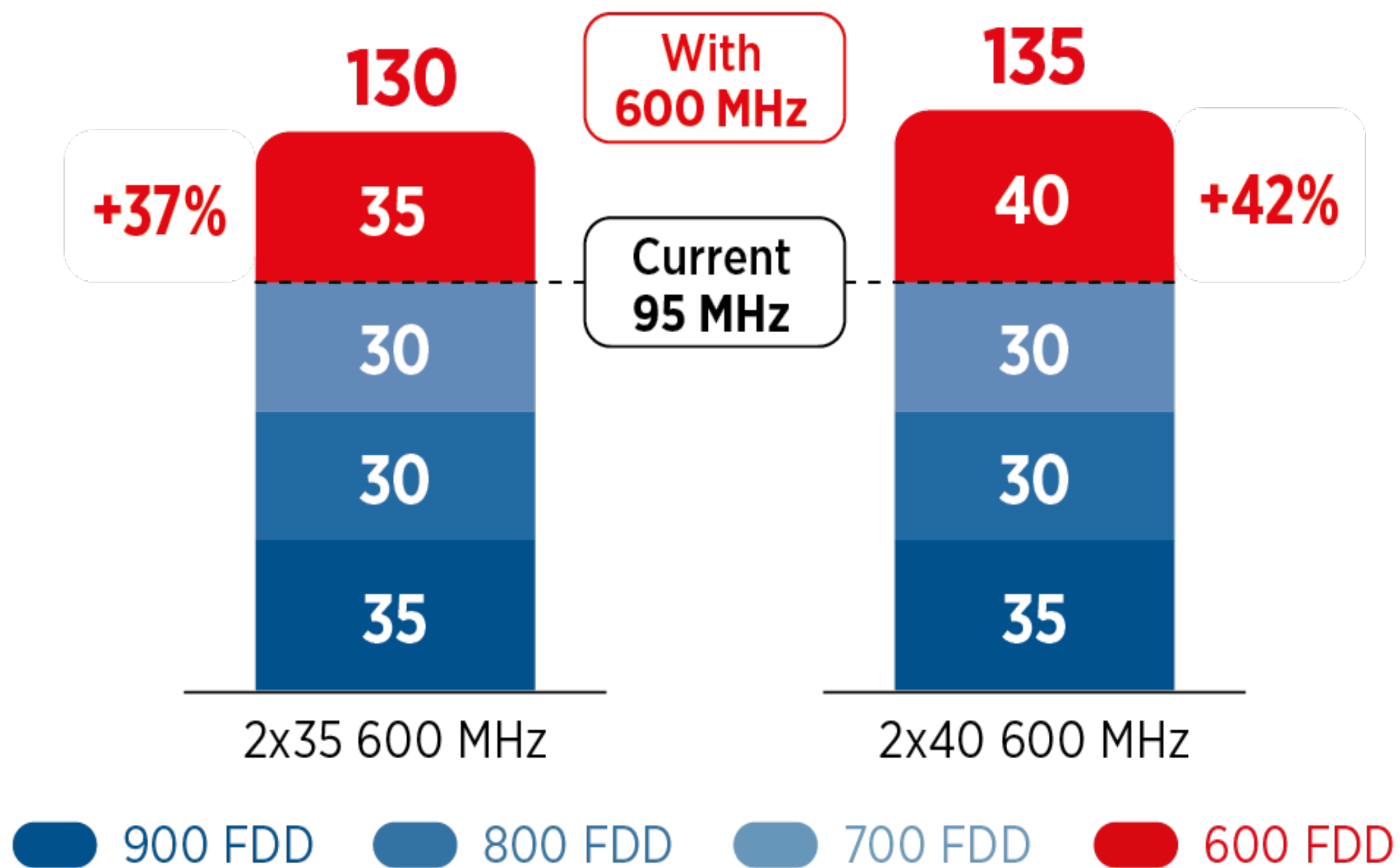


5G Connections in ASMG

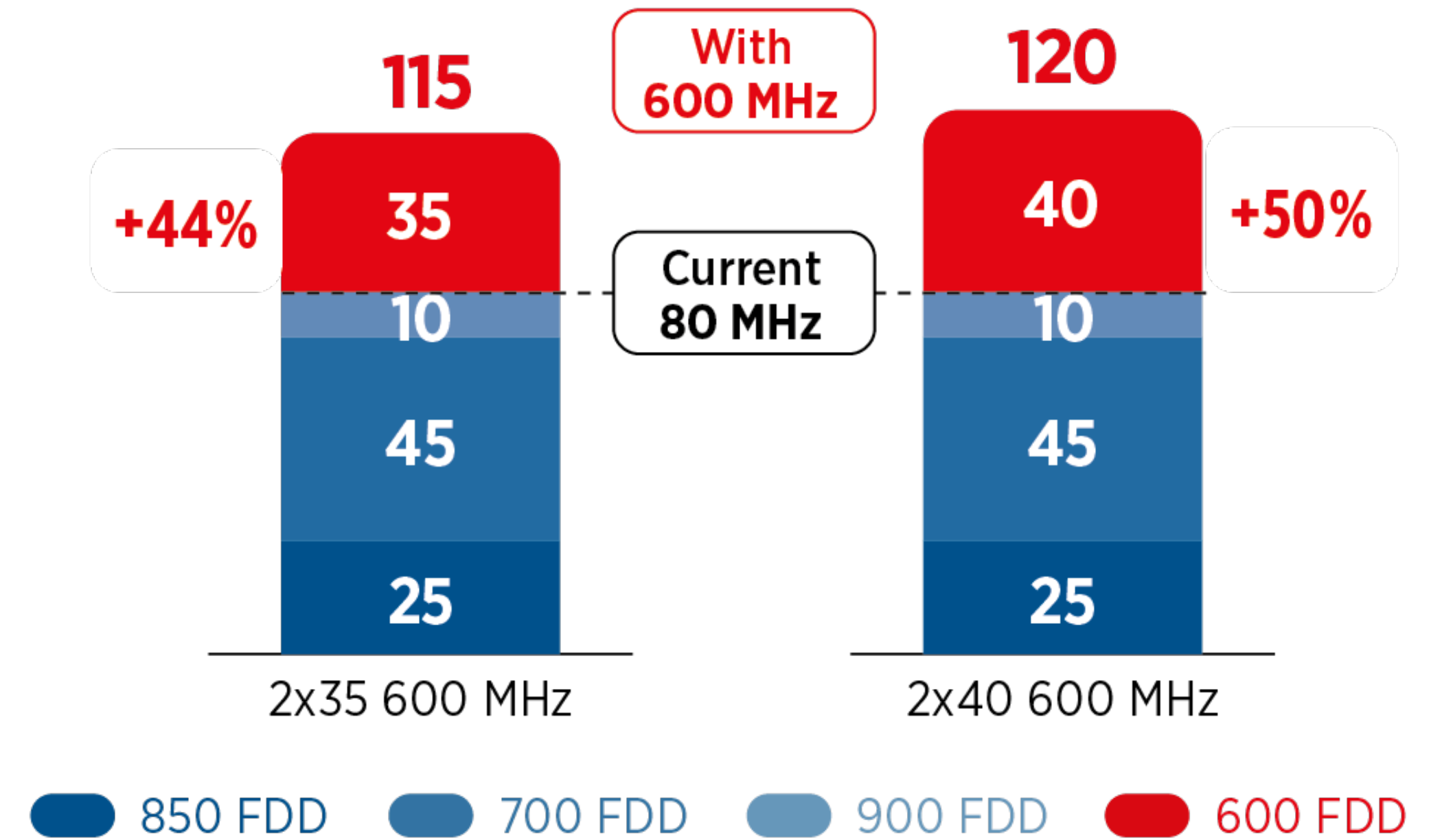


Why More Low-Band Spectrum?

EMEA



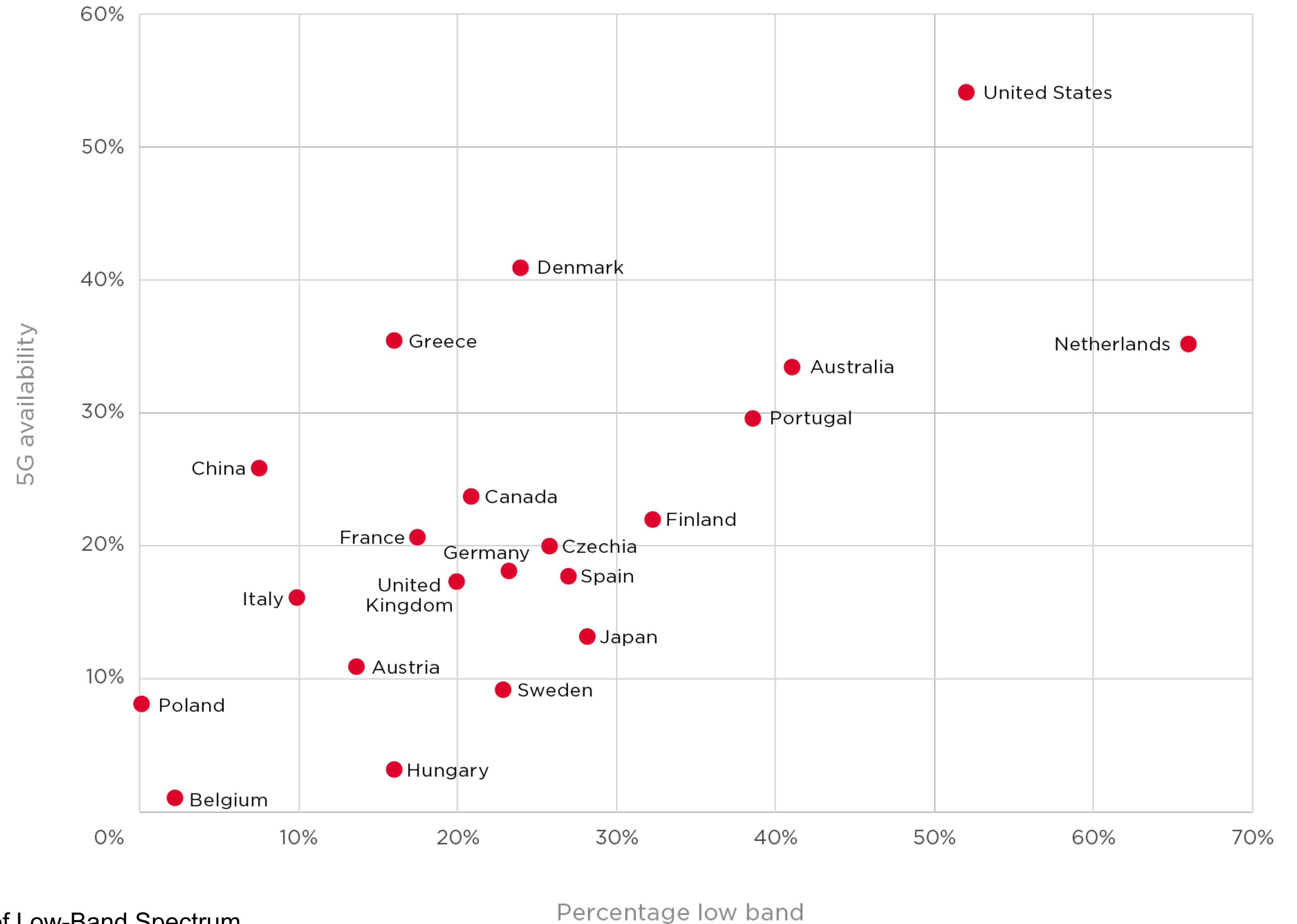
LatAm and APAC



Socio-Economic Benefits of 5G: Importance of Low-Band Spectrum

5G Availability and the Use of Low-Band Spectrum

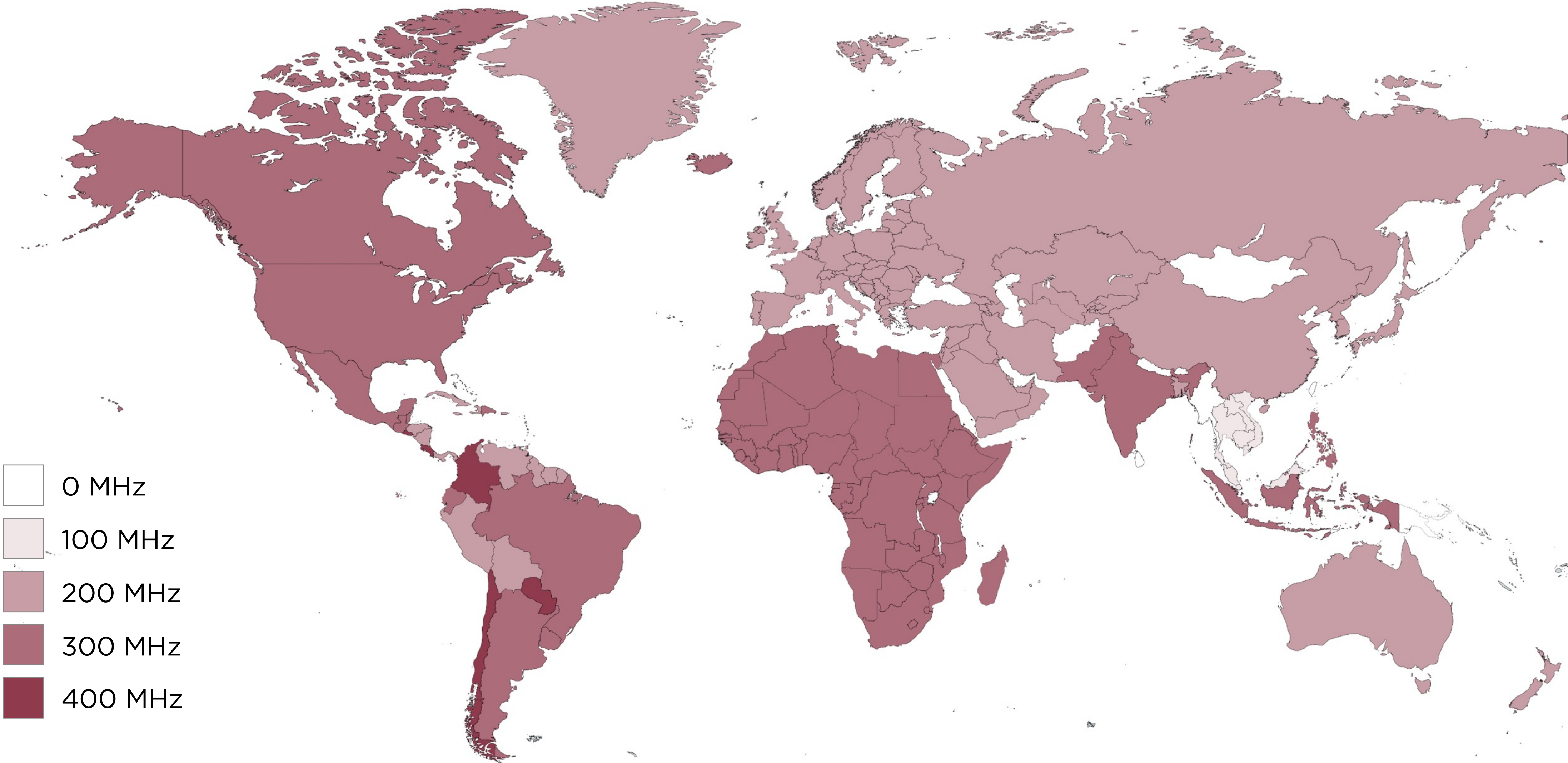
Q3 2022



Socio-Economic Benefits of 5G: Importance of Low-Band Spectrum

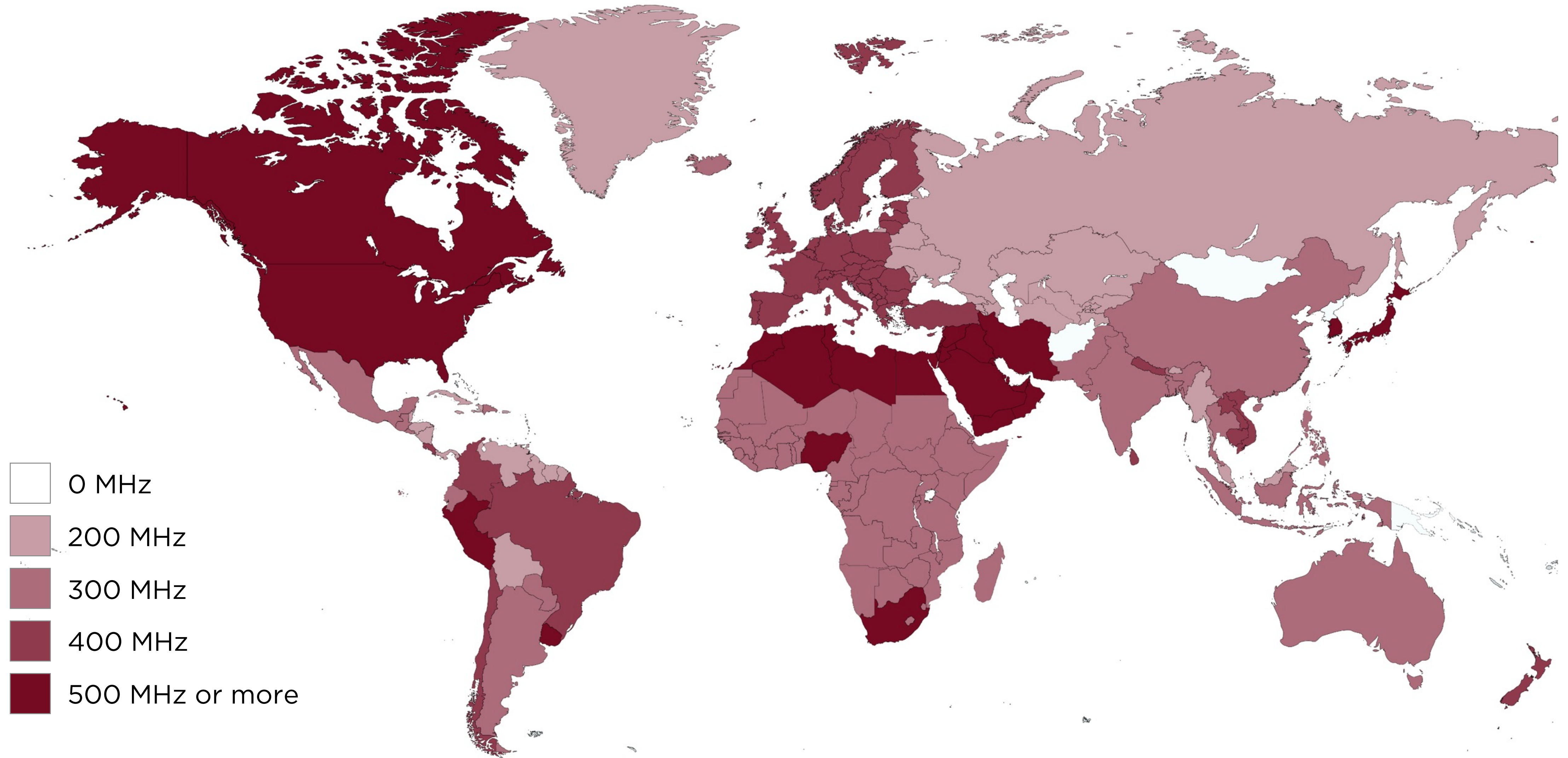
Overview of 3.3-4.2 GHz IMT identifications

Spectrum in the 3.3-4.2 GHz band identified in the Radio Regulations

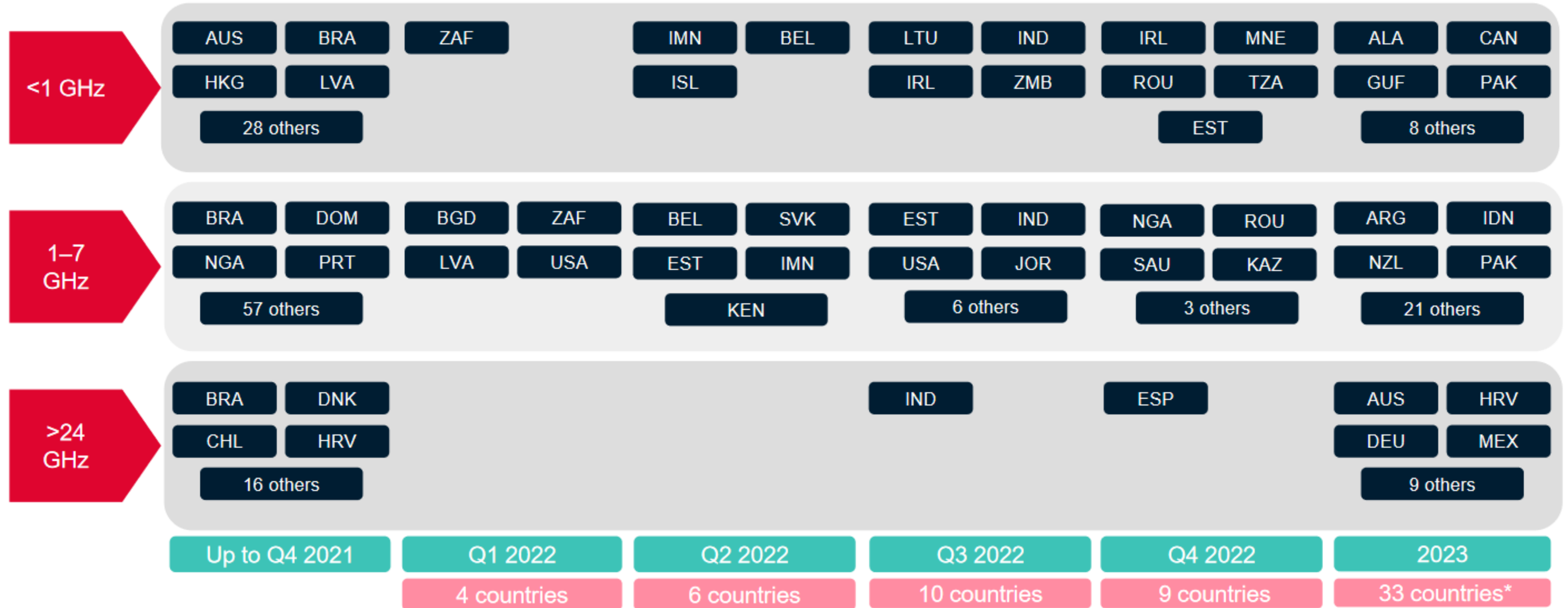


Reality: Countries have Moved Beyond the RRs

5G markets have moved beyond the ITU in their 3.3-4.2 GHz assignments



5G spectrum assignments pipeline



Note: A country is counted twice if spectrum is assigned twice in a year. 2023 data based on previous announcements; however, some of these assignments are unlikely to take place.

Data correct to 31 December 2022
Source: GSMA Intelligence



Digital Equality

Low-band

470-694 MHz

Harmonisation

3.5 GHz

3.3-3.8 GHz

Expansion

6 GHz

6.425-7.125 GHz

Future

IMT 2030

7 - 24 GHz



For the benefit of billions

Mobile is used by over 5 billion people worldwide every day. It creates business opportunities, connects us with loved ones, facilitates healthcare and education, and allows us to enjoy the things that make life worth living.

Panel and Q&A

Moderator:

Carol Sosa Leguizamón, Spectrum Policy Director, GSMA

Panellists:

Moath AlManea, Director of Spectrum Regulation and Allocation, CST

Herman Schepers, Dynamic Spectrum Alliance

Ali Cheema, Head of Government & Industry Relations, Ericsson



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Spectrum: The Road to the Future

Break



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Communications, Space &
Technology Commission

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Session 3

Spectrum for Good
What is new and
what is to come?

ASMG Chair Interview

Tareq Al Awadhi
Chairman
ASMG

GSMATM



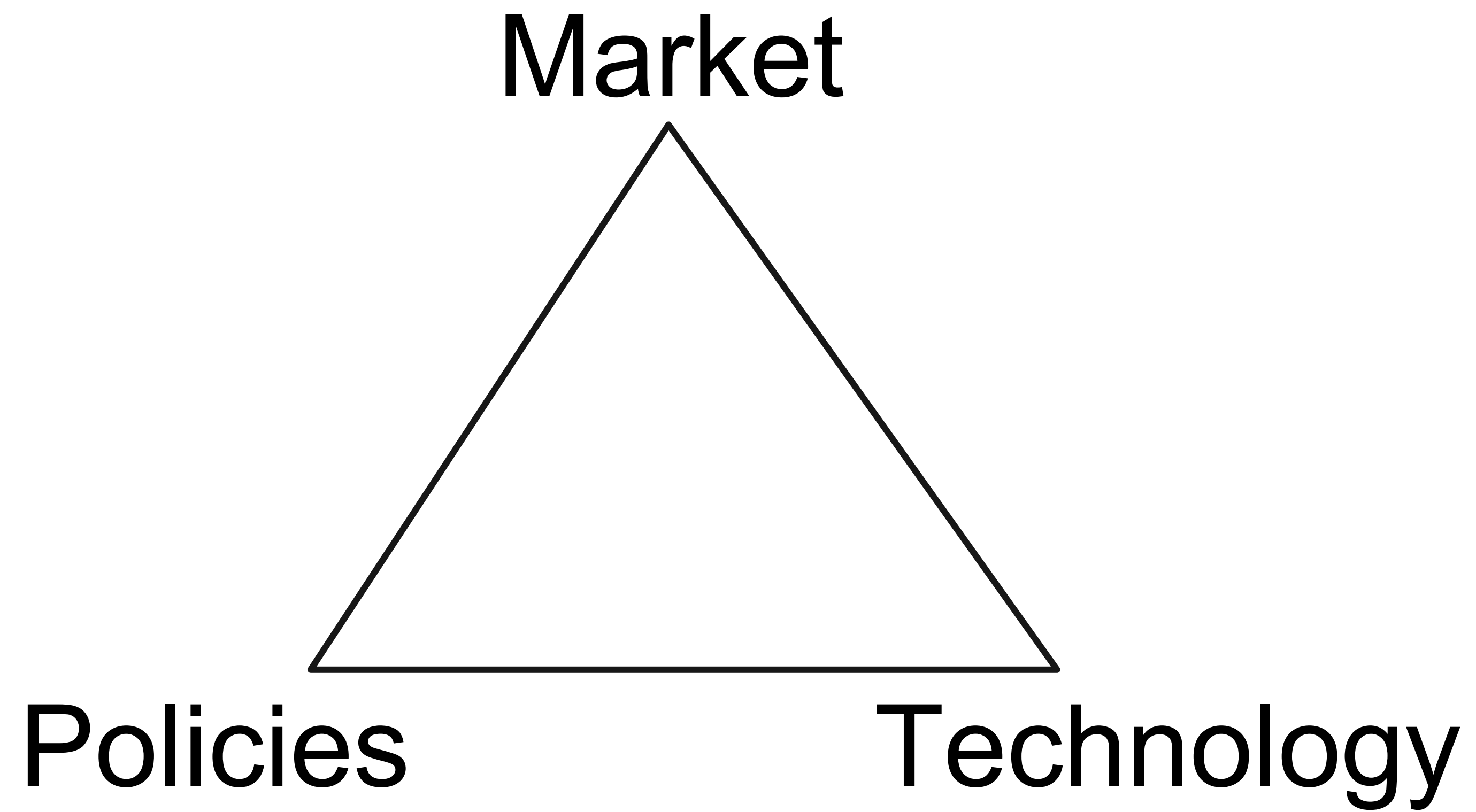
Present & Future of Spectrum Management

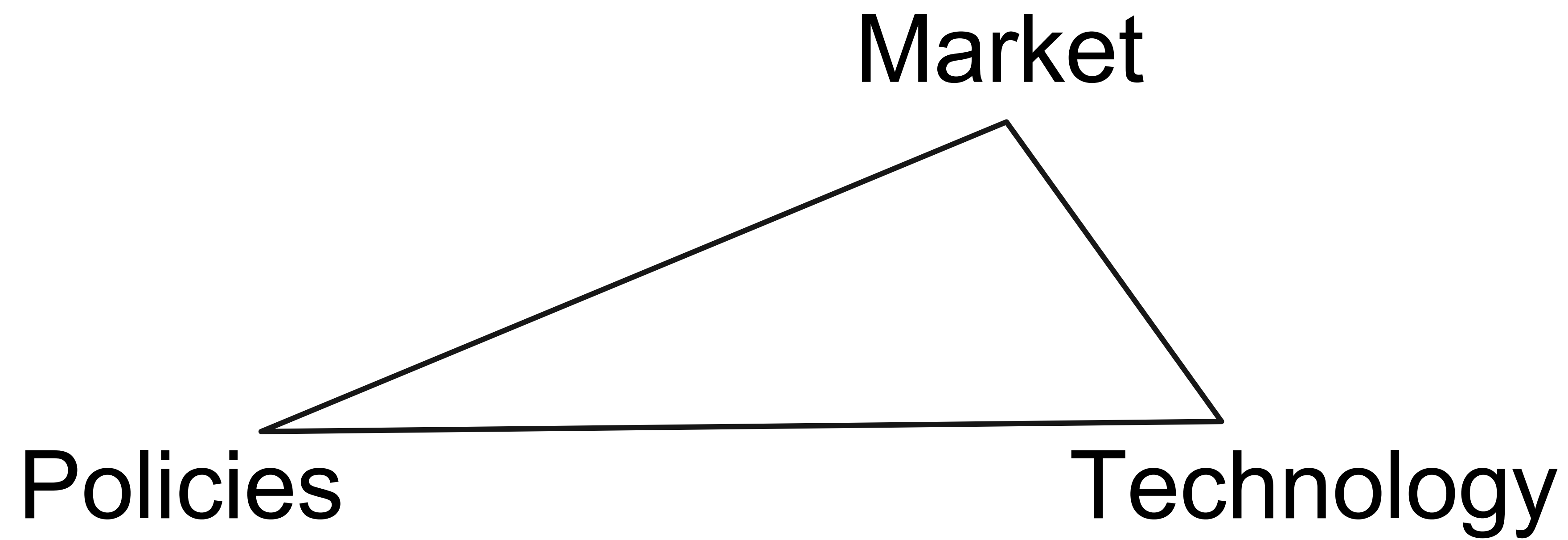
Ali Cheema
Head of Government &
Industry Relations, Ericsson

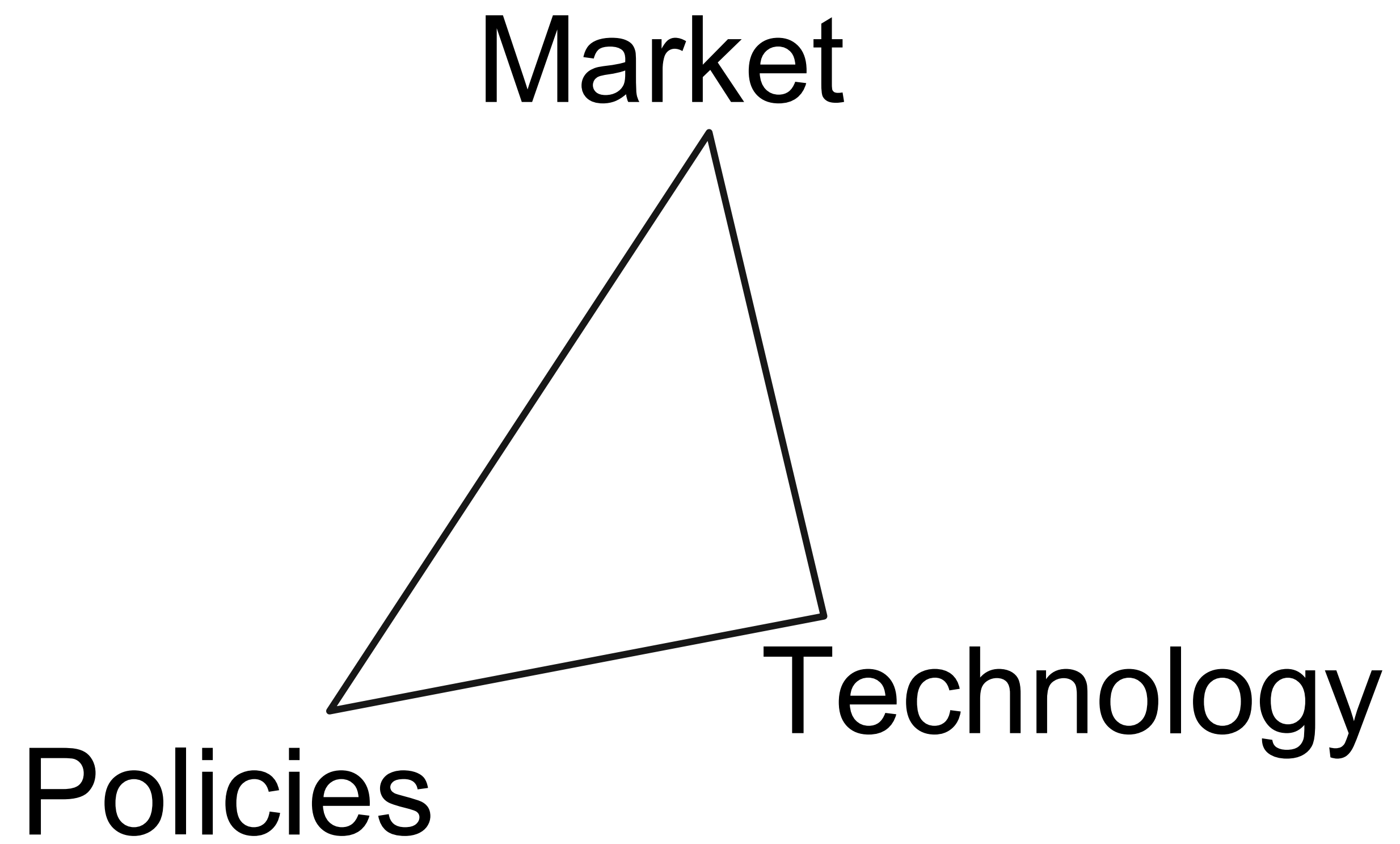
GSMATM

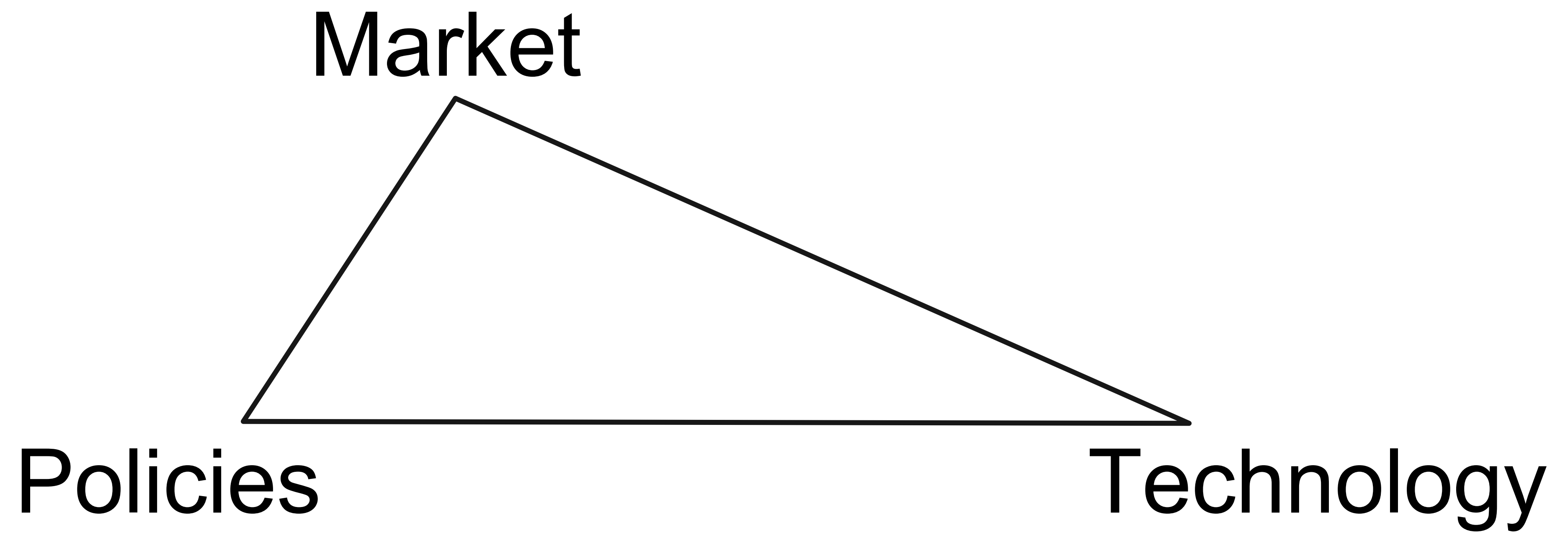
Evolution of needs in mobile technology

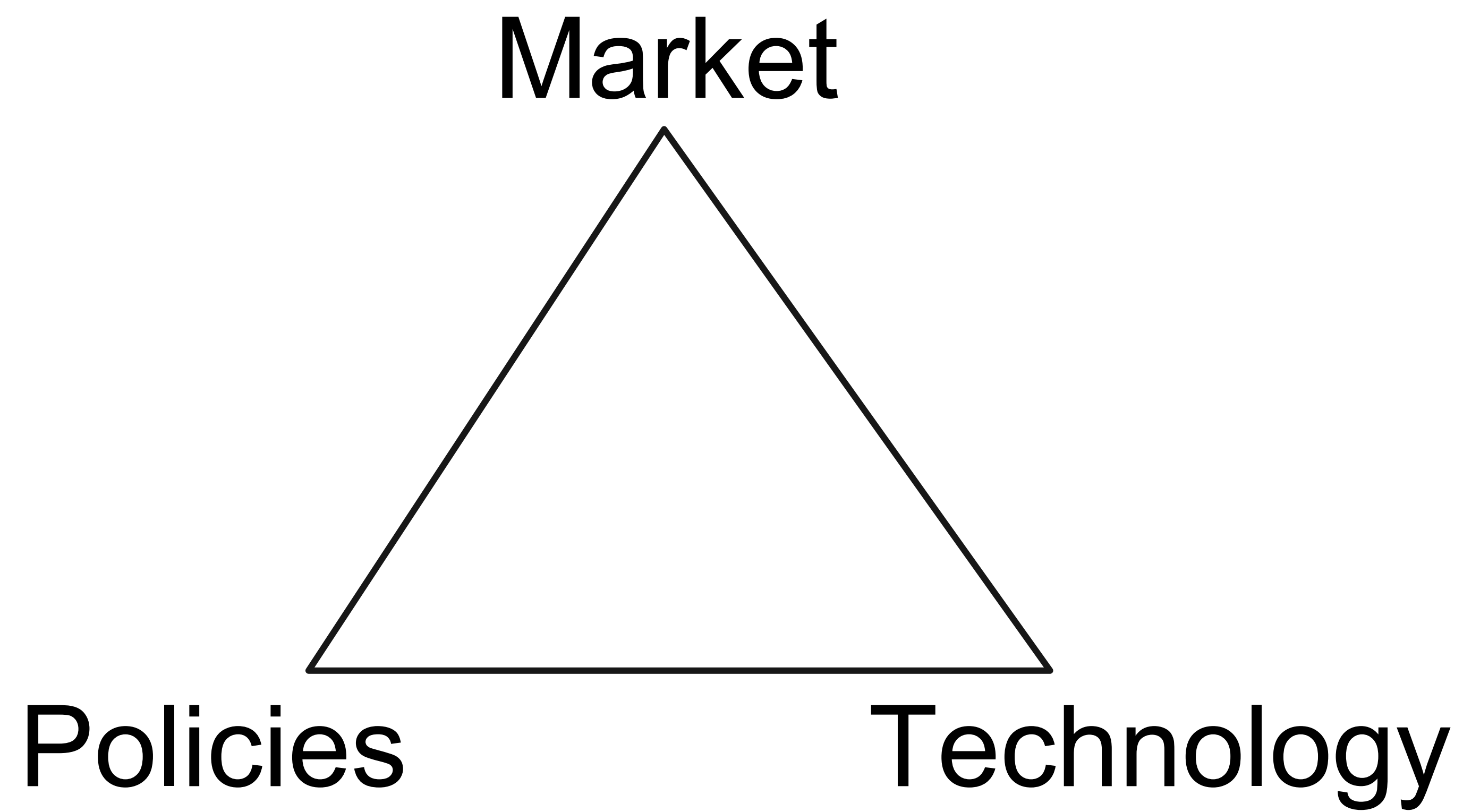
Ali Cheema
Head of Government & Policy Advocacy
Middle East & Africa



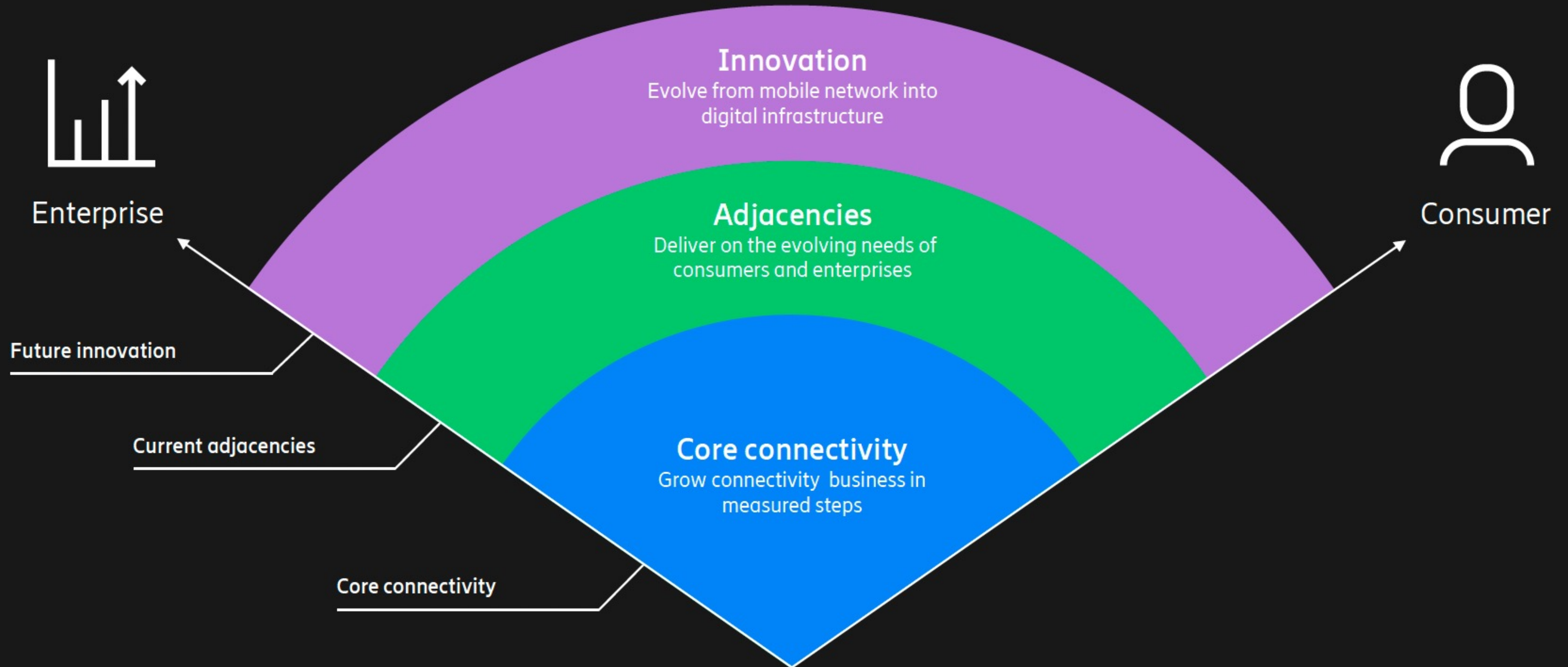




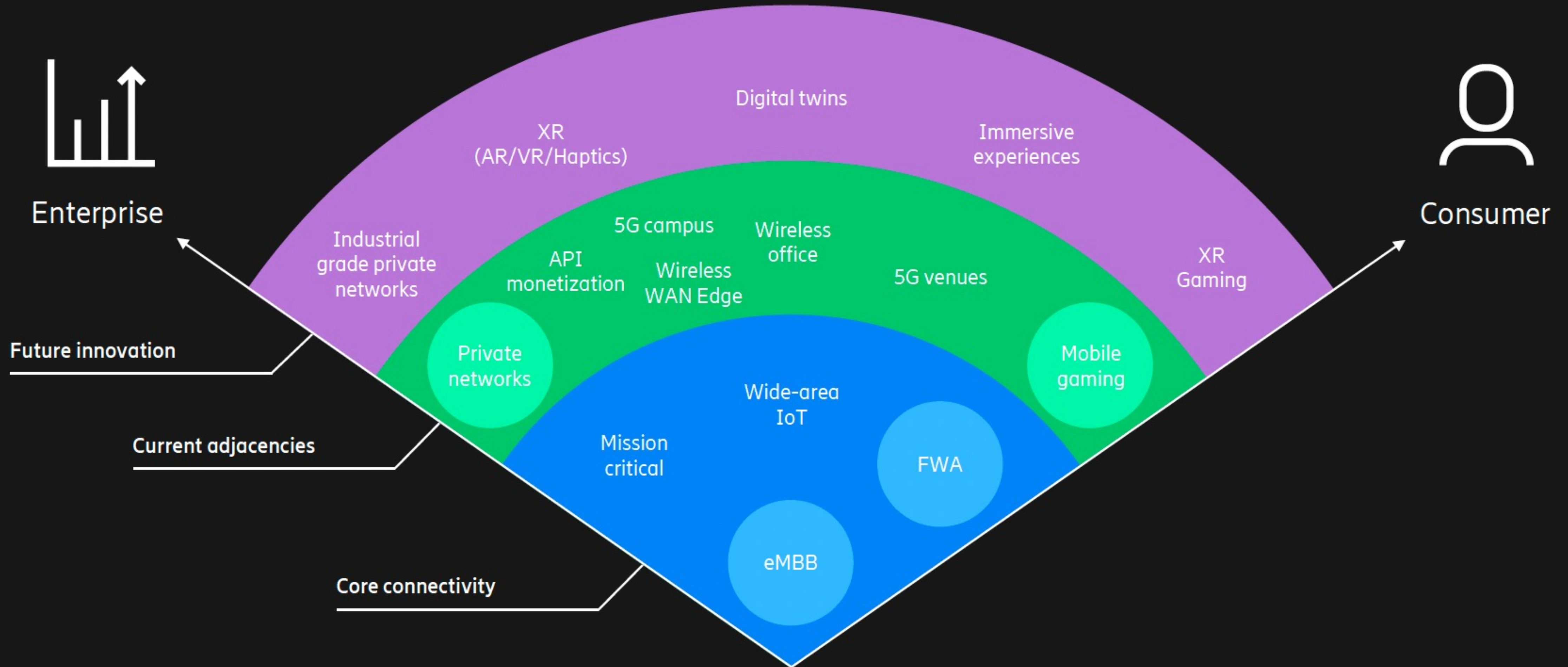






Measured steps needed to avail of the connectivity opportunity



Current opportunities for 5G value creation




Policy makers can take actions to support successful 5G deployment

Type	Enabler	Description
Supply side	National 5G strategy	<ul style="list-style-type: none"> ▪ Publish a holistic national roadmap for 5G implementation, detailing how 5G will be introduced to the market, the services that might be offered and timescales for any preparatory work to plan for spectrum release ▪ Encourage the public sector and industry bodies to assess how their services and end users can benefit from 5G connectivity ▪ Put in place an economy-wide 5G ready strategy to accelerate the pace for 5G transition
	Spectrum availability 	<ul style="list-style-type: none"> ▪ Prepare spectrum award processes to enable national MNOs to gain 5G licences in low, mid and high bands to support 5G deployment in different environments¹ ▪ Ensure that spectrum pricing is not investment prohibitive ▪ Ensure flexibility for MNOs to re-purpose spectrum licensed for previous generations of mobile technology, to support greater spectrum efficiency and accelerated deployment from the latest generations of technology (i.e. 4G/5G)
	Infrastructure build-out facilitation	<ul style="list-style-type: none"> ▪ Amend or simplify procedures to streamline site upgrade procedures and to remove any bottlenecks in site planning, so to support rapid 5G roll-out ▪ Ensure the fees to use public sites are orientated on a cost recovery basis
		<ul style="list-style-type: none"> ▪ Encourage an open environment in which MNOs can share infrastructure with other industries as needed (e.g. fibre networks used by utilities or alongside railways, public sites for towers) ▪ Consider appropriate policy measures to reduce the cost and accelerate the deployment of 5G (in particular in rural/underserved areas)
	Coverage 	<ul style="list-style-type: none"> ▪ Issue national-level guidelines to facilitate the acquisition of new macro sites and to accelerate small-cell deployments ▪ Streamline planning processes to avoid lengthy deployment delays
		<ul style="list-style-type: none"> ▪ Collaborate with MNOs to develop effective solutions for coverage in areas where commercially led solutions are not viable, including public funding where there is clear evidence of market failure (such as to reach the most remote locations) ▪ Consider offsetting fees (e.g. spectrum auction or recurring spectrum fees) against coverage commitments (e.g. indoors, in rural areas) and for funding of data capacity improvements where end user needs are not being met

¹ As shown by the modelling in this report, mid-bands are expected to be a critical enabler of the largest economic benefits from 5G while low bands will be used as a complement to mid-bands in less densely populated locations, and for use cases with wide-area requirements. Harmonised mmWave bands may be important as capacity offload solutions and to deliver specific use cases

Policies targeted at vertical sectors can incentivise enterprises to invest in 5G and encourage adoption



Type	Enabler	Description
Supply side	Energy efficiency	<ul style="list-style-type: none"> Engage with MNOs to ensure that MNOs can deploy 5G networking solutions with high energy efficiency, to optimise power consumption and reduce operational costs
	FWA	<ul style="list-style-type: none"> Include gigabit capable FWA as a complement to fibre as a means of achieving national broadband targets, especially in areas underserved by fixed infrastructure
	Tax breaks	<ul style="list-style-type: none"> Incentivise the roll-out of 5G infrastructure by offering tax credits, noting in its Regional Economic Outlook for Europe published in April 2021, the International Monetary Fund (IMF) advocated that governments give infrastructure investment a boost by providing temporary investment tax credits to accelerate investments, for example for digital and sustainable technologies¹ Seek international benchmarks of possible approaches. For example, the Japanese government provided a 15% tax credit to organisations investing in and using 5G infrastructure (between April 2020 and end of March 2022)²
Demand side	Enterprise and industrial policies 	<ul style="list-style-type: none"> Give a prominent role to 5G as a key enabler of the digital transformation agenda of major vertical sectors (e.g. manufacturing, agriculture, healthcare, utilities) Provide clear guidelines on 5G deployment, and the importance and role played by 5G in delivering different use cases
	Public sector	<ul style="list-style-type: none"> Encourage public authorities to make 5G-specific investments (e.g. in next-generation connectivity plans) Encourage 5G use by the public sector, for example in municipal buildings (e.g. facilities management, provision of public services, maintenance of public spaces), and to support education and tourism
	Carbon abatement	<ul style="list-style-type: none"> Promote the use of 5G-based solutions by vertical sectors Highlight the role 5G can play to support efforts to achieve environmental commitment roadmaps and zero net carbon emissions
	Targeted subsidies	<ul style="list-style-type: none"> Allocate direct funds to further accelerate research and facilitate tests and trials between MNOs, suppliers and enterprises from multiple vertical sectors Offer subsidies to promote industry collaboration and the creation of a strong supply ecosystem, to support the development of 5G use cases, and to help stimulate demand for 5G-based solutions

¹ See: <https://www.imf.org/en/Publications/REO/EU/Issues/2021/04/12/regional-economic-outlook-for-europe>

² See: <https://taxsummaries.pwc.com/japan/corporate/tax-credits-and-incentives#:~:text=Accredited%20corporations%20will%20be%20entitled,put%20such%20infrastructure%20into%20use.>

**Technology evolution and
spectrum demands...**

XR can be the next paradigm shift after the smartphone ≡

VR to AR

Near term

Head-Up-Display, blended information



AR takes lead

Mid term

Recognize surrounding, geo-specific



All day XR

Long term

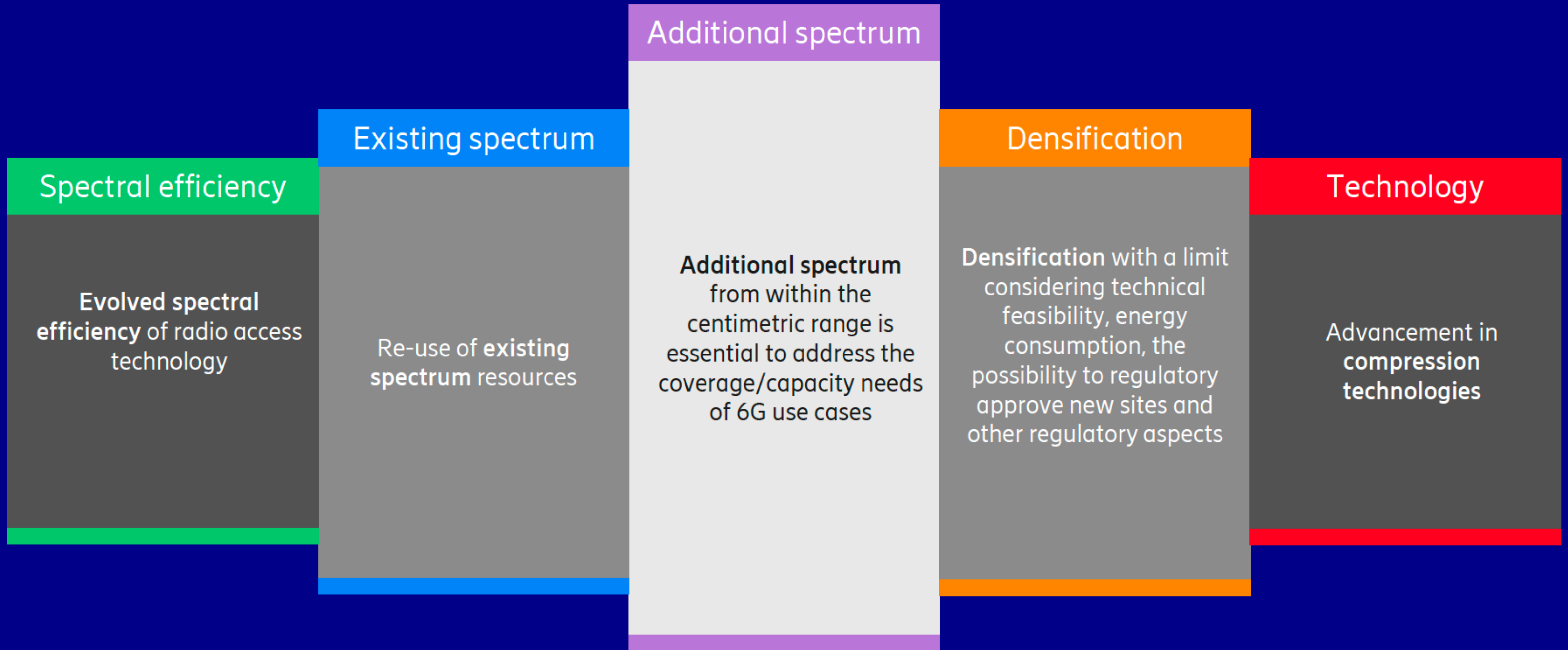
Fully immersive



Ericsson technology will have an advantage

Spectrum implications

The different solution components

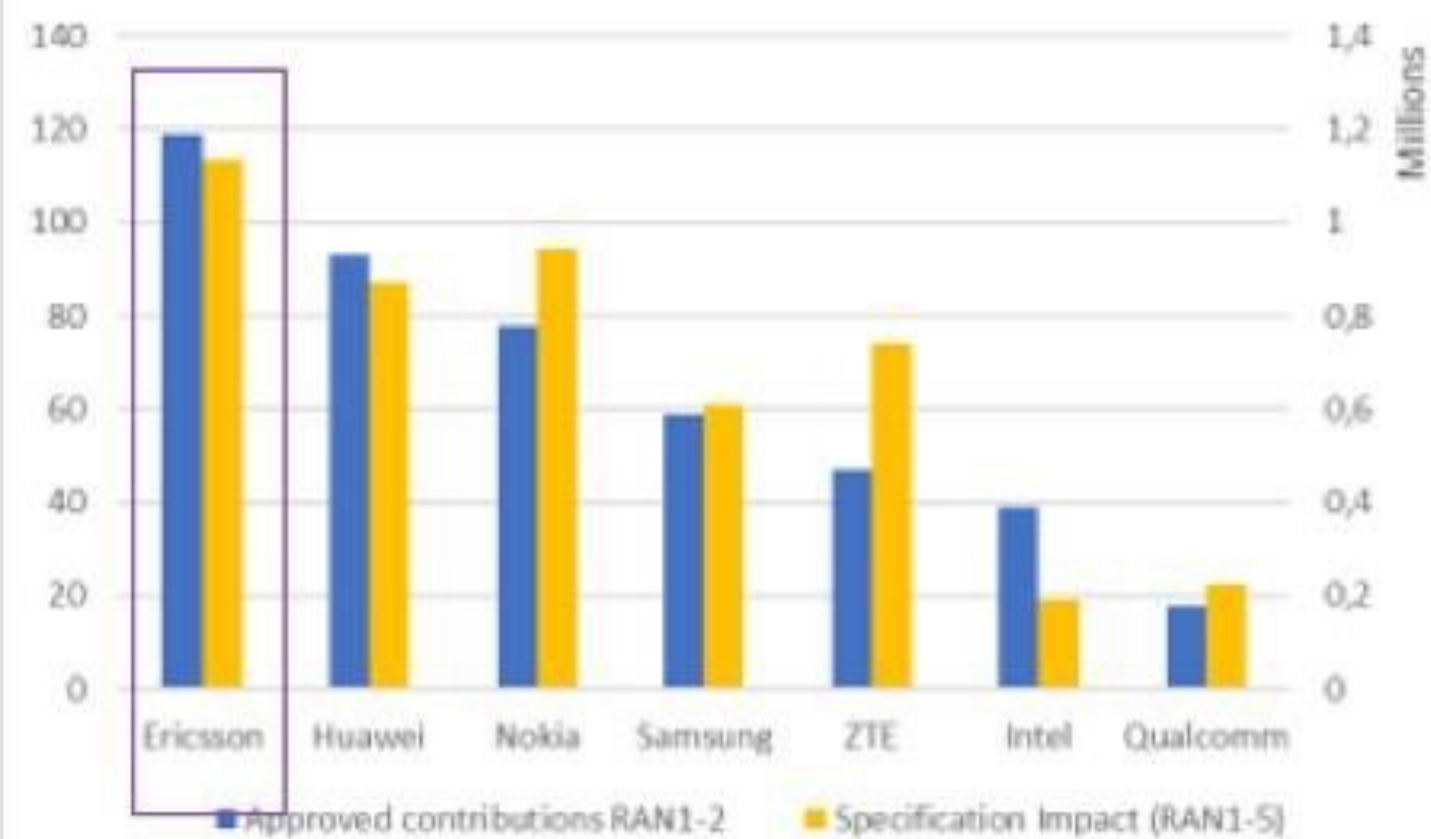


Ericsson standardization leadership



3GPP

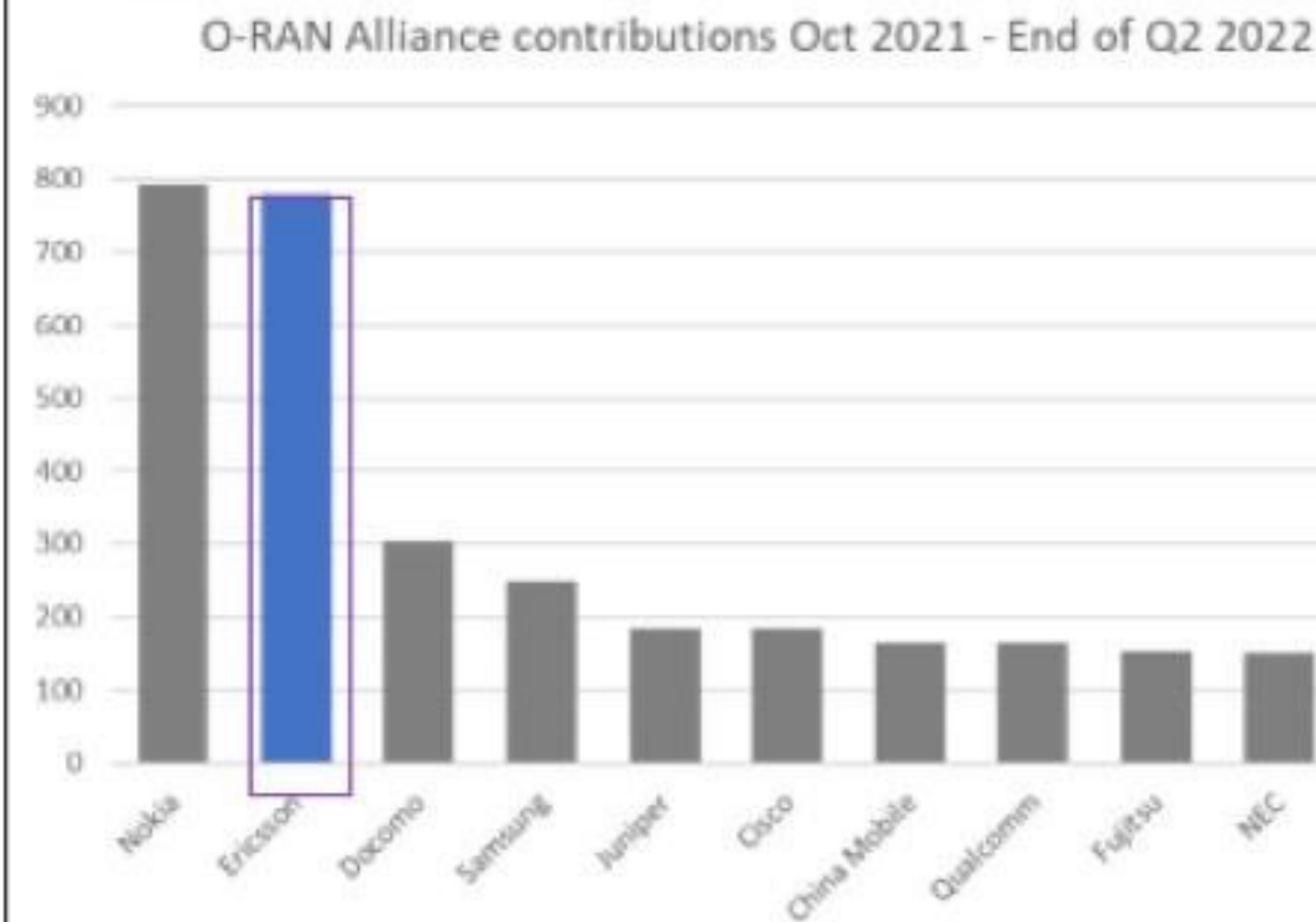
1st in approved NR contributions and specification impact in RAN1-2 in Rel-17



Innovations like Ericsson Spectrum Sharing

O-RAN Alliance

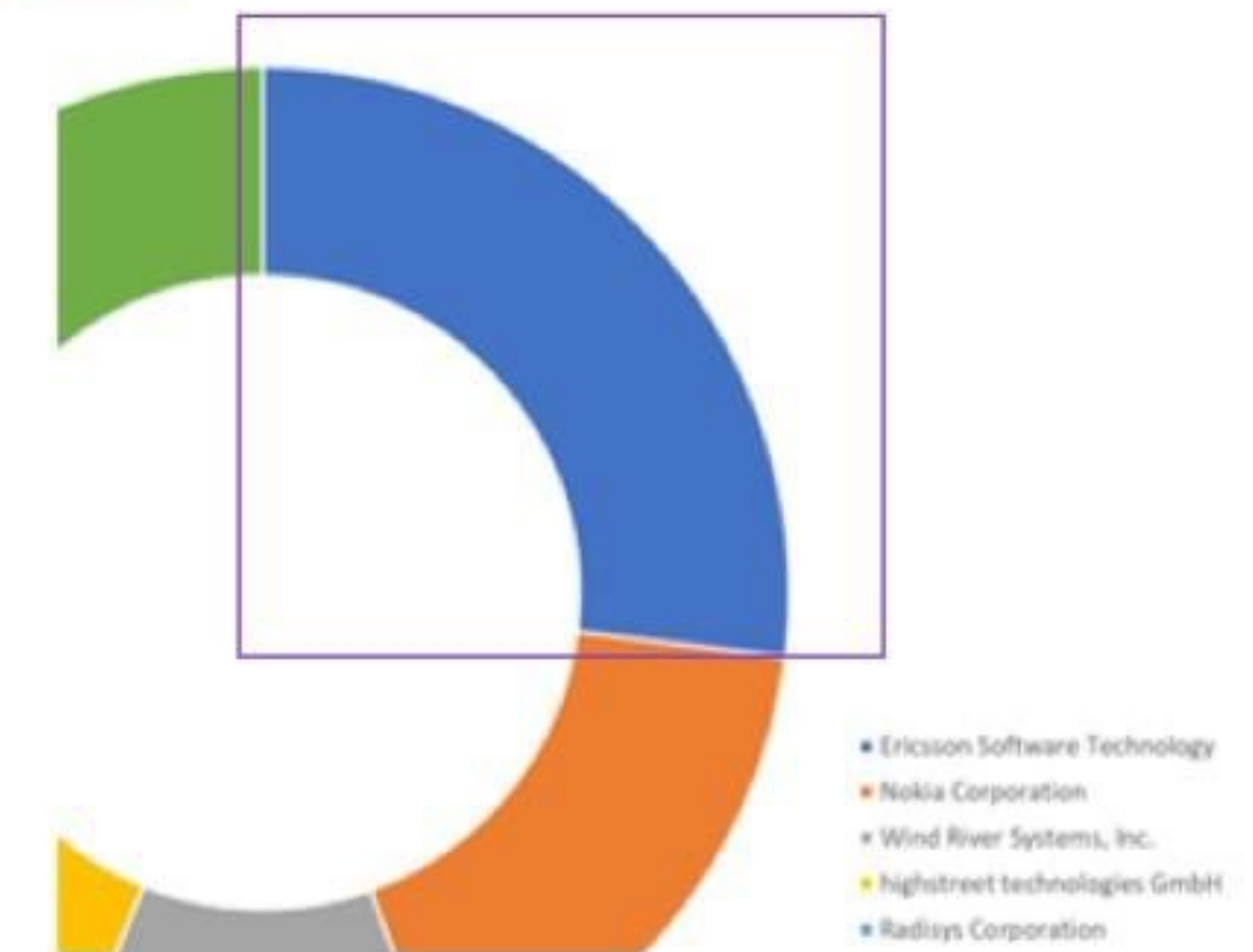
2nd in total contributions to O-RAN Alliance



Innovations like Non RT-RIC¹ open platform and other open interfaces

Open source

1st in number of commits in OSC (Q2 2021 – Q2 2022)



Innovations like orchestration and multivendor management

Ericsson at the forefront of the industry evolution

1) Non RT-RIC = Non Realtime RAN Intelligent Controller

Ericsson, Qualcomm and Thales to take 5G into space



Available in English [Français](#) [日本語](#) [简体中文](#) [한국어](#) [繁體](#)

- The activity follows approval for satellite-driven 5G from the 3GPP global telecommunications standards
- 5G non-terrestrial networks could help to provide areas currently not served by terrestrial networks
- This initial work in France would be to test and validate satellite and ICT ecosystem

PRESS RELEASE | JUL 11, 2022 07:00 (GMT +00:00)



Ericsson Radio 4408

Small cell CBRS solution in a sleek, compact formfactor, suitable for a variety of outdoor deployments.

Spectrum sharing

Enhanced coexistence capabilities with incumbents



It is becoming increasingly difficult to find "clean" spectrum



Potential new spectrum for 6G in 7-15 GHz already accommodates other co-primary services



6G coexistence capabilities "by design" are more important than ever to enhance sharing with incumbent services

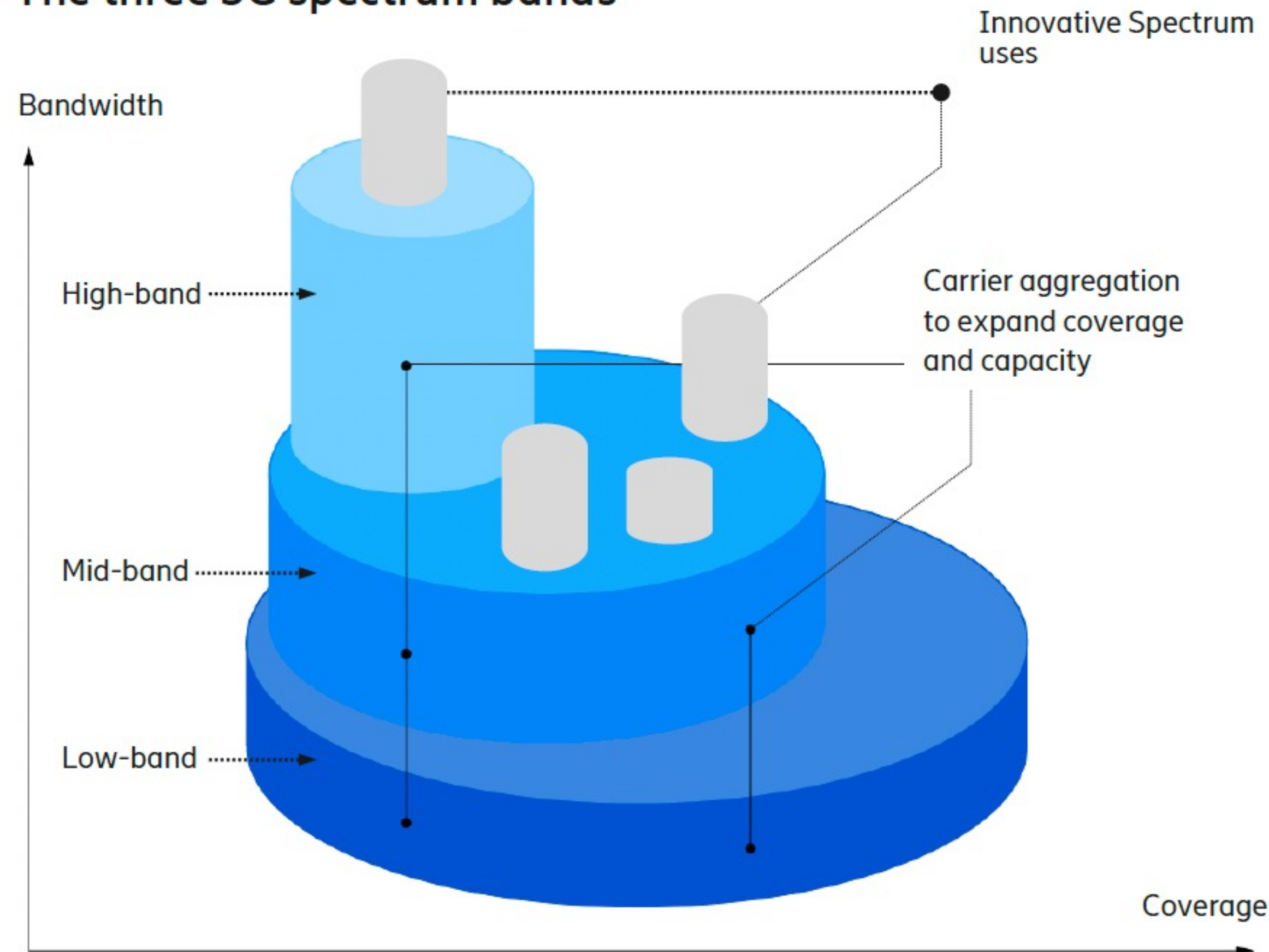


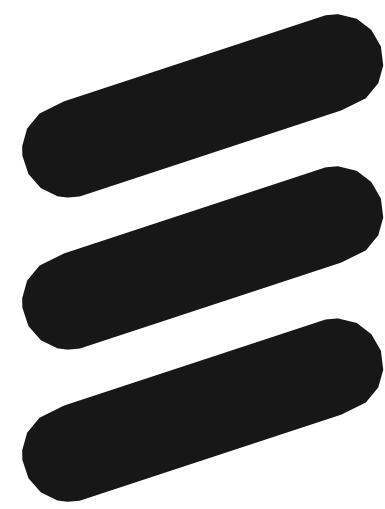
Ericsson recognizes the challenge and is committed to exploring this area.

A strong baseline of licensed spectrum can support overlay of innovative solutions



The three 5G spectrum bands





Panel and Q&A

Moderator:

Luiz Felipe Zoghbi, Spectrum Engagement Director, GSMA

Panellists:

Ayman Maghrabi, Director of Frequency Assignment and Licencing, CST

Ahmad Talaat, Head of Technology - Saudi Arabia, Nokia



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Spectrum: The Road to the Future

Closing

Jawad Abbassi
Head of MENA
GSMA