Agenda

Time	Segment	Speaker
14:00	Welcome and housekeeping	Nicolás Forster **GSMA**
14:05	Networks and Devices market update: key trends and drivers	Pablo Iacopino **GSMA Intelligence**
14:15	GSMA Network Settings Exchange: GSMA NSX updates and how they can help your business	Shamit Bhat **GSMA**
14:25	Why MNOs benefit from Network Settings Exchange	Florian-Leon Schmitt **Deutsche Telekom**
14:35	How Mobile Network Virtual Operator Enablers (MVNOEs) and MVNOs benefit from GSMA's Network Settings Exchange	Kevin Haddad **Ztar Mobile**
14:45 – 15.00	Q&A and closing remarks	Nicolás Forster **GSMA**

GSMA™

GSMA Intelligence

Mobile industry is transforming faster than ever before
Growth and evolution of mobile devices and networks are at the heart

Proliferation of connected devices

- Handsets
- Tablets and laptops
- Consumer IoT devices
- XR devices
- 5G FWA CPE
- Connected vehicles
- Enterprise IoT devices and machines

New networks and capabilities

- 5G mobile networks
- 5G FWA networks
- IoT networks
- Private networks
- Network sunsets (2G, 3G)
- VoLTE and Vo5G
- ViLTE and Vi5G
- eSIM and iSIM
- Satellite

Network settings are essential to help OEMs, MNOs and MVNOs deliver a fast, complete and seamless user experience

Consumers going digital is a major force driving change
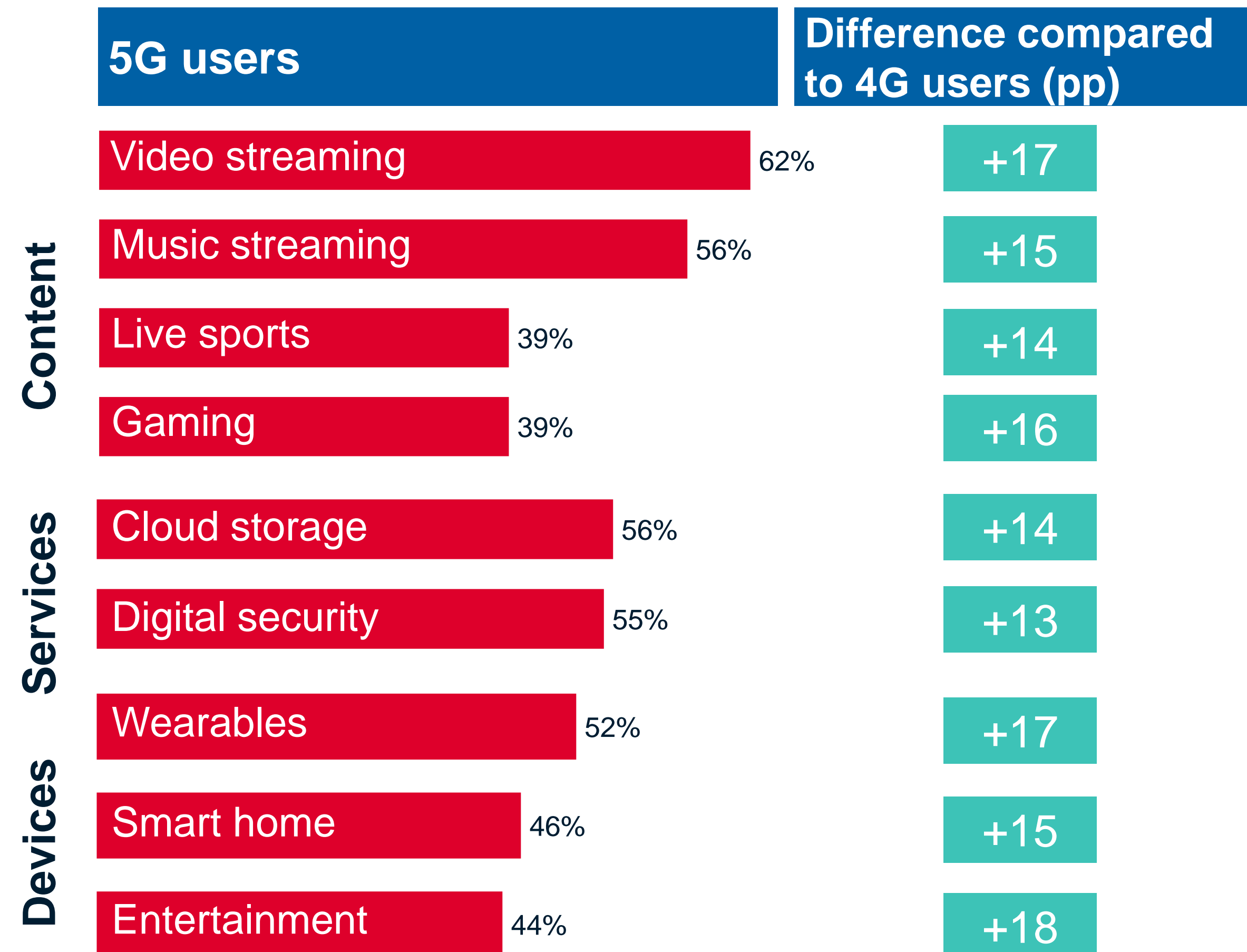## *Network settings ensure consumers get the most from digital services*

Smartphone is the leading central platform

More and more subscriptions to digital services

Smooth and full control (via apps)

5G raises the bar

Consumer interest in adding non-connectivity offerings to their mobile subscriptions

5G users		Difference compared to 4G users (pp)
Content		
Video streaming	62%	+17
Music streaming	56%	+15
Live sports	39%	+14
Gaming	39%	+16
Services		
Cloud storage	56%	+14
Digital security	55%	+13
Devices		
Wearables	52%	+17
Smart home	46%	+15
Entertainment	44%	+18

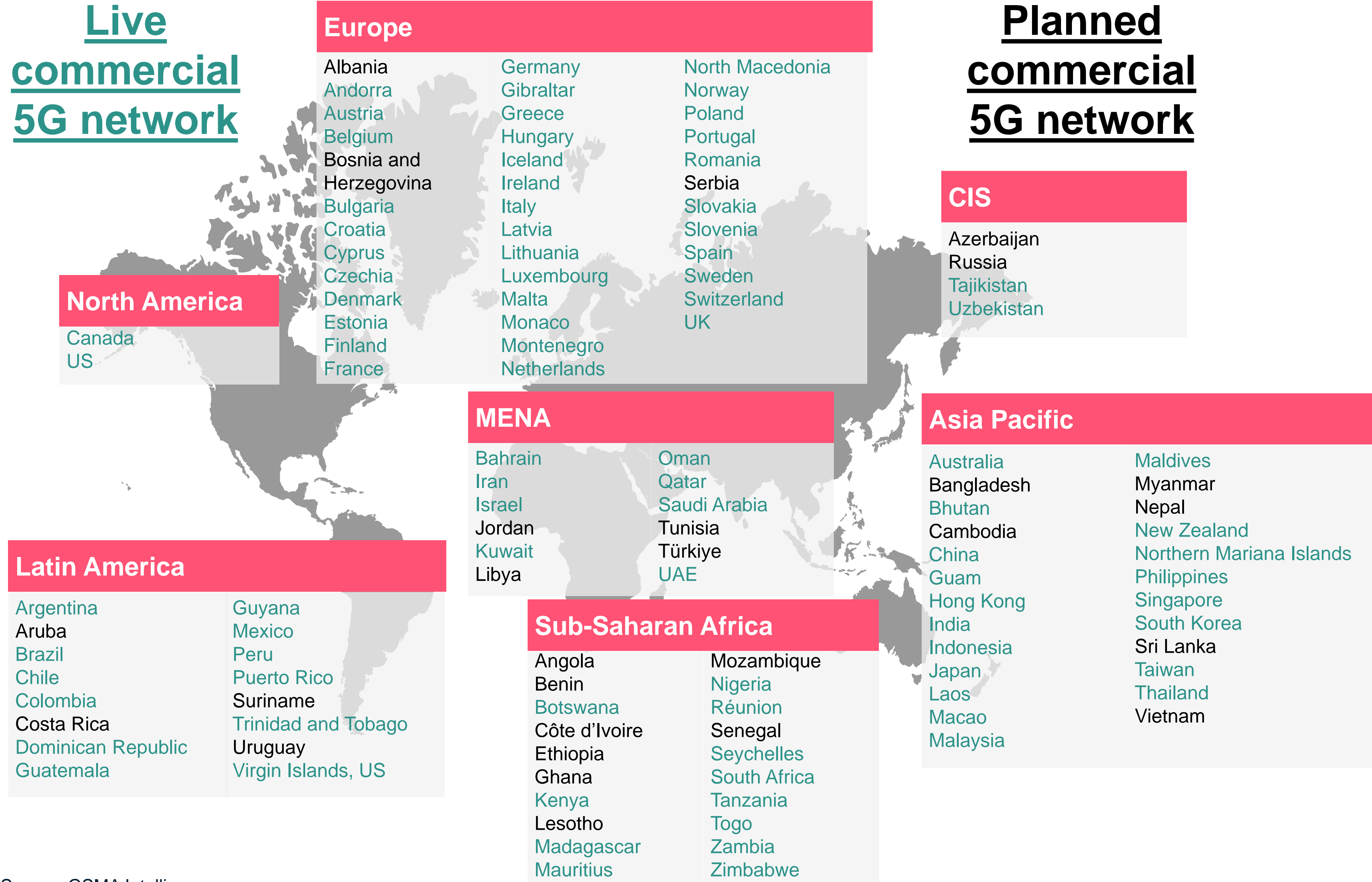### Consumer behaviour: comparing 5G vs. 4G users

Key findings from our global consumer survey

- **Bundling:** 5G subscribers are more interested in adding non-connectivity offerings to their mobile subscription contracts

- **Content:** 5G subscribers make greater use of digital entertainment services (e.g. video, gaming) on their smartphones

5G commercialisation keeps growing
5G is now a global trend

GSMA Intelligence

Live commercial 5G network

Planned commercial 5G network

As of 31st March 2023

Europe

Albania	Germany	North Macedonia
Andorra	Gibraltar	Norway
Austria	Greece	Poland
Belgium	Hungary	Portugal
Bosnia and	Iceland	Romania
Herzegovina	Ireland	Serbia
Bulgaria	Italy	Slovakia
Croatia	Latvia	Slovenia
Cyprus	Lithuania	Spain
Czechia	Luxembourg	Sweden
Denmark	Malta	Switzerland
Estonia	Monaco	UK
Finland	Montenegro	
France	Netherlands	

North America

Canada
US

CIS

Azerbaijan
Russia
Tajikistan
Uzbekistan

MENA

Bahrain	Oman
Iran	Qatar
Israel	Saudi Arabia
Jordan	Tunisia
Kuwait	Türkiye
Libya	UAE

Asia Pacific

Australia	Maldives
Bangladesh	Myanmar
Bhutan	Nepal
Cambodia	New Zealand
China	Northern Mariana Islands
Guam	Philippines
Hong Kong	Singapore
India	South Korea
Indonesia	Sri Lanka
Japan	Taiwan
Laos	Thailand
Macao	Vietnam
Malaysia	

Latin America

Argentina	Guyana
Aruba	Mexico
Brazil	Peru
Chile	Puerto Rico
Colombia	Suriname
Costa Rica	Trinidad and Tobago
Dominican Republic	Uruguay
Guatemala	Virgin Islands, US

Sub-Saharan Africa

Angola	Mozambique
Benin	Nigeria
Botswana	Réunion
Côte d'Ivoire	Senegal
Ethiopia	Seychelles
Ghana	South Africa
Kenya	Tanzania
Lesotho	Togo
Madagascar	Zambia
Mauritius	Zimbabwe

228 Operators have launched mobile 5G services

+

62 Operators have announced plans to launch mobile 5G services

=

290 Operators in total across **113** countries worldwide
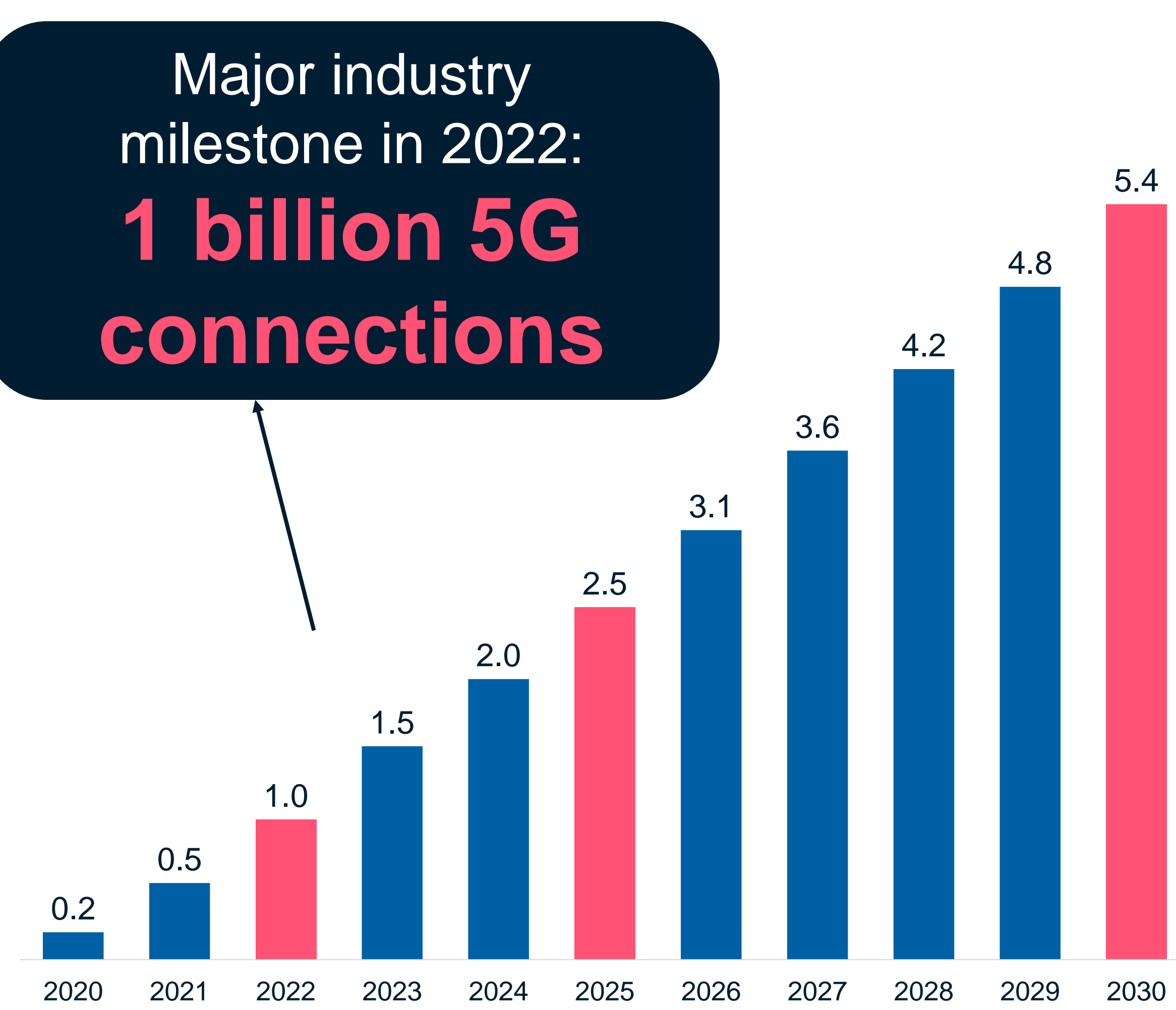
Source: GSMA Intelligence.

5G adoption is faster than that of previous networks
Scaling beyond the first 1 billion

Global 5G connections
Billion*

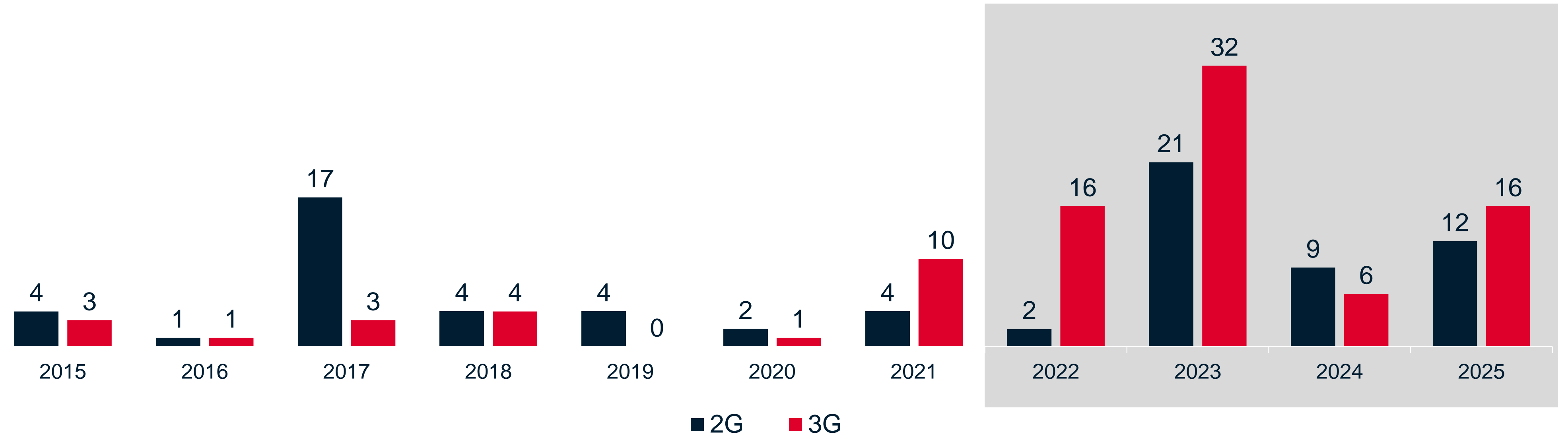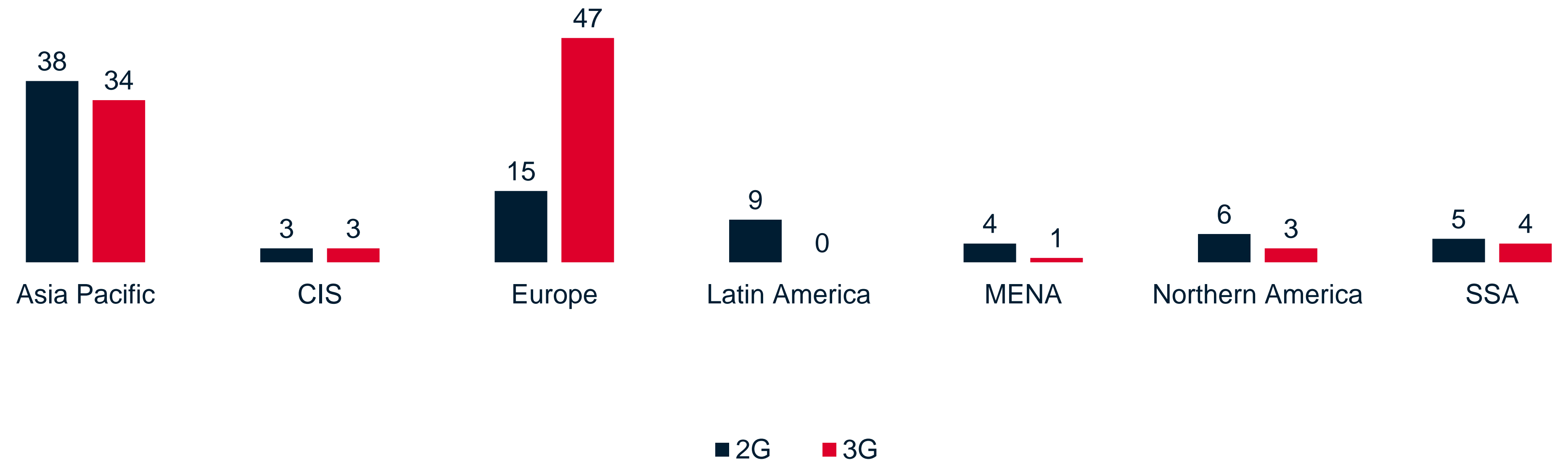**Major industry milestone in 2022: 1 billion 5G connections**

Global 5G connections by year:
- 2020: 0.2
- 2021: 0.5
- 2022: 1.0
- 2023: 1.5
- 2024: 2.0
- 2025: 2.5
- 2026: 3.1
- 2027: 3.6
- 2028: 4.2
- 2029: 4.8
- 2030: 5.4

5G share of mobile connections
Globally*

Network shares shown: 2G, 3G, 4G, 5G

5G share by year:
- 2020: 2%
- 2021: 7%
- 2022: 12%
- 2023: 18%
- 2024: 22%
- 2025: 28%
- 2026: 33%
- 2027: 39%
- 2028: 44%
- 2029: 50%
- 2030: 55%

Source: GSMA Intelligence. * Excluding 5G FWA connections and 5G IoT cellular connections.
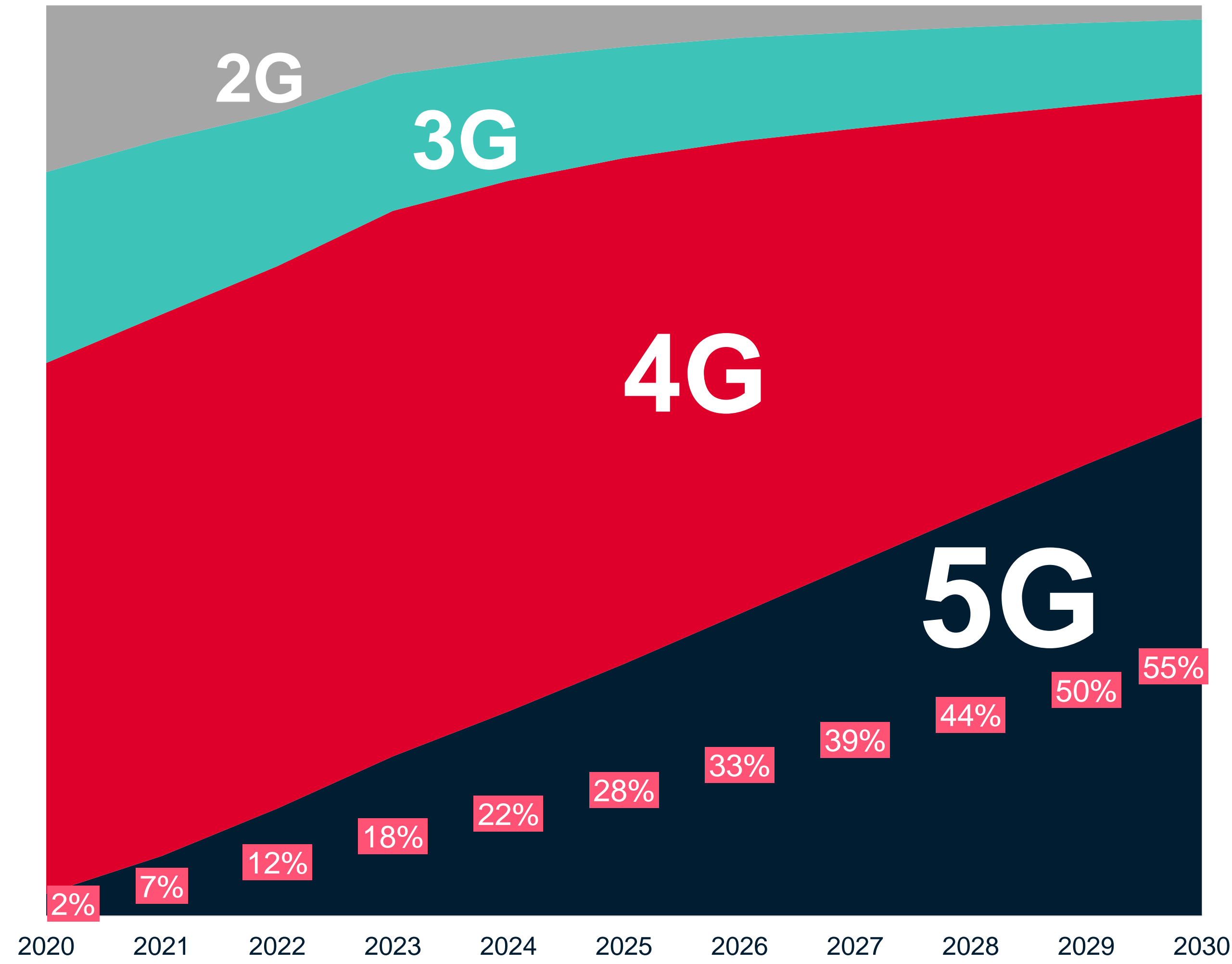
The arrival of 5G has accelerated network sunsets
3G shutdowns are more popular than 2G shutdowns

2G and 3G network sunsets (globally)

Year	2G	3G
2015	4	3
2016	1	1
2017	17	3
2018	4	4
2019	4	0
2020	2	1
2021	4	10
2022	2	16
2023	21	32
2024	9	6
2025	12	16

■ 2G ■ 3G

Completed and planned sunsets, by region (2015–2025)

Region	2G	3G
Asia Pacific	38	34
CIS	3	3
Europe	15	47
Latin America	9	0
MENA	4	1
Northern America	6	3
SSA	5	4

■ 2G ■ 3G

Source: GSMA Intelligence.

5G and network sunsets are driving VoLTE/Vo5G up
Voice and video going over 4G and 5G

GSMA Intelligence

Number of countries providing VoLTE service (including Vo5G) – Globally
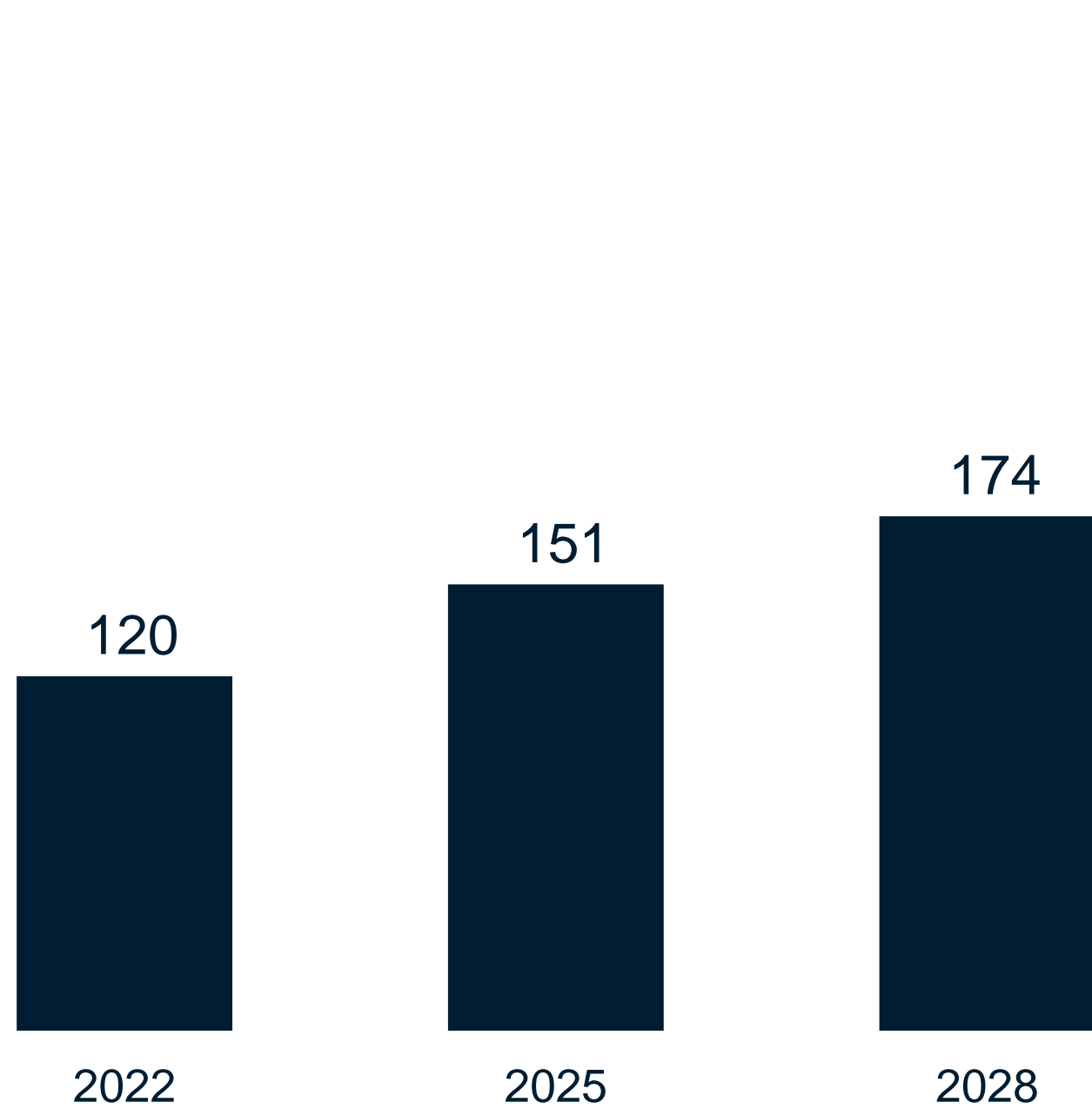
Number of MNOs providing VoLTE service (including Vo5G) – Globally
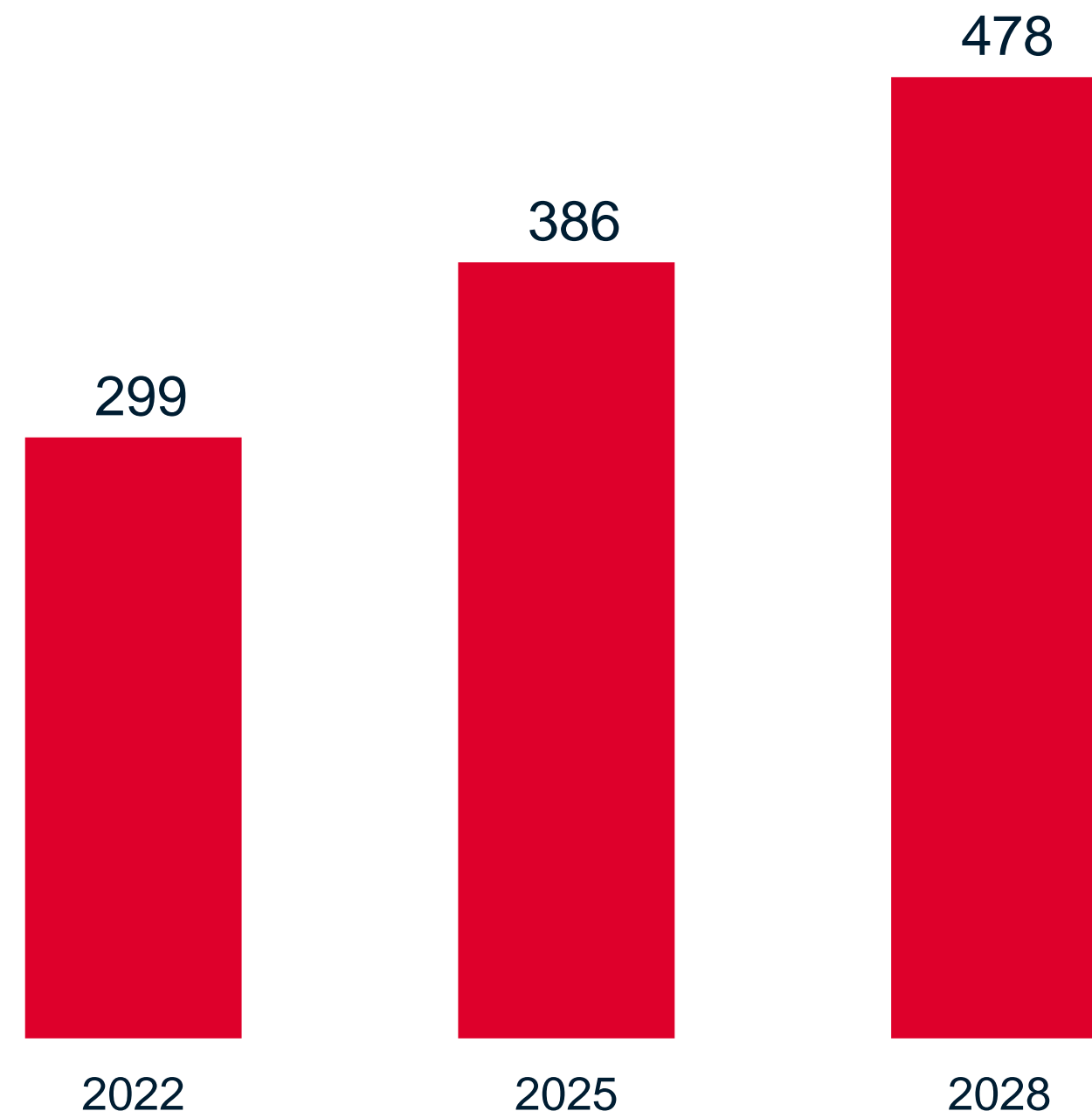
Number of VoLTE connections (including Vo5G) – Globally, billion

COUNTRIES

2022	2025	2028
120	151	174

MNOs

2022	2025	2028
299	386	478

CONNECTIONS

2022	2025	2028
3.7	5.3	6.4
62%	70%	76%
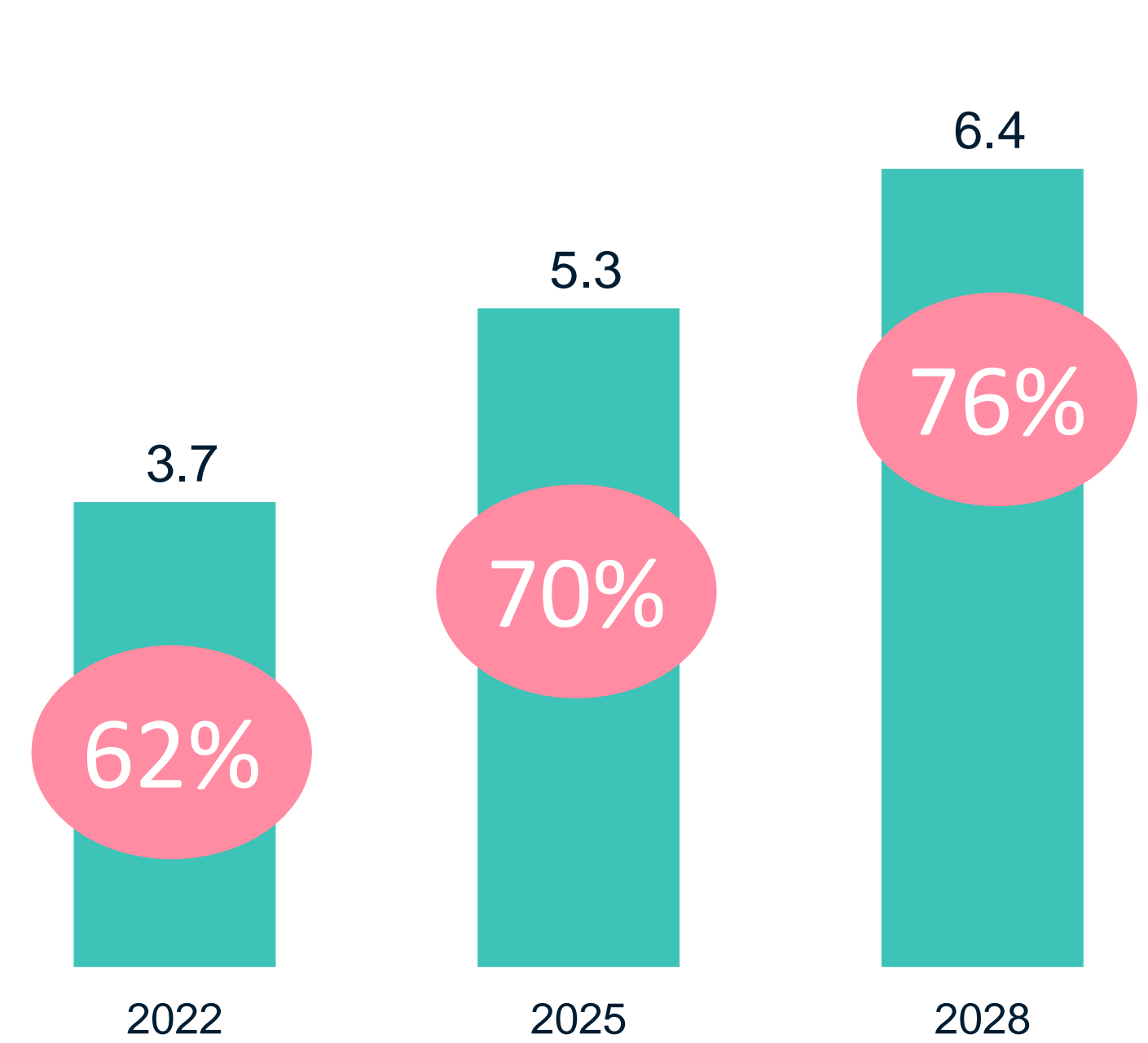
VoLTE connections as % of 4G+5G connections

Source: GSMA Intelligence.

eSIM is now mainstream…and global
Momentum is accelerating: eSIM-only smartphones a major milestone

Commercial availability of eSIM service for smartphones

Number of countries

Date	Number of countries
Dec. 2018	24
Dec. 2019	45
Dec. 2020	69
Dec. 2021	82
Jun. 2022	88
Dec. 2022	102
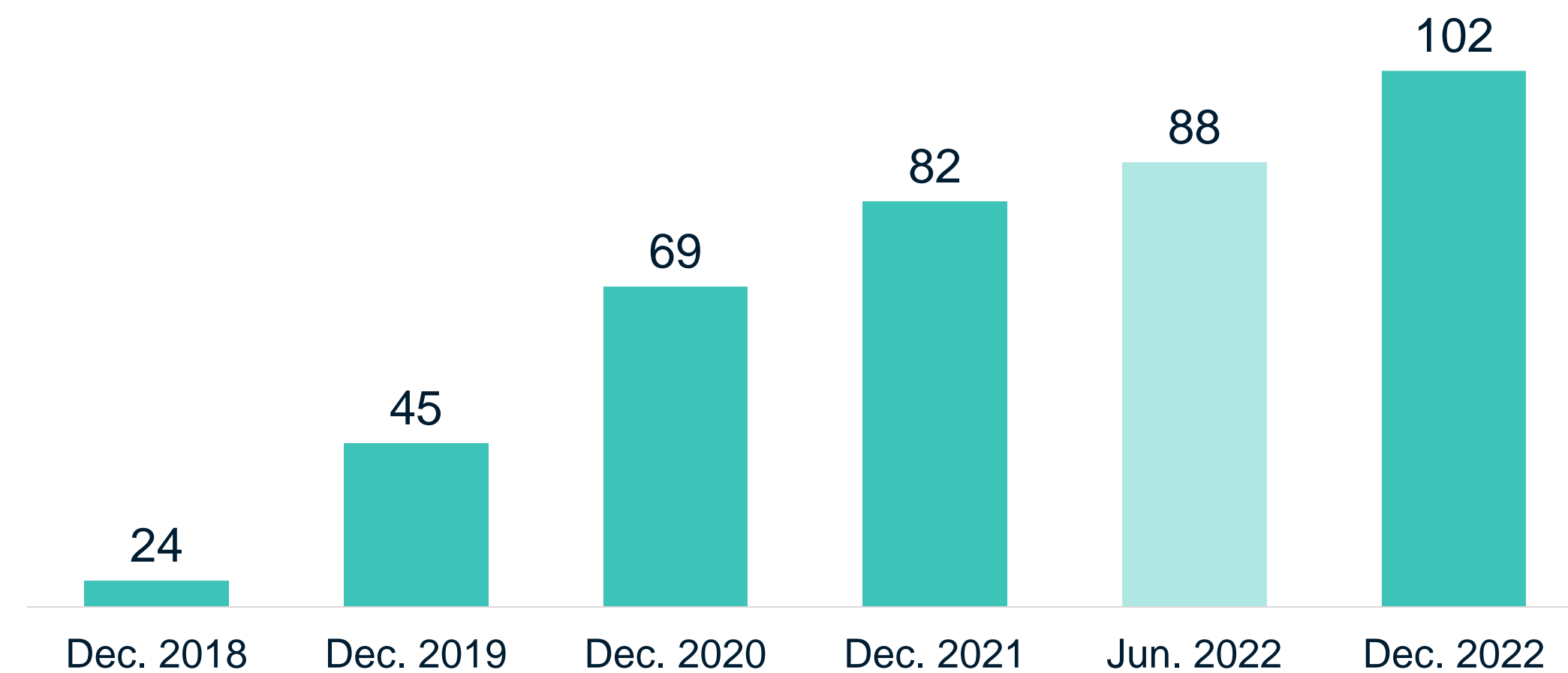
Number of mobile service providers (MNOs and MVNOs) offering commercial eSIM service for smartphones

2x

Date	Number of providers
Dec. 2018	45
Dec. 2019	103
Dec. 2020	175
Dec. 2021	232
Jun. 2022	261
Dec. 2022	343
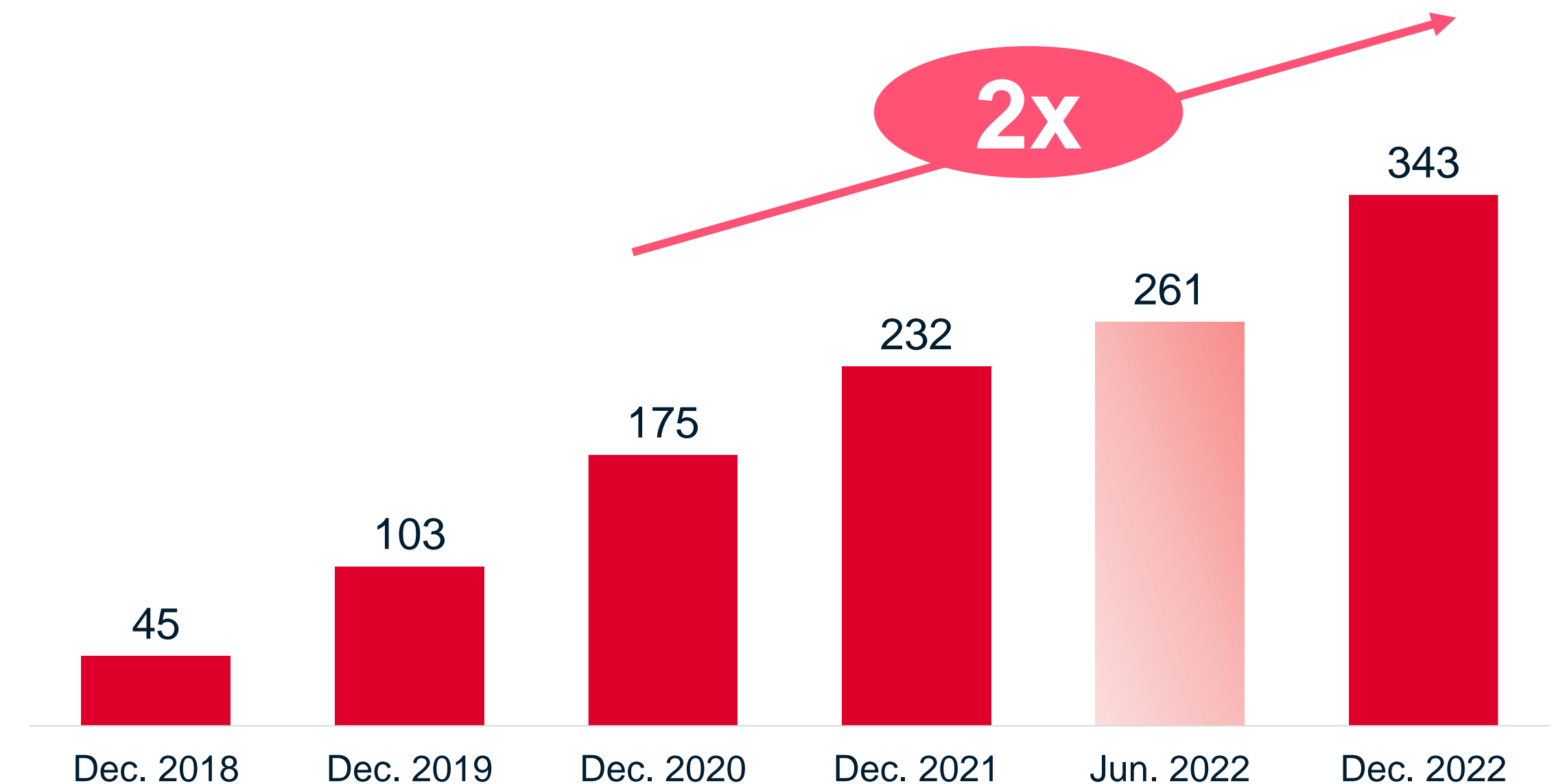
eSIM-only effect: eSIM commercialisation has accelerated after the launch of eSIM-only iPhones in the US in Sept. 2022

eSIM smartphone connections to 2030

Percentage of total smartphone connections (installed base) globally

88% **8.0 bn**

76% **6.9 bn**

61% **5.6 bn**

eSIM smartphone connections (2030)

—Low adoption scenario —Baseline scenario —High adoption scenario
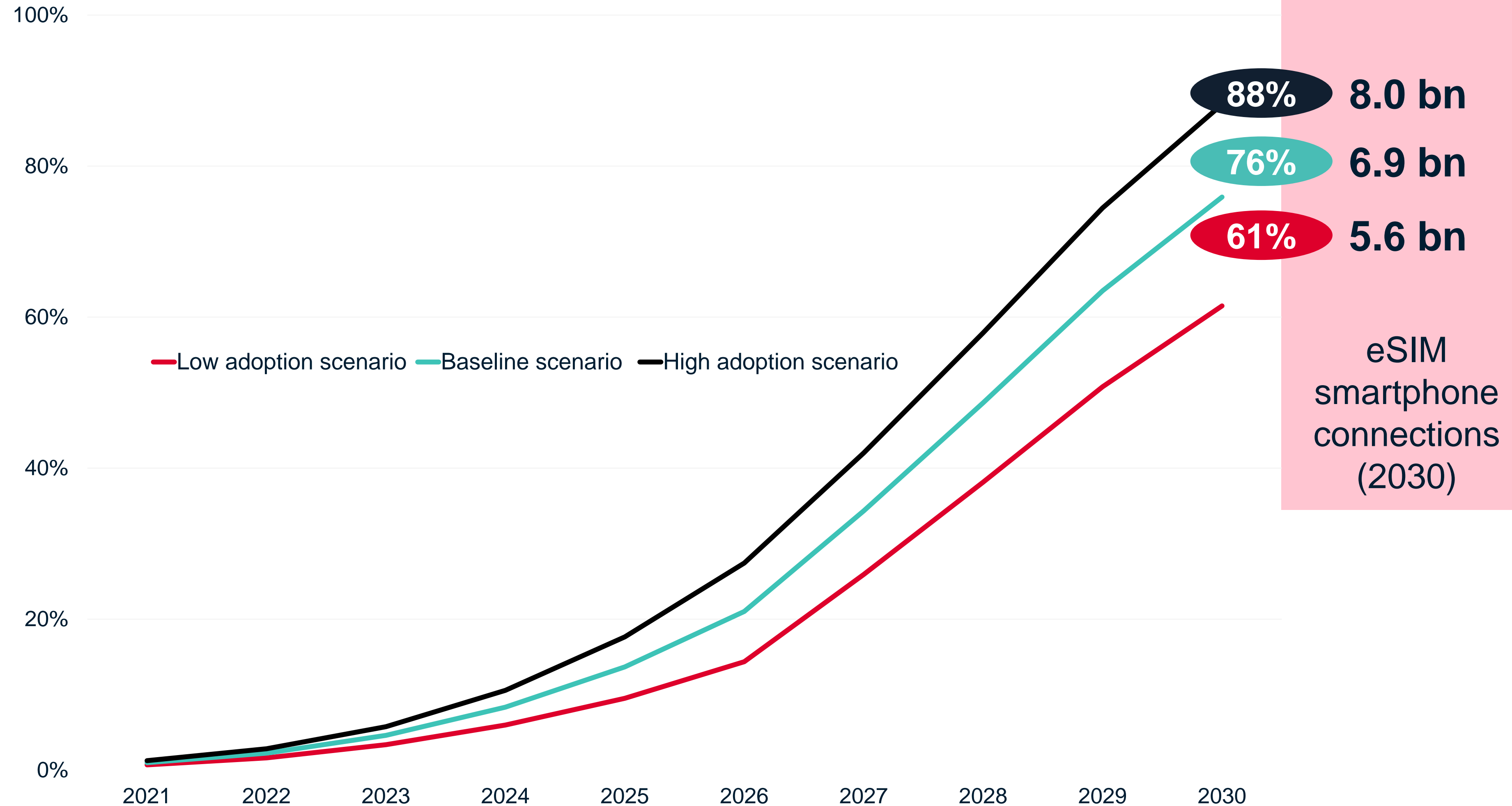
Key milestones: Baseline scenario (globally)

- **1 billion** eSIM smartphone connections by **2025**

- By 2028, **half** of smartphone connections will use eSIM

- North America will be leading by far **(eSIM-only effect)**. Europe follows

Source: GSMA Intelligence.

IoT market: explosion of connections and devices
~3x growth through to 2030

Global IoT connections

Billion, globally
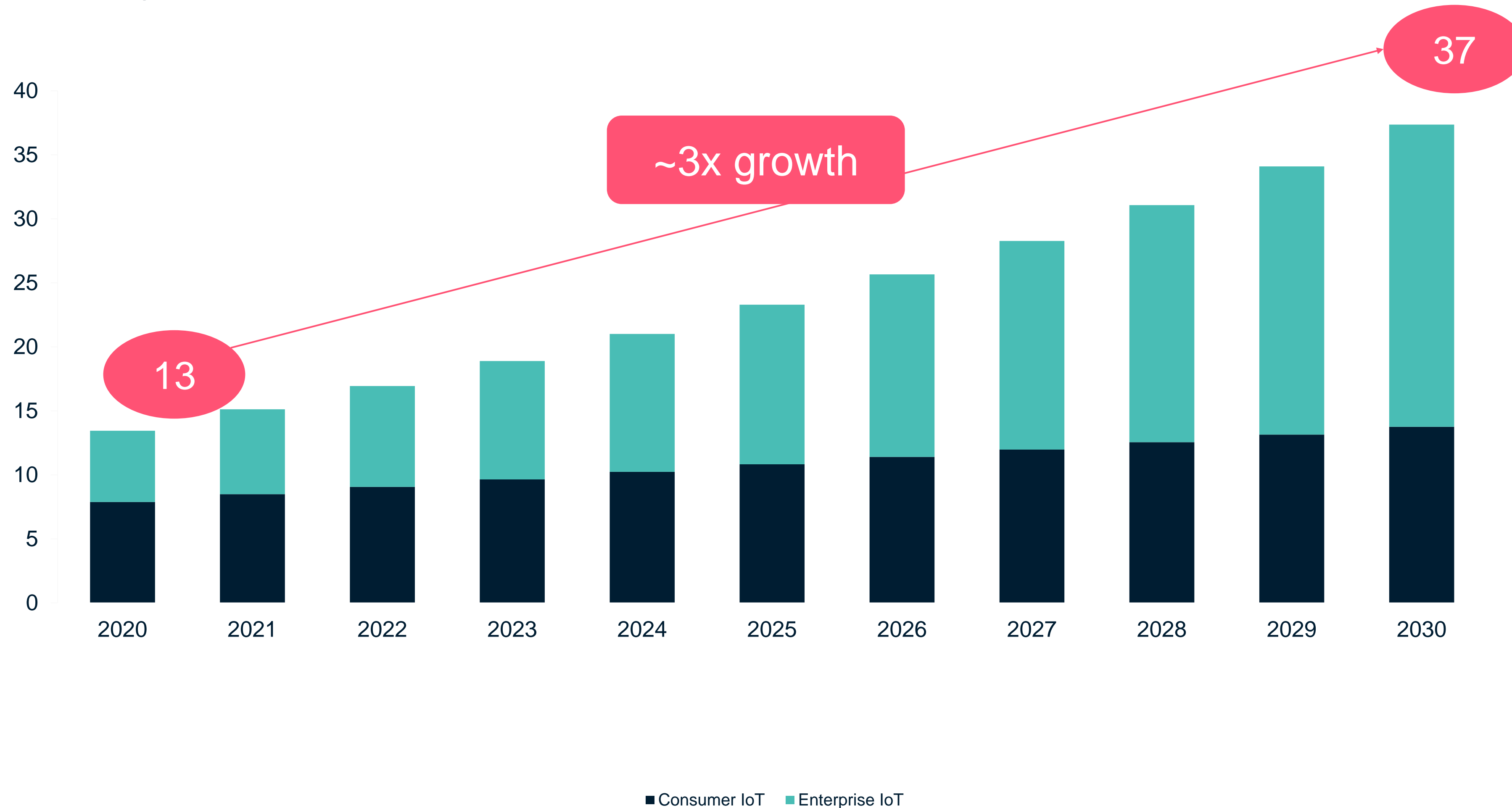
- **Enterprise driving IoT growth**: across all vertical sectors

- **Consumer trends:** smart home drives growth. Smartwatches overtaking fitness trackers

- **Cellular on the rise:** nearly 6 billion licensed cellular IoT connections by 2030

■ Consumer IoT ■ Enterprise IoT

Source: GSMA Intelligence.

Momentum for private networks is accelerating
Boosting the number of networks and devices

Enterprise demands for Private Networks

22%

of enterprises deploying or planning to deploy IoT solutions require location-specific network coverage (i.e. a factory or campus)

of which 88%

have invested or are likely to invest in a private network for that location

Trends in Private Networks deployments

- **Network vendors and operators are the main contractors so far…but new players are emerging**

- **4G was the leading network tech in the early days; 5G is now taking the lead**

- **Industrial sectors lead…but there are deployments in all sectors of the economy**

About GSMA Intelligence

info@gsmaintelligence.com

30+ analysts & industry experts

44K+ users worldwide

150+ reports published annually

50m data points updated daily

350 data metrics tracked

170 data metrics modelled and forecasted up to 2030

2k+ news items curated on our platform, updated quarterly

6K+ operator networks tracked
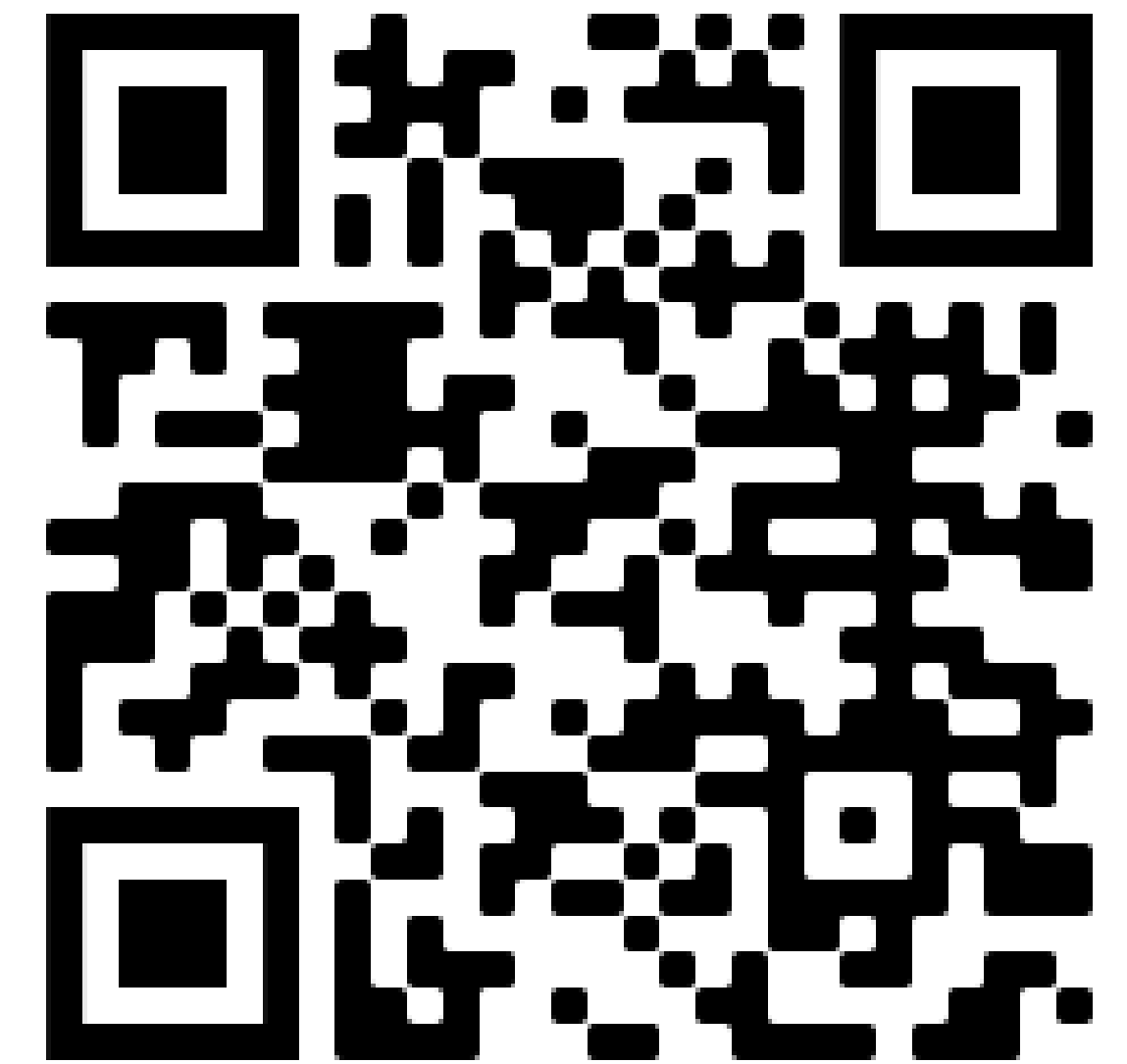
The world's only device network settings platform

One location
where operators and MVNOs update the device manufacturing community with the latest device network settings, so a device can be fine-tuned to a specific network, enabling all services to run reliably, worldwide.

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How it works

MNOs and MVNOs

Upload new / amend existing device network settings file

Network Settings Exchange

Receive notifications and download files

Settings pushed to new and current devices, especially OEM devices

OEM and Chipset Manufacturers

GSMA

+634
OEMs signed up

30%
of OEMs have downloaded a settings file in the past 12 months

+746
OEMs download settings files p/m on average

+140
MNO and MVNO accounts

+170
unique network settings featured

GSMA

New features/ settings process

Submit Idea

Contributor
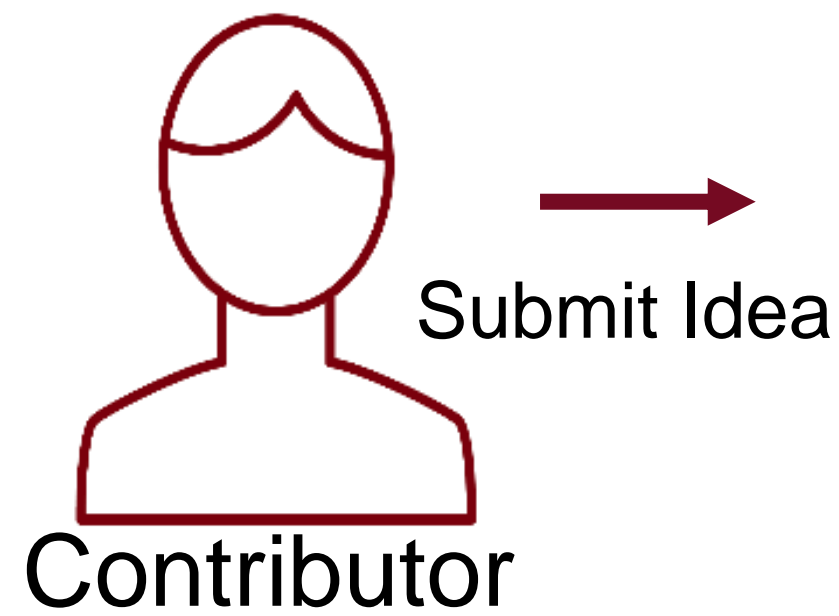
GSMA

GSMA Network Settings Exchange

Product Idea Submission Sheet

Please fill the simply form below and kindly submit your idea to the product team who can be found at Networks Settings Exchange

Product Idea Title:	
Date:	
Submitter Name:	
Submitter Email Id:	
Submitter Company:	
Idea Description:	<Describe your idea in simple words. For example: User should have an ability to….>
Beneficiaries:	<Who is going to benefit from the idea: List company(s), stakeholder groups, type of companies etc.>
Beneficiary Benefits:	<Describe how the beneficiaries will benefit from your idea>
Usability experience Impacts:	< Describe how your idea will impact the usability experience of the beneficiary and other user segments>

Complete Idea Submission sheet and share with nsx@gsma.com

NSX Product Backlog - TSG

ID	Idea	Pros	Cons	Priority (High, Medium, Low)	Submitted By	Date	Requires TS.32	Status	Release Date	Comment
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
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17										
18										

Ideas analysed, added to product backlog, and prioritised by GSMA Product through the TSG
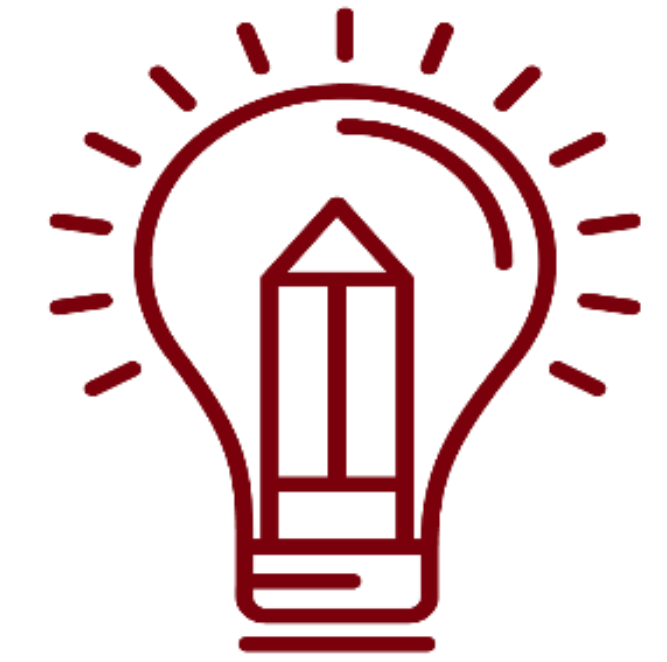
New Features and/or TS.32 Settings implemented in NSX based on release plan, GSMA budget, and agreed priorities.

GSMA

GSMA Network Settings Exchange Planned enhancements

In Planning 2023

- TS.32 v13 (new 5G settings) – Planned Q4 2023
- APN settings process updates
- OEM and MNO messaging – sharing OEM release info with MNO

On Product Roadmap

- UI/ UX Enhancements – to be prioritized
  - Usability improvements
  - GSMA branding/ design changes
- Automated ingestion of settings files into OEM systems – TBD in TSG

GSMA

BACKGROUND / RECAP

2016

- **TS.32:** Technical Adaptation of Devices through Late Customization V1.0
  - PRD defining a set of Network related Settings in Devices, (IMS, APN, 2G/3G/4G/5G, Others)
  - Work on TS.32 is still ongoing, currently in V12.0. (2023)

- **TS.36:** Devices Setting Database
  - PRD defining requirements & functions of a "Device Settings Database"
  - a platform to share TS.32 settings among MNOs & OEMs - Designed by MNOs & OEMs
  - TS.36 was used for reference, and archived after NSX launched

2019

- GSMA develops and launches Network Settings Exchange (NSX)
  - Actively maintained and developed by GSMA. Growing in usage ever since **(~630 OEMs / 140 MNOs)**

ERLEBEN, WAS VERBINDET.

DT PARTICIPATION

- **DT uses service to share all 15 separate network settings documents**
  - 12 MNOs & 3 MVNOs
  - Since launch 2019, more than 1.500 downloads accumulated
  - Incoming queries from OEMs & Chipset manufacturers

- **Target: OEMs & devices outside of DT portfolio**
  - Most of the ~600 OEMs have no bilateral relation with DT at all
  - Used to be blind-spot for our Terminals-Team

- **DT active in TSG driving NSX & TS.32 forward ever since**

GSM Association   Non-confidential
Official Document TS.32 - Technical Adaptation of Devices through Late Customisation

Technical Adaptation of Devices through Late Customisation
Version 11.0
18 May 2022

This is a Non-binding Permanent Reference Document of the GSMA

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DT SETTINGS IN NSX

S.No	File Name	Total Number of times OEMs Downloaded
1	TS.32 v9.1 Magenta Telekom Austria_232_03_01_220519.xlsx	62
2	TS.32 v9.1 T-Mobile Netherlands_204_16_1_220518.xlsx	50
3	TS.32 v9.1 Tele2 NL (MVNO T-Mobile Netherlands)_220519.xlsx	52
4	TS.32 v9.1 T-Mobile Polska_260_02_1_220519.xlsx	54
5	TS.32 v9.1 Slovak Telekom_231_02_1_220519.xlsx	50
6	TS.32 v9.1 Telekom Romania_226_03_06_1_220519.xlsx	50
7	TS.32 v9.1 Telekom Deutschland_262_1_1_220519.xlsx	57
8	TS.32 v9.1 Congstar (MVNO Telekom Deutschland)_262_1_1_220519.xlsx	59
9	TS.32 v9.1 T-Mobile Czech Republic_230_01_1_220518.xlsx	56
10	TS.32 v9.1 COSMOTE Greece_202_01_1_220519.xlsx	57
11	TS.32 v9.1 Hrvatski Telekom_219_01_1_220519.xlsx	56
12	TS.32 v9.1 Magyar Telekom_216_30_1_220519.xlsx	56
13	TS.32 v9.1 Makedonski Telekom_294_01_1_220519.xlsx	57
14	TS.32 v9.1 Crnogorski Telekom Podgorica_297_02_1_220519.xlsx	60
15	TS.32 v9.1 Bonbon (MVNO Hrvatski Telekom)_219_01_1_220519.xlsx	63

OUTLOOK & CALL TO ACTION

- **New work-mode to jointly work on NSX features in future, with OEMs, MNOs & GSMA**

- **Starting July 13th**

- **DT expects increasing maturity, more features and wider relevance of NSX**

- **Hoping for more OEMs and MNOs to join the service and the discussion in TSG**

Introduction

✓ Privately held Ztar Mobile is a leading US enabler of private label mobile service and private label wireless solutions

✓ We're a company of go-getters and builders. We're innovating the way people and businesses buy wireless. We bring over 20 years of global mobile solution experience to every partnership, enabling our clients to create and deliver intuitively seamless mobile experiences for their customers from private label cell phone programs, m-commerce to IoT services to name a few

✓ We have launched numerous private label brands for our retail partners

✓ Ztar Mobile partners with leading wireless operators including AT&T, T-Mobile, Rogers Wireless, and device manufacturers and distributors in its operating markets. These partnerships allow Ztar Mobile to deliver complete outsourced wireless solutions, from service creation to billing and customer care as well as a wide range of Managed Services and Professional Services

Experience is the Strategy
# Frictionless Experiences in World of Disruptions

✓ Nearly 80% of American consumers point to speed, convenience, knowledgeable help and friendly service as the most important elements of a positive customer experience

✓ We consistently need to provide our customers an exceptional value, minimum friction or stress to on-board and activate our customers. We won't have many chances to get it right

✓ With multi network configurations and independently sourced devices, consumers still expect their device to perform without issue and without manual intervention

✓ Consumers would walk away from a brand they love after just one bad experience, for example

   ✓ Outdated settings can mean no internet access on subscriber devices

   ✓ Unavailable MMS – no picture, no group messaging or no video messaging

   ✓ Loss of tethering or hotspot feature

   ✓ Unavailable VoLTE services – no video calling or 5G

✓ Demarcating device configuration exchange enable Ztar and OEMs to serve consumers and reduce frustration and care support costs. Without it, Ztar would have to provide every OEM with a form that is not standard

✓ We got introduced to GSMA NSX by an OEM and swiftly were on-boarded

✓ We worked with our MNOs to ensure accuracy of the network configuration settings, the file was uploaded to the platform. MNO engagement is critical for MVNO accurate upload. Monitor downloads.

ZTAR MOBILE
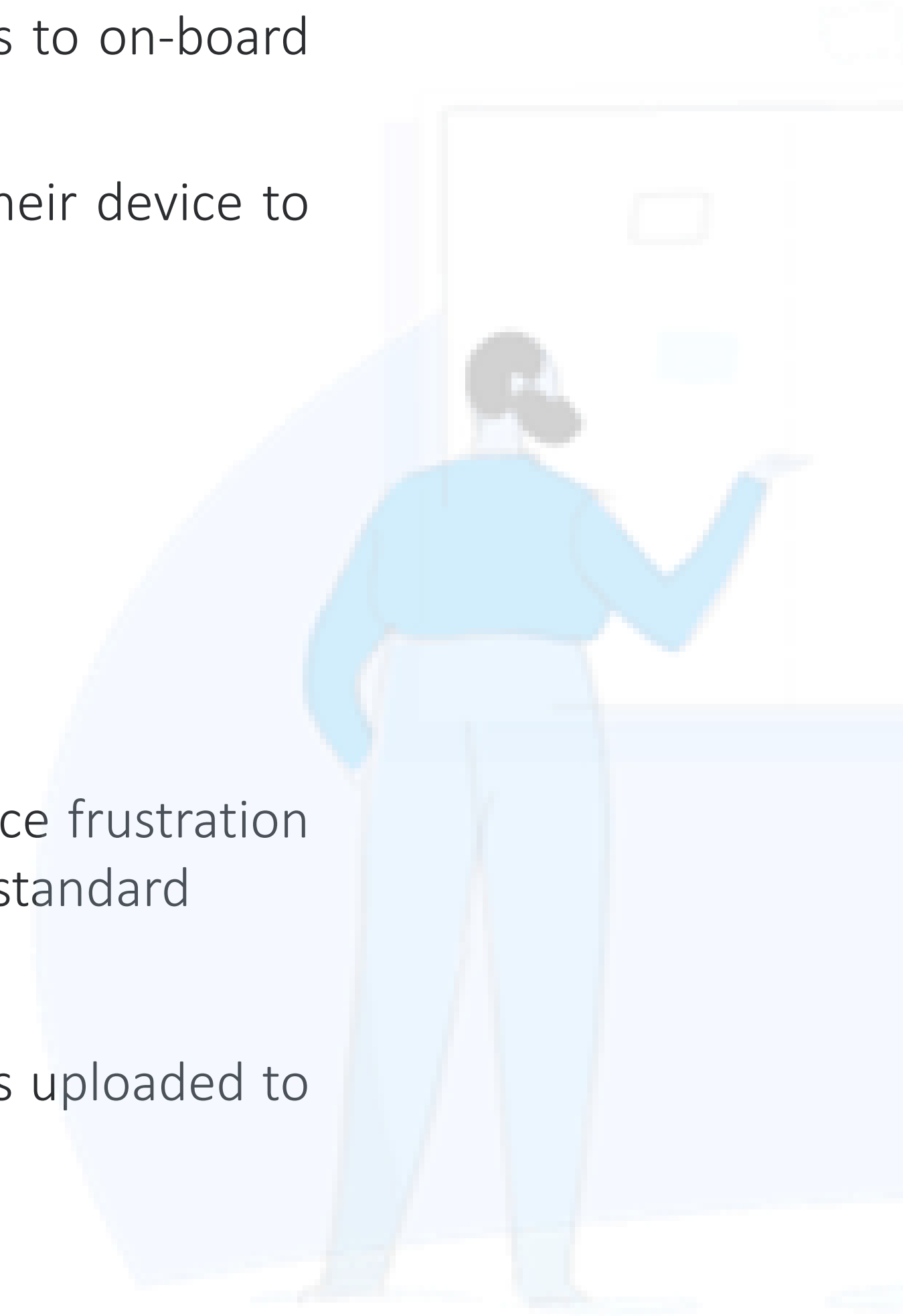
OEM Benefit

✓ Update network settings as they become available while new and current devices can access and configure

✓ Reduces operational costs by getting access to hundreds of MVNEs in one platform

✓ Reduces operational costs by MNOs to support their reseller/MVNO network configuration (APN, MMS, …) to support the considerable variety of devices

✓ Open direct to consumer business model for purchase the device activate on any brand/network

✓ Standardized template means settings can be shared quickly and easily, IMS and APN settings always configured correctly on devices in your network

✓ Network settings are published to current and future devices

ZTAR MOBILE
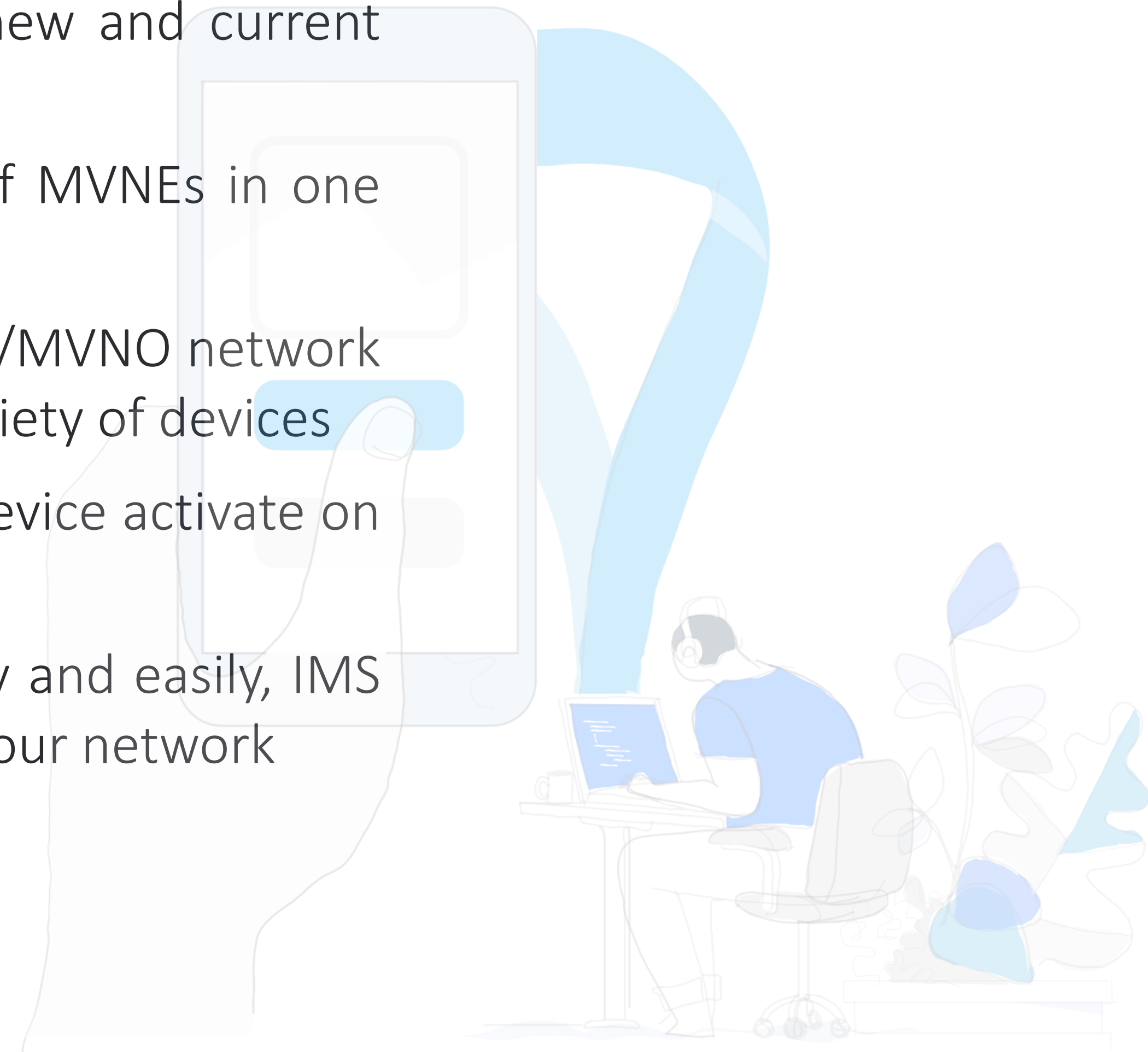
Experience is the Strategy
Next

- ✓ Activating eSIM and managed subscriptions

- ✓ Device Validation

- ✓ Mediation and roaming services for MVNX

- ✓ MDN Management Services

ZTAR MOBILE

Thank you for joining, any questions?

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