

NTN IN CONSUMER MOBILE

Consumer attitudes to
direct-to-handset services

Viasat  | **GSMA
Intelligence**

The Great
Connectivity
Convergence

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CHAPTER ONE

Chapter 1: What is the Great Connectivity Convergence?

Satellite and cellular connectivity have always served different roles. Satellite brings reliability and resilience — essential for aviation, maritime, emergency services, and other industries that operate in remote areas, beyond the reliable reach of cellular coverage. Cellular delivers affordable, high-performance coverage where most people live, with devices optimized for battery, size, and cost.

When users leave areas where cellular coverage is concentrated to go on hikes, road trips, rural commutes, or travel abroad, they frequently encounter connectivity gaps — often when reliable access matters most. And even within dense coverage zones, users can encounter these same “not spots”. Until now, adding satellite connectivity to consumer devices to remedy the issue wasn’t always a practical solution, especially at a very large scale.

That’s all changing with the emergence of direct-to-device (D2D). For the first time, everyday devices — smartphones, wearables, vehicles, and more — can be adapted to connect to satellites using the same 3rd Generation Partnership Project (3GPP) standards they already use for cellular. That means that these devices can connect directly to satellite without the need for an intermediary satellite terminal or additional hardware.

This huge shift — the “Great Connectivity Convergence” — gained momentum when the standards body, 3GPP, wrote satellite into the global mobile “rulebook.” Release 17 (R.17) introduced support for non-terrestrial networks (NTN) including a standardized framework that enables messaging, voice, and data traffic to be carried over satellites using the same protocols as terrestrial cellular networks, ensuring chipsets, devices, and networks can interoperate without custom workarounds.

Now that a path has been cleared, businesses and consumers are beginning to adopt services powered by hybrid cellular/satellite connectivity. And as adoption grows, so will the variety of use cases, bringing the world one step closer to truly ubiquitous global connectivity.



What's the consumer mobile opportunity in the Great Connectivity Convergence?

Following the release of these standards, we've seen real ecosystem momentum, as chipset vendors and original equipment manufacturers (OEMs) increasingly add NTN capabilities to their offerings. Meanwhile, mobile network operators (MNOs) and satellite network operators are partnering and collaborating to deliver new services to consumers.

Sitting within the umbrella of D2D is direct-to-handset (D2H), a subset which is currently focused on providing smartphones, smartwatches, and similar devices with satellite connectivity that can be used to send SMS, make calls, and use data.

For consumers, the need is clear: ending the frustrating blackspots that can hit at critical moments. D2H addresses this gap directly, and our findings suggest that end users are willing to pay for the added confidence in their devices' connectivity coverage.

This isn't just about convenience — D2H can underpin a new generation of safety features, such as satellite-supported SOS that works virtually everywhere and delivers a new level of peace of mind to users.

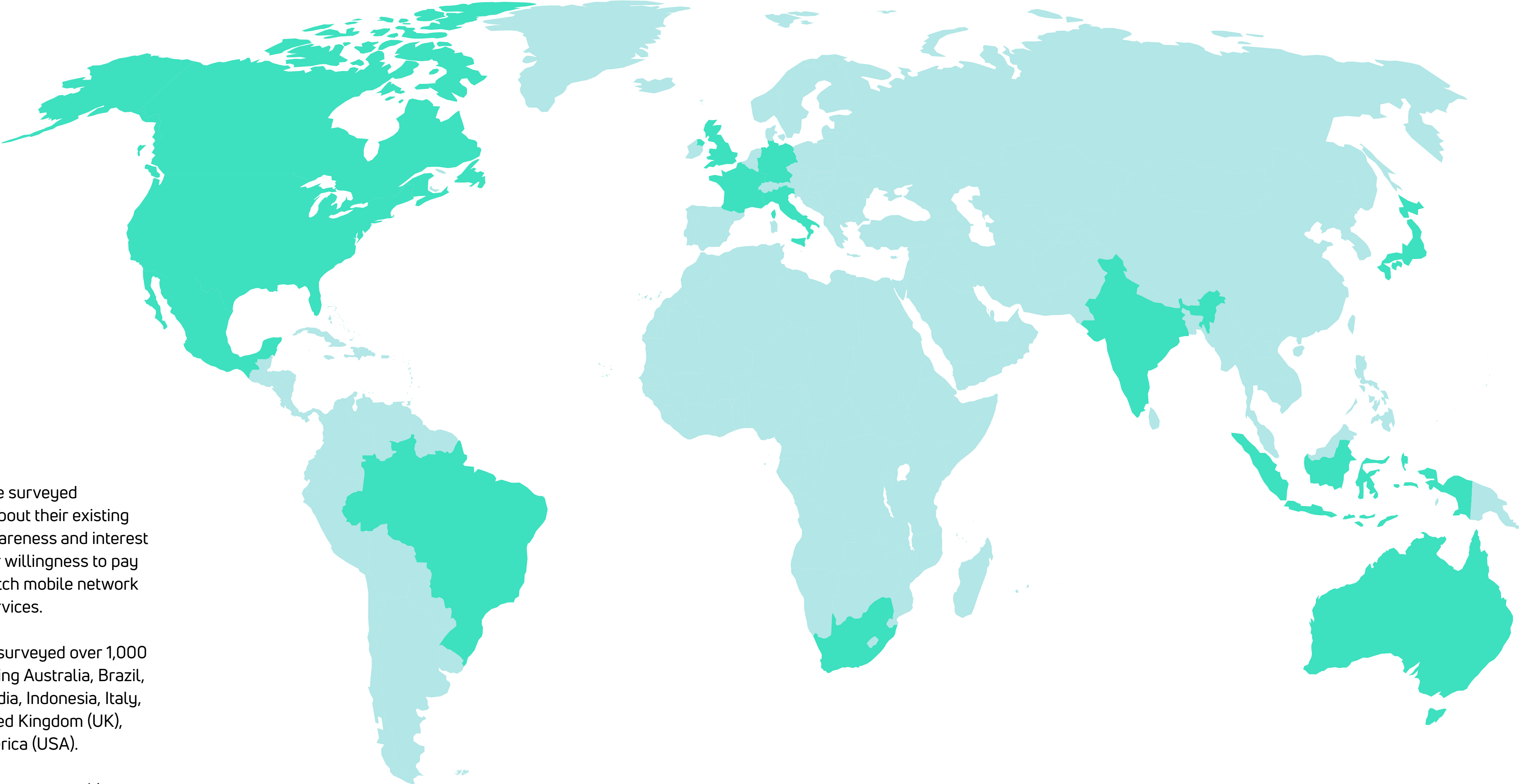
As adoption grows, consumer preferences are likely to shift toward operators and devices that offer this "coverage certainty." This may

completely reshape the competitive dynamic in both the handset and operator markets, making satellite integration a key differentiator rather than a niche.

The opportunity is clear for MNOs: differentiation, improved customer experience, and new revenue streams. Our research explores not only the technology driving this shift, but also the nuances in consumer appetite worldwide — what people value, and how their choices may reshape the landscape for operators and OEMs.

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Methodology

Viasat and GSMA Intelligence surveyed 12,390 mobile phone users about their existing terrestrial coverage, their awareness and interest in satellite services, and their willingness to pay for these services and to switch mobile network providers to access these services.

From May to June 2025, we surveyed over 1,000 people in each market, covering Australia, Brazil, Canada, France, Germany, India, Indonesia, Italy, Japan, South Africa, the United Kingdom (UK), and the United States of America (USA).

GSMA Intelligence undertook a survey with these same parameters in 2024, and throughout the report we compare this year’s results to that survey to get an insight into how key elements have developed in the past year.

CHAPTER TWO

Chapter 2: Coverage issues set the stage

Even in today’s hyper-connected world, consistent mobile coverage is far from guaranteed. That frustration has made reliable coverage the key driver of interest in satellite-enabled services.

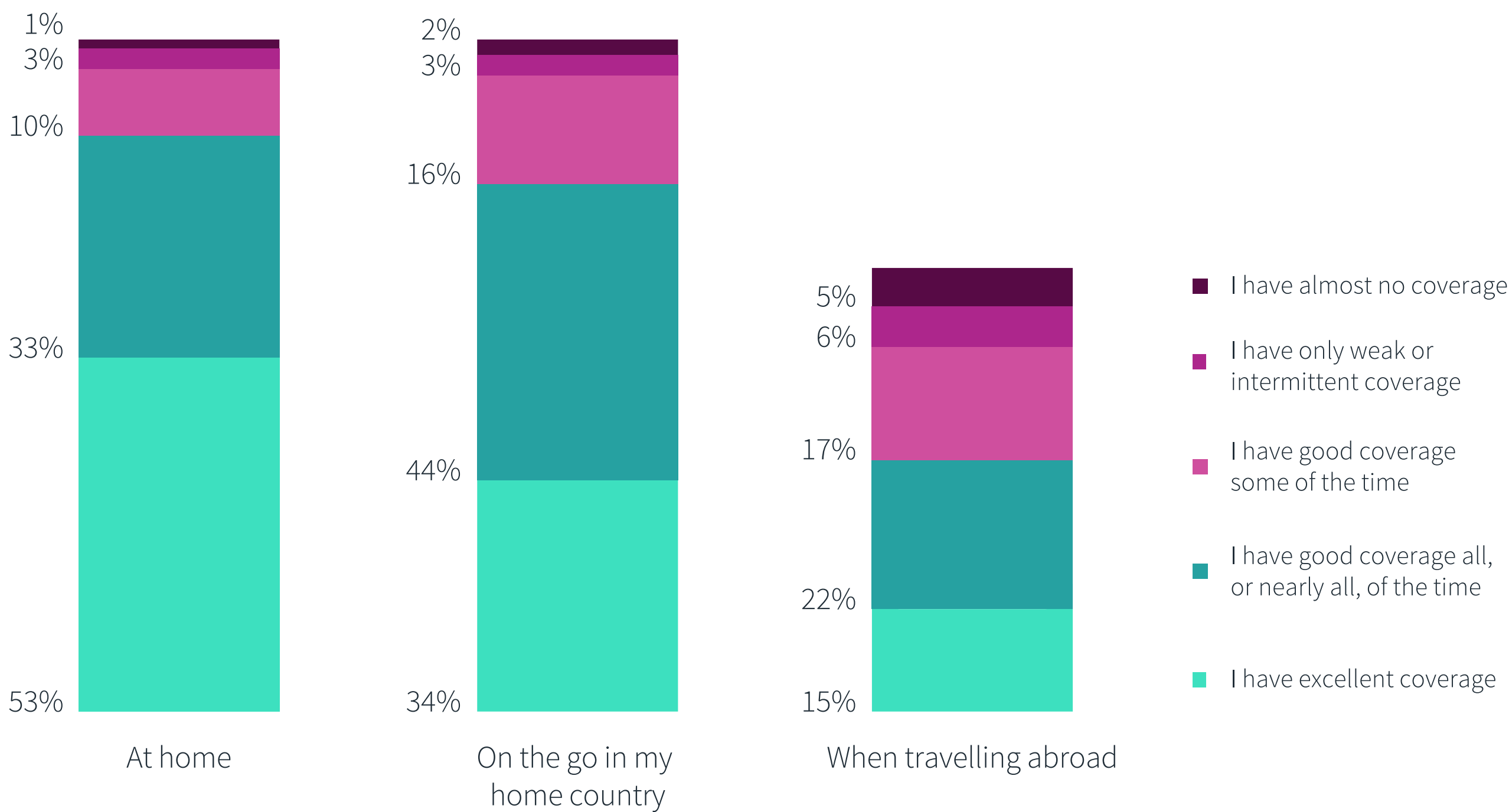
Across the 12,000 consumers in our survey, unsurprisingly coverage was strongest at home, with only 14% reporting issues such as inconsistent service or no coverage. The picture declines when consumers are on the move domestically: 21% report they get, at best, good coverage just some of the time, with 1 in 20 (5%) saying their coverage is consistently weak or intermittent.

Once abroad, most people encounter worse coverage, with 28% reporting that, at best, they only get good coverage some of the time and 11% facing weak or even no service.

In a world which is deeply dependent on continuous connectivity, “good coverage some of the time” simply isn’t good enough for many consumers. These gaps disrupt critical moments of all kinds — from a businessperson on a rural commute waiting for an important email to an adventurer abroad in need of assistance. Poor coverage can jeopardize not only livelihoods, but in many emergencies, actual lives.

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Thinking about your primary mobile phone for personal use, how would you rate the quality of mobile network coverage you get from your existing provider?



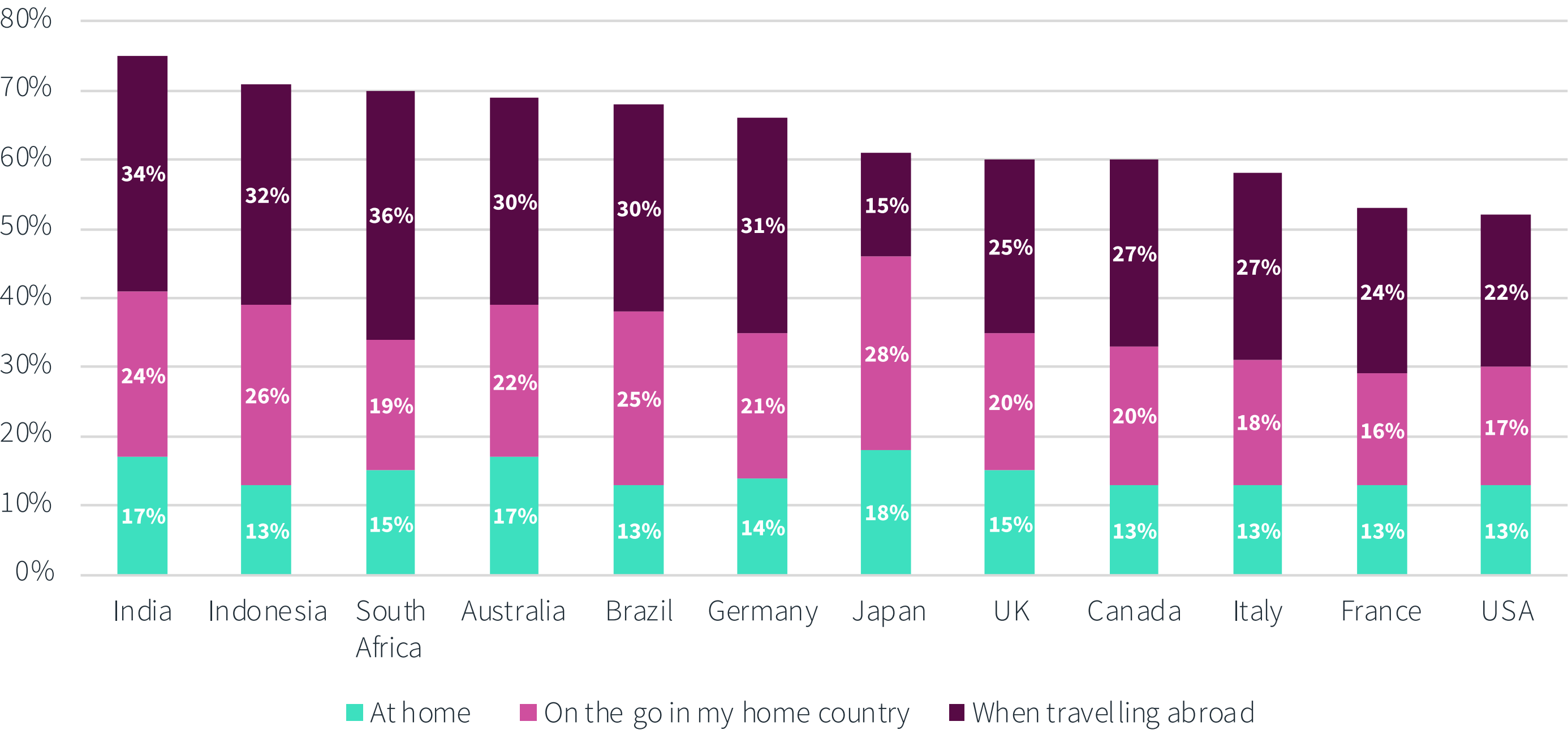
Mobile coverage quality by country

As a rule, coverage generally gets worse the farther consumers travel from home — though not in every case. Factors such as country size and infrastructure limitations contribute to variations between markets, revealing important nuances in regional consumer mindsets.

In Australia, 17% report good coverage only “some of the time” at home, rising to 23% on the go, but — counterintuitively — falling to 20% when abroad. In Japan, the picture is tougher at home (18%) and on the go (28%), yet Japanese consumers are even less likely to report facing issues when travelling overseas, at just 11%.

This pattern may reflect stronger roaming agreements and infrastructure in popular overseas destinations compared to patchier domestic networks. In countries with vast geographies (such as Australia) or complex urban networks (like Japan), consumers can sometimes enjoy more consistent coverage abroad, where roaming agreements prioritize tourism destinations via cross-border partnerships.

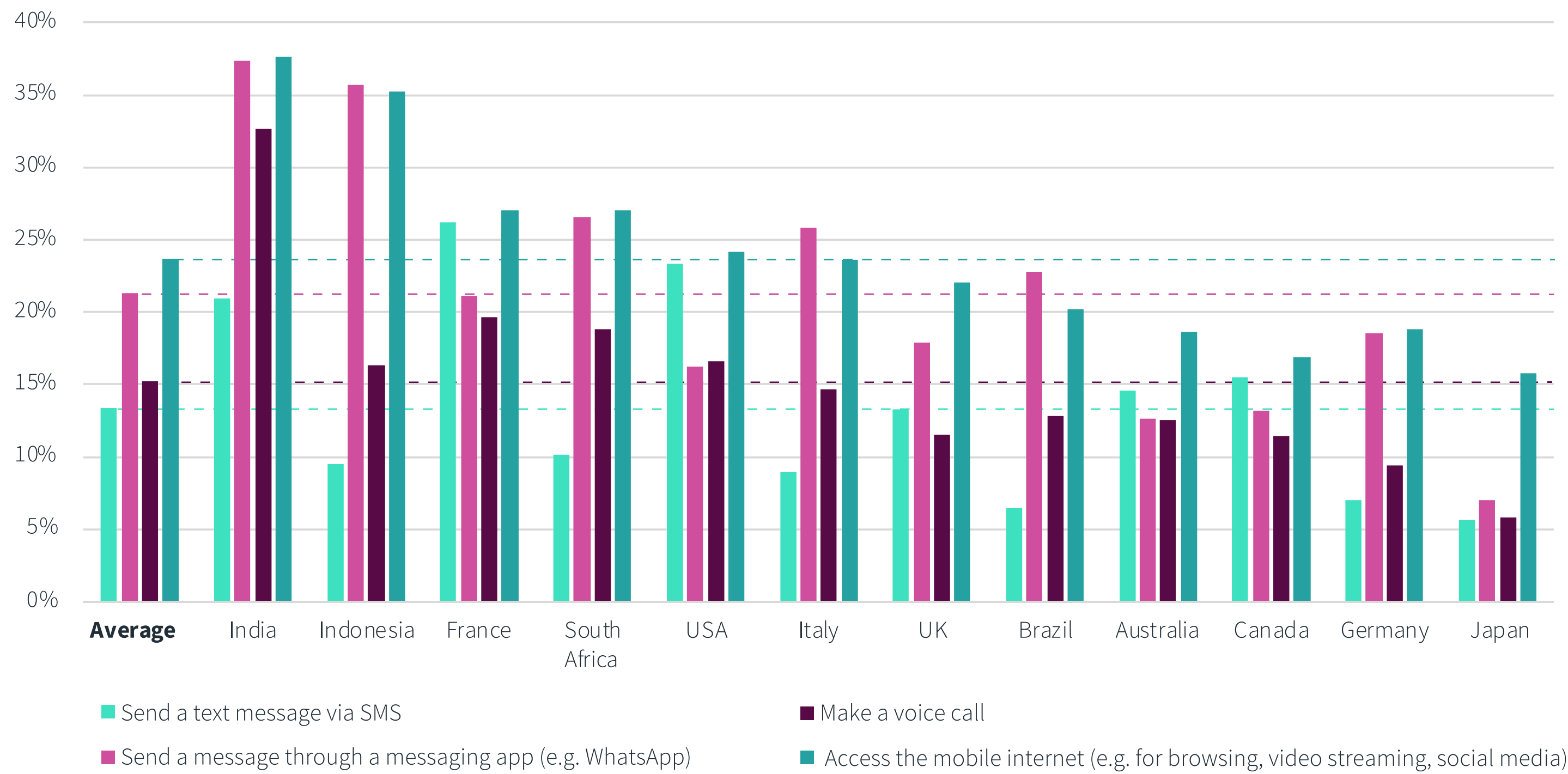
Share of respondents who experienced: good coverage some of the time, weak/intermittent, coverage and almost no coverage



On average, more than a third of consumers lose access to basic mobile services at least twice a month.
The severity differs by region, but in population terms, less connected areas represent a significant proportion of the global market.

For example, Indonesia and India showed the highest share of users who report losing signal more than five times a month for app-based messaging and mobile internet, highlighting the ongoing gaps in network reach and reliability.

Share of respondents who were unable to access mobile services over 5 times in the month before being surveyed because they were out of signal

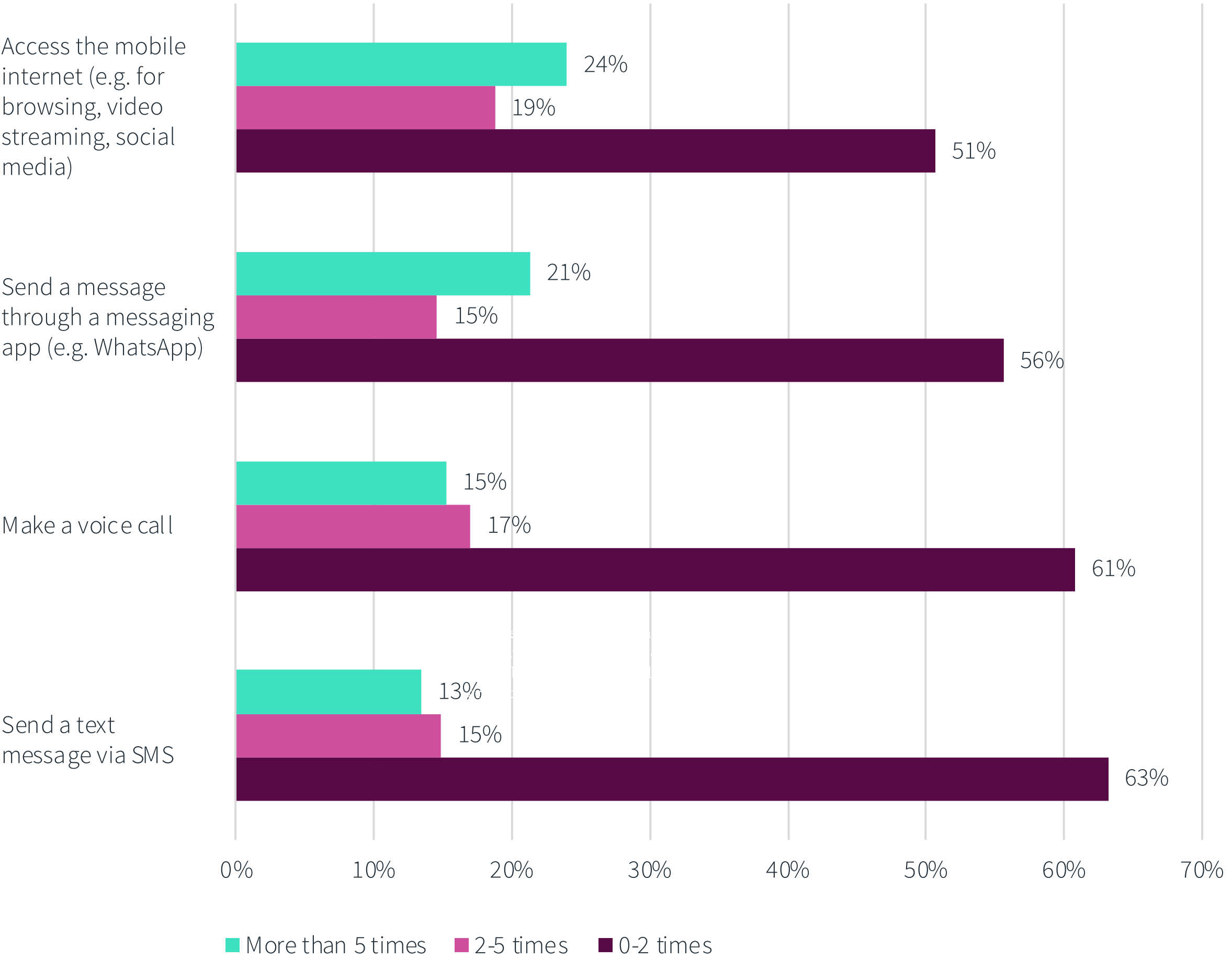


However, poor connectivity isn't limited to emerging or less developed markets. In fact, France (26%) and the U.S. (23%) record the highest share of users who were unable to use SMS or text services at least five times in the month before they were surveyed. This underlines the fact that unreliable coverage remains a problem even in countries with extensive network infrastructure.

So, with the issue so widespread, it's no surprise that consumers everywhere place high value on ubiquitous, consistent coverage. On average, 91% say it matters at home, 89% while on the go domestically, and 70% when travelling abroad.

Notably, that last figure has risen two points since 2024, underscoring a simple truth — **reliable coverage is no longer a nice-to-have, but a universal expectation shaping consumer loyalty and operator opportunity alike.**

Roughly how many times over the last month have you NOT been able to do any of the following on your mobile phone because you were out of signal?*



*Please exclude times when you have been below ground, e.g. in basements or on underground trains



CHAPTER THREE

Chapter 3: Consumer awareness and interest in satellite services

While satellite connectivity has long played a vital role in the modern world, having its capabilities built directly into everyday smartphones is still a relatively new phenomenon. So, in order to gauge whether people want these capabilities — and would be willing to pay for them — we first need to understand consumer awareness levels: the extent to which people have heard of, recognize, or understand satellite products or services.

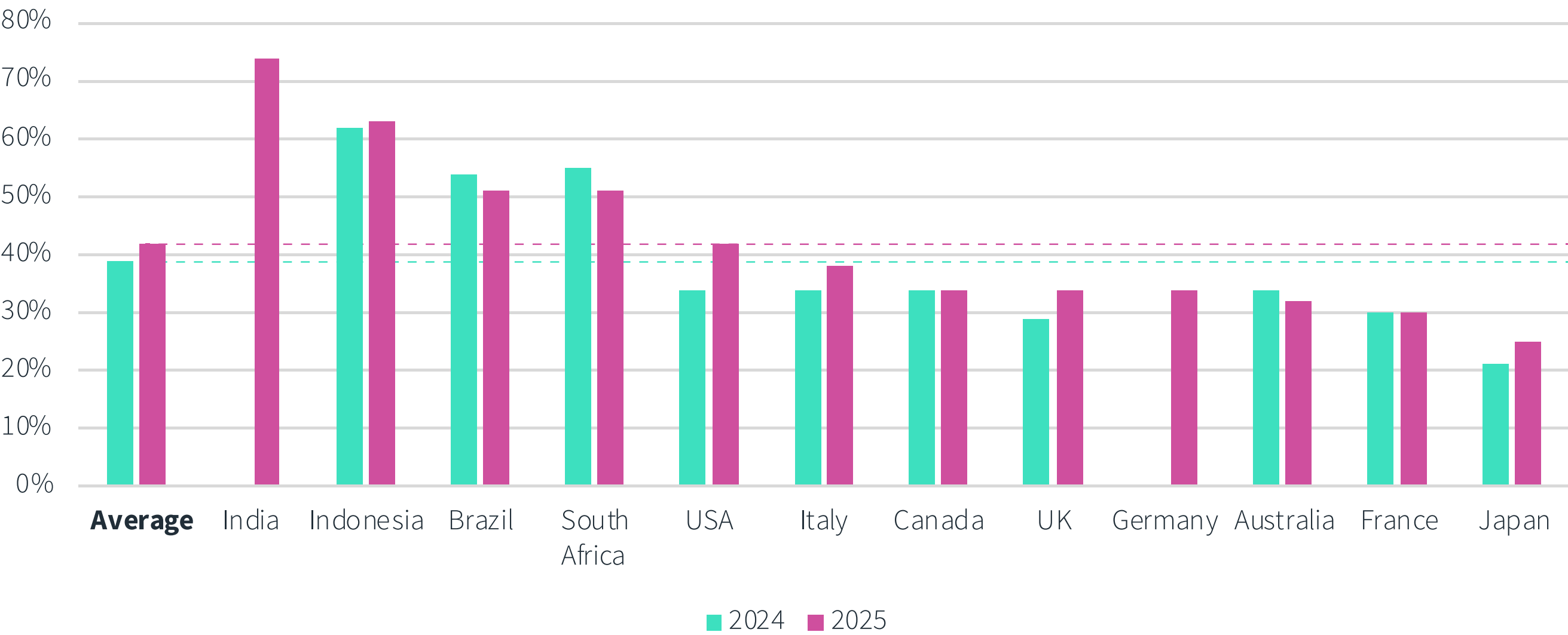
Globally, close to half of respondents (42%) are aware of satellite-enabled features in newer premium smartphones, such as the iPhone’s emergency SOS and Samsung Galaxy’s SOS. Awareness has risen on average three points year-on-year, showing that knowledge of these capabilities is no longer niche, and continues to grow.

Awareness, however, seems heavily influenced by regional market conditions. In India, for example, 74% of consumers are aware of these features — almost 50 points higher than in Japan (25%).

One clear reason is that **in markets with more frequent coverage challenges, consumers become more motivated to explore alternatives**. Telcos and satellite providers also promote satellite services more actively in these regions, while high-profile launches have further boosted visibility.

And because many of these countries are mobile-first — with limited fixed broadband infrastructure — it’s no surprise consumers in them are especially attuned to features that promise to close coverage gaps.

Are you aware of new satellite enabled connectivity being built into newer premium smartphones, such as emergency SOS in newer iPhones and Samsung SOS on newer Galaxy smartphones?



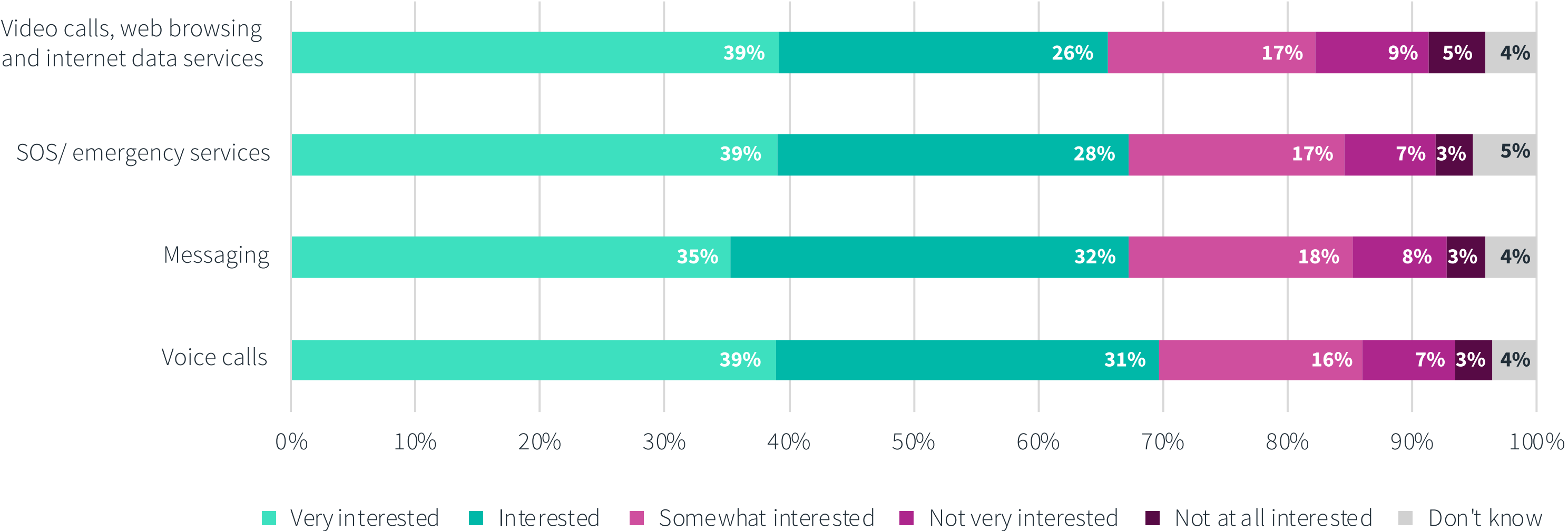
Managing consumer expectations

After awareness comes interest. And while the vast majority (~80%) of respondents express interest in satellite-enabled services on their smartphone when outside mobile coverage, once again, we see clear discrepancies between more and less economically developed markets.

In less economically developed and emerging markets, interest is significantly higher across all services, with consumers showing considerably stronger enthusiasm for web browsing and video calls via satellite. This pattern is reversed in consumers of more developed economies, where interest is focused more on messaging and SOS.

This may be a symptom of the “leapfrogging” effect, which saw consumers in many emerging markets bypass PC-based internet access and go straight to mobile devices. Over time, that dependency may have raised expectations of what mobile operators should be able to deliver.

How interested are you in using the following seamless outdoor satellite-enabled services on your smartphone in areas outside of mobile coverage? By seamless, we mean no changes to the way you normally use your phone

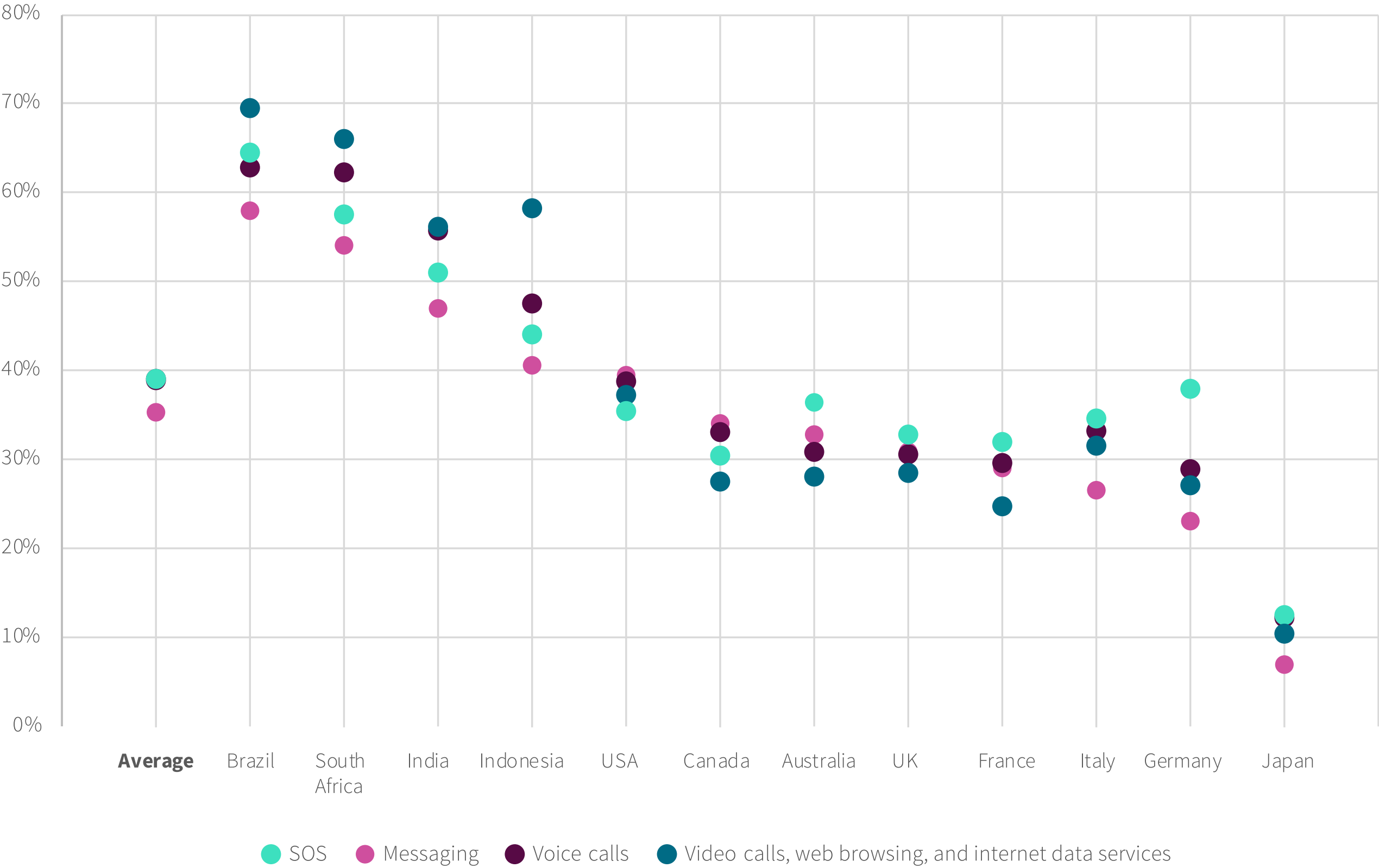


So, for MNOs, this presents both opportunity and risk. Appetite for satellite-enabled services is undeniable, but so is the need to manage expectations.

For at least the next few years, satellite connectivity on smartphones will be largely focused on lower-bandwidth services such as messaging, SOS, and voice, especially when delivered at scale across diverse handsets.

MNOs have a delicate balance to strike: harnessing demand without overpromising. That means managing expectations carefully, especially in high-potential emerging markets where both general excitement and demand for data-rich services are strongest.

Share of respondents who are "very interested" in using the following seamless outdoor satellite-enabled services on their smartphones in areas outside of mobile coverage



CHAPTER FOUR

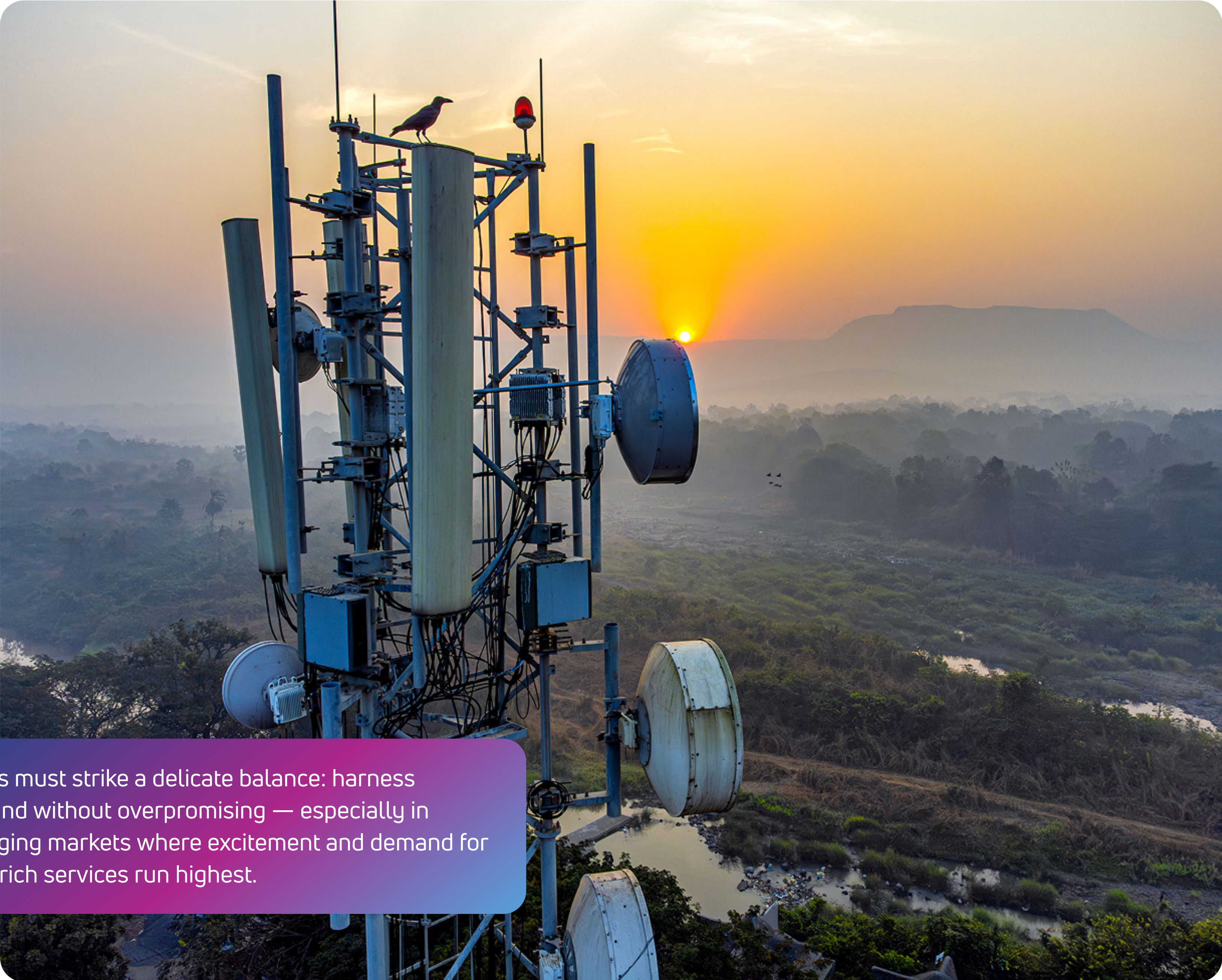


Chapter 4: From awareness to action – willingness to pay and churn

With just over 60% of respondents willing to pay for satellite services, the commercial opportunity is clear. However, that opportunity varies significantly by market.

Because despite awareness and interest being important, the real test of market potential is whether people will pay — and how much. On average, more than 60% of all consumers say they would pay extra for satellite services on top of their existing monthly spend, whether on prepaid or contract tariffs. This shows that, at least in principle, widespread interest translates into perceived value.

As expected, the same divide we've seen throughout holds here: in less economically developed economies where awareness and interest are highest for satellite capabilities, there's also much more openness to paying more. For instance, in India (89%) and Indonesia (82%), willingness to pay far outstrips that of respondents in the U.S. (56%) or France (48%).



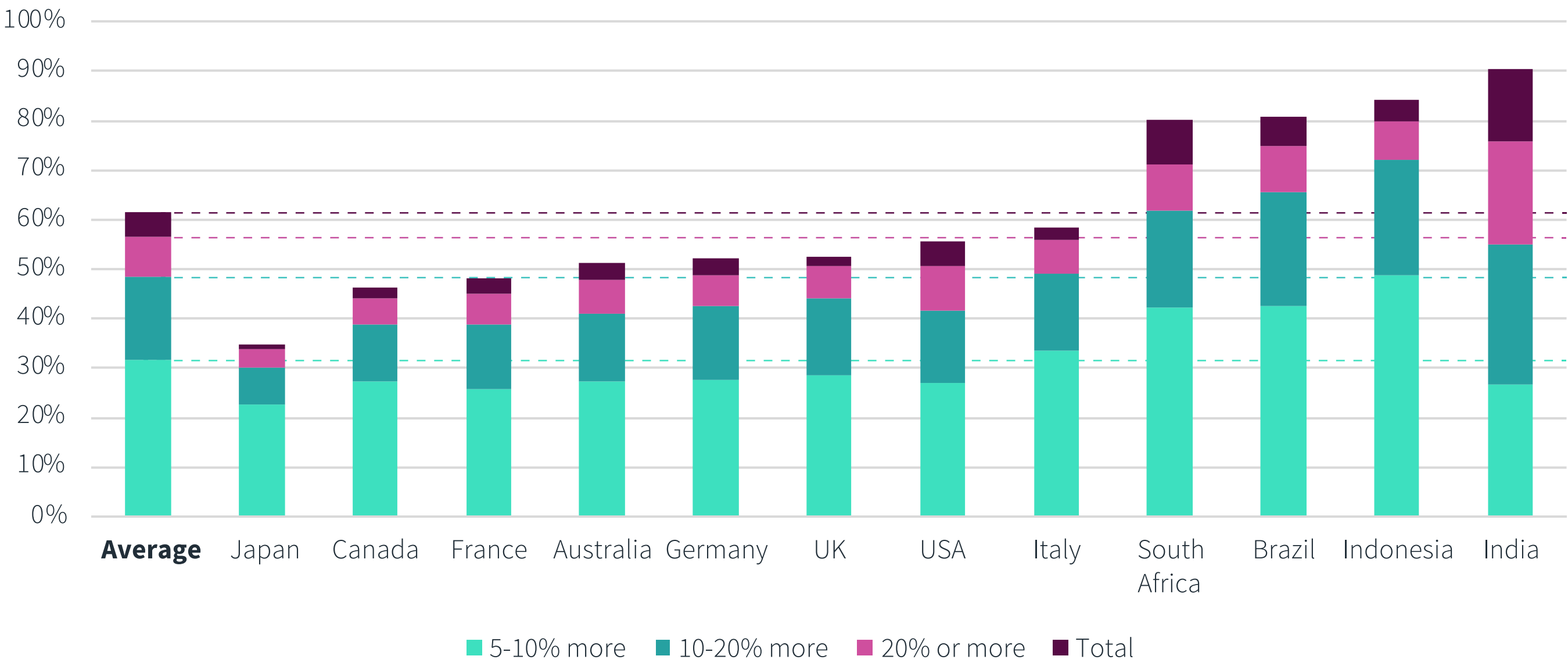
MNOs must strike a delicate balance: harness demand without overpromising — especially in emerging markets where excitement and demand for data-rich services run highest.

For telcos, that means incremental revenue is on the table — but only if they adapt their commercial approach to the dynamics of each market. **On average, respondents say they’d spend 5-7% more per month, as a percentage of their current monthly tariff, for satellite-enabled services.** However, India’s average uplift of 9% is particularly notable given the country’s overall lower Average Revenue Per User (ARPU) of \$2.35, especially when compared to the likes of the U.S., at \$45.57 (source for ARPU: GSMA Intelligence). That willingness to pay highlights the many nuances telcos must account for in each market.

Several factors may be driving this. Despite India’s overall low ARPU, its growing middle and upper classes — fueled by the country’s expanding technology sector — increasingly have the disposable income to pay for D2D services. They’re also likely more motivated to do so, given the frustration caused by frequent signal loss during everyday tasks.

Taken together, India’s sheer population size, rising wealth, and strong willingness to pay make it a major opportunity for MNOs — provided they tailor their strategy to the market’s unique characteristics.

How much more would you be willing to pay on top of your existing monthly tariff spend if your network provider offered seamless outdoor satellite-enabled services on your smartphone in areas outside of mobile coverage? (Average across all services)



What are consumers willing to pay?

Differences in what consumers are prepared to pay offer insight into how they perceive satellite-enabled services.

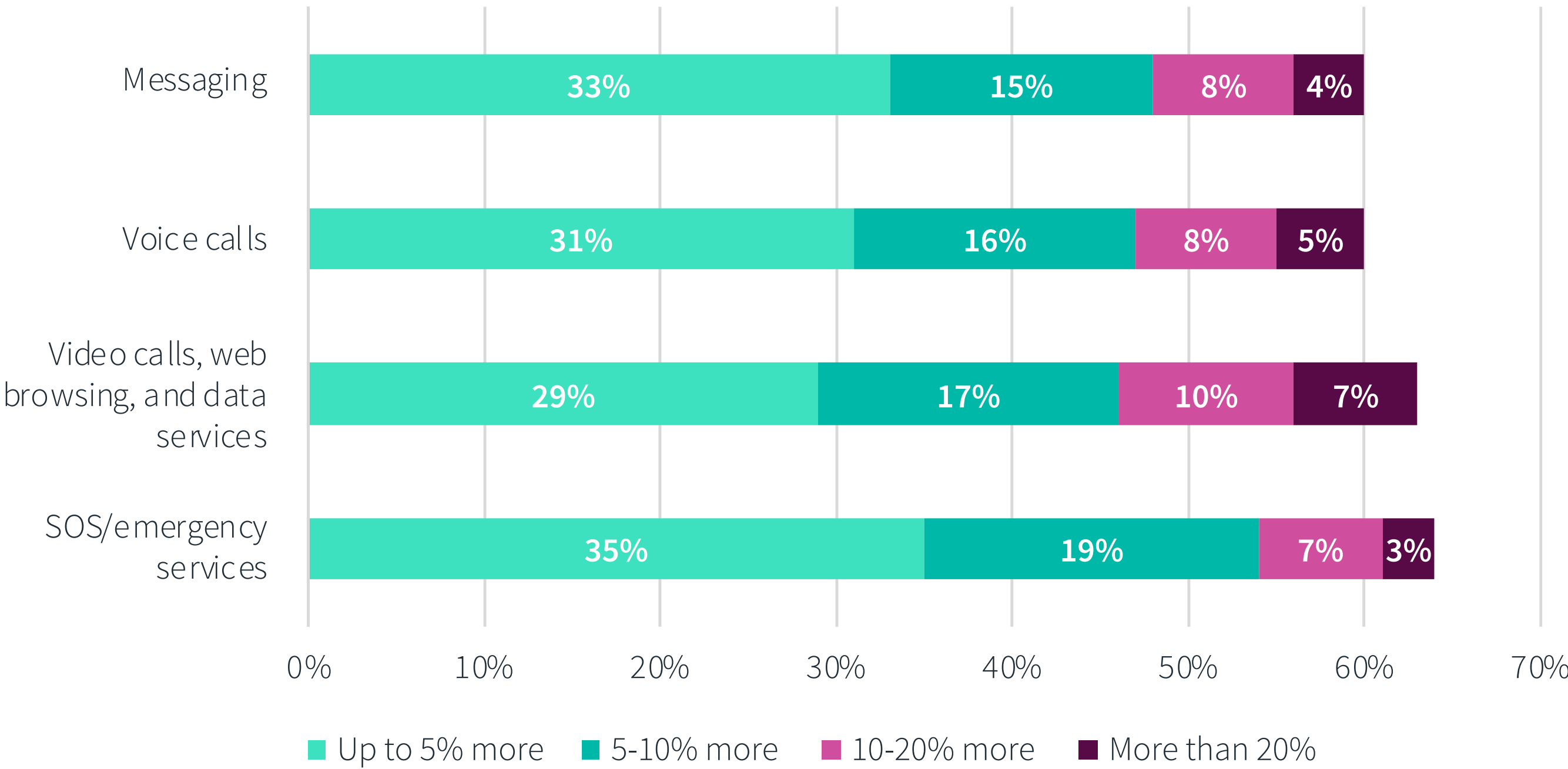
When it comes to paying up to 10% more on their monthly spend, the most popular service is SOS/emergency (54%), while video calls, web browsing, and data services rank lowest (45%). However, that pattern reverses when we look at those willing to pay more than 10%: SOS/emergency drops to 10.2%, while video, browsing, and data rise to 16%.

This suggests that SOS/emergency services are essentially seen as a basic add-on. Data-rich services are perceived as top-tier features, which justify even higher costs: consumers willing to pay more than 10% are disproportionately likely to prioritize them.

It's also worth noting that many existing satellite-enabled SOS services aren't explicitly charged for and are often offered free to end users. This hints that consumers have formed a familiarity with how mobile and networking technology works, so they intuitively understand that some services are easier to deliver than others.

So, for MNOs and handset manufacturers, D2D opens the door to varied commercial models depending on strategy. And by leaning into existing perceptions and customer priorities at the country level, they can also set realistic expectations about what's available now versus what's coming later.

How much more would you be willing to pay on top of your existing monthly tariff spend if your network provider offered the following seamless outdoor satellite-enabled services on your smartphone in areas outside of mobile coverage?



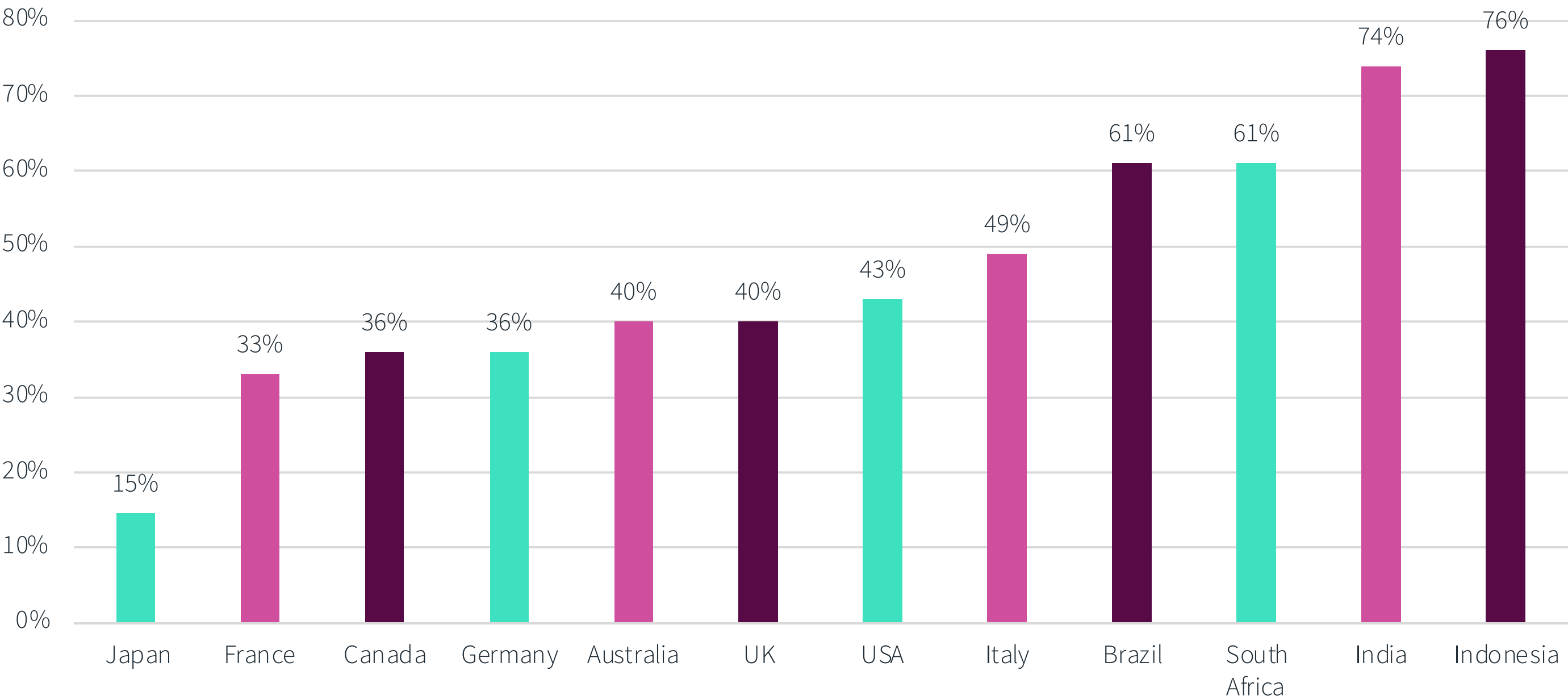
How D2D services could drive churn

One metric that’s just as telling as willingness to pay is willingness to churn: would a customer leave their current provider for one that offered hybrid connectivity?

Overall, almost half (47%) of users say they would switch to a different operator if outdoor smartphone services in areas outside coverage were included in their subscription. That’s up one point from last year, underlining how D2H is steadily becoming a stronger competitive differentiator.

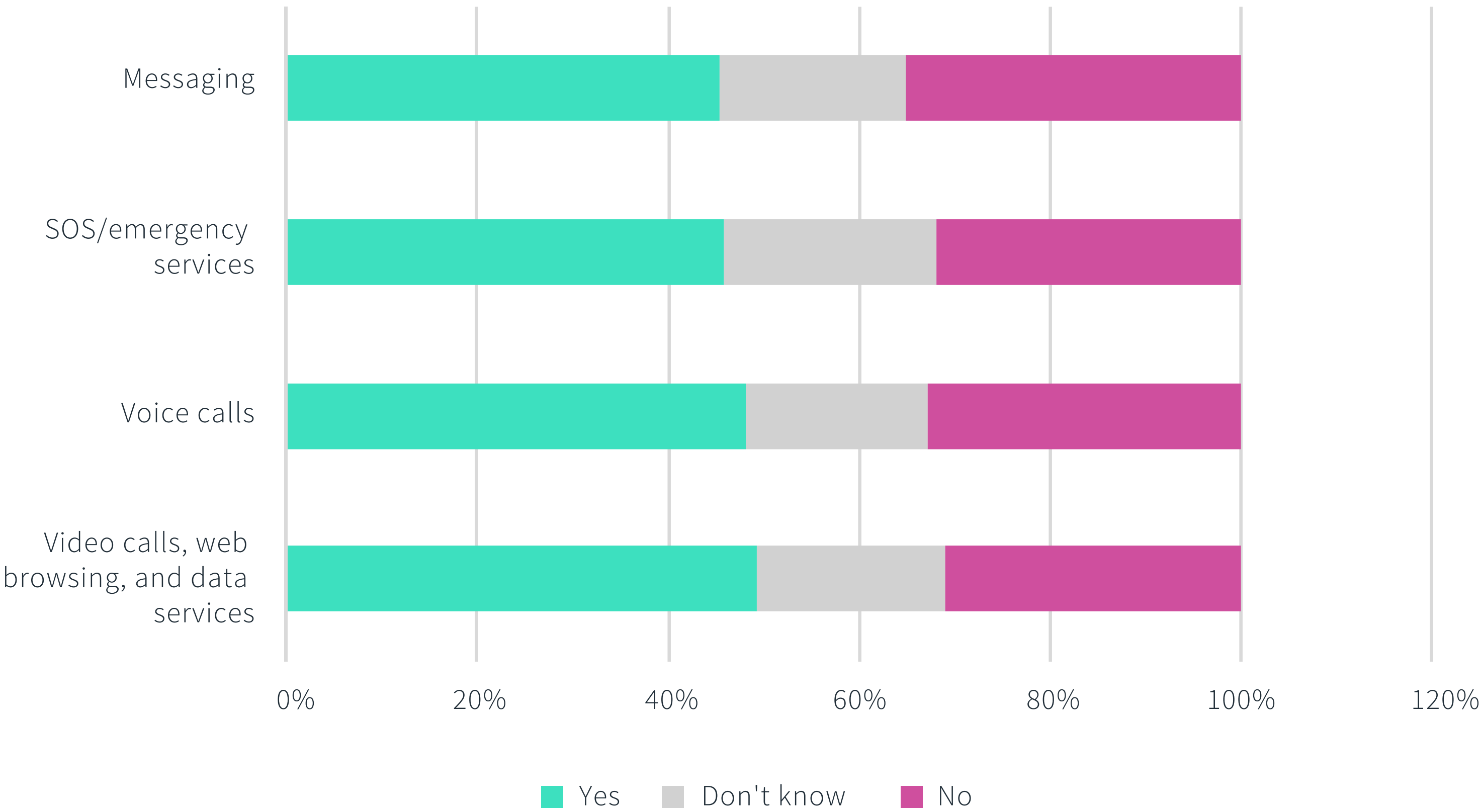
On the other side, just less than a third (33%) of respondents say they wouldn’t consider switching for D2D-powered services, while a fifth (20%) remain unsure — suggesting there’s potential for the market to expand as the technology goes mainstream and consumers gain a clearer understanding of what it is and the benefits it brings.

Share of respondents who would you consider switching to another mobile network provider if they offered the following seamless outdoor smartphone services in areas outside of mobile coverage as part of their subscriptions (total)



Overall, 49% say they would consider switching providers to access data and video calls via satellite, compared with 45% for messaging and 46% for SOS/emergency services. Even so, the high figures for messaging and SOS show that MNOs can already use these capabilities to strengthen their offerings in the short term — and as data-rich services come to the fore, there will be more opportunities to differentiate.

Share of respondents who would you consider switching to another mobile network provider if they offered the following seamless outdoor smartphone services in areas outside of mobile coverage as part of their subscriptions (by service)



CHAPTER FIVE

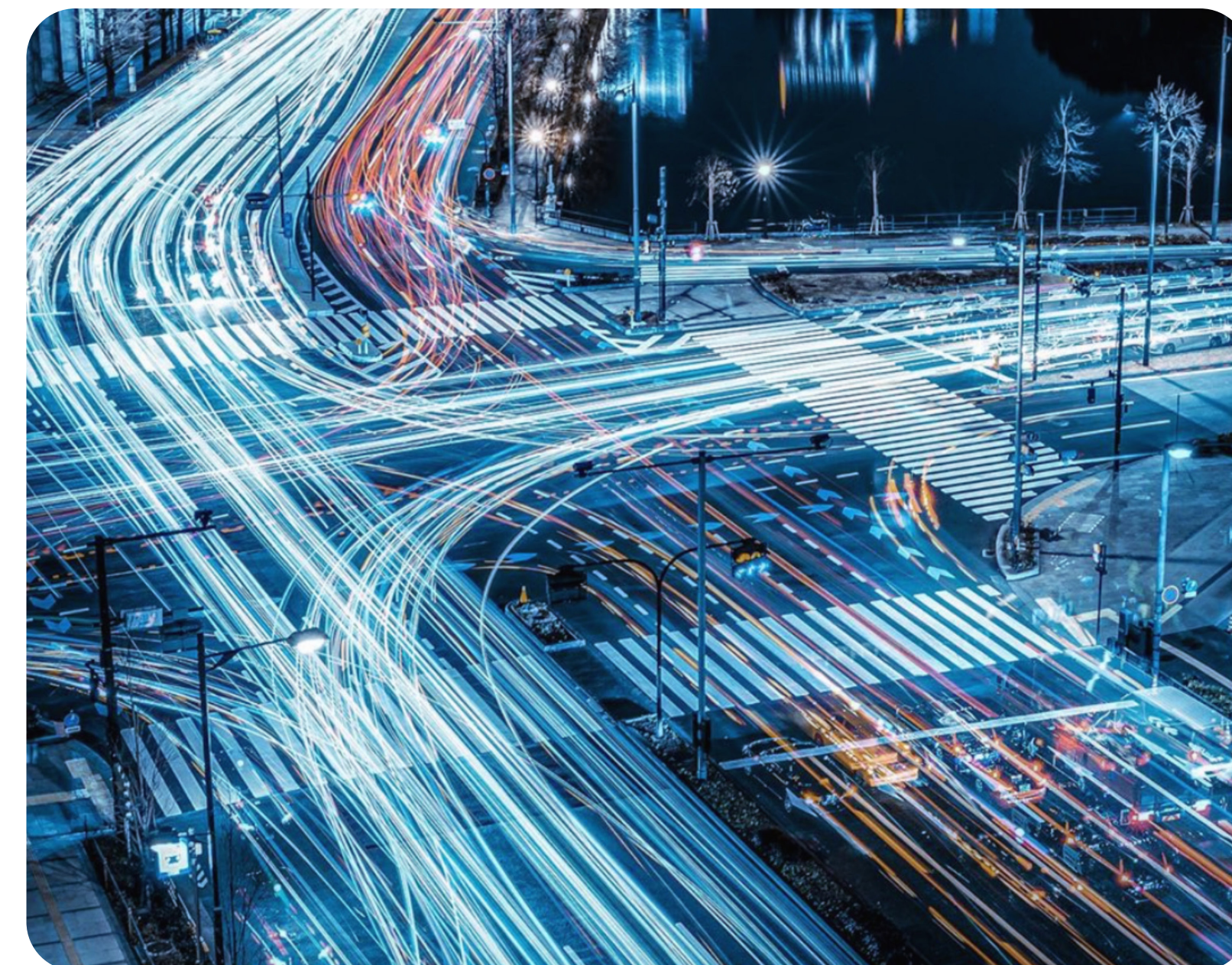
Chapter 5: D2H – the next big telco opportunity

Satellite-powered connectivity services could drive significant revenue growth globally, according to GSMA Intelligence research. The opportunity spans a variety of scenarios: connecting those who are currently unconnected, helping those with intermittent coverage stay online, and serving premium segments willing to pay for ubiquitous domestic — and even international — coverage.

That opportunity is also deeply tied to digital inclusion. Nearly 2.6 billion people worldwide still lack reliable connectivity, according to the International Telecommunication Union. By extending coverage through D2D, telcos can bridge that divide while opening new pools of demand — unlocking education, healthcare, and economic participation for underserved communities. Ensuring access to critical services such as telehealth, emergency response, and online learning makes D2D both a growth engine and a catalyst for meaningful social impact.

All of this is underpinned by clear consumer appetite, with many willing to pay more or even switch providers to access these services. So, to fully grasp the opportunity, telcos need a deeper understanding of consumer mindsets around the value of enhanced coverage.

At the moment, network quality is the number one purchase criterion when choosing a mobile provider, according to several GSMA Intelligence surveys. Consumers may be more likely to gravitate toward those capable of boosting coverage via NB-NTN — making the potential for sharp, meaningful differentiation significant.

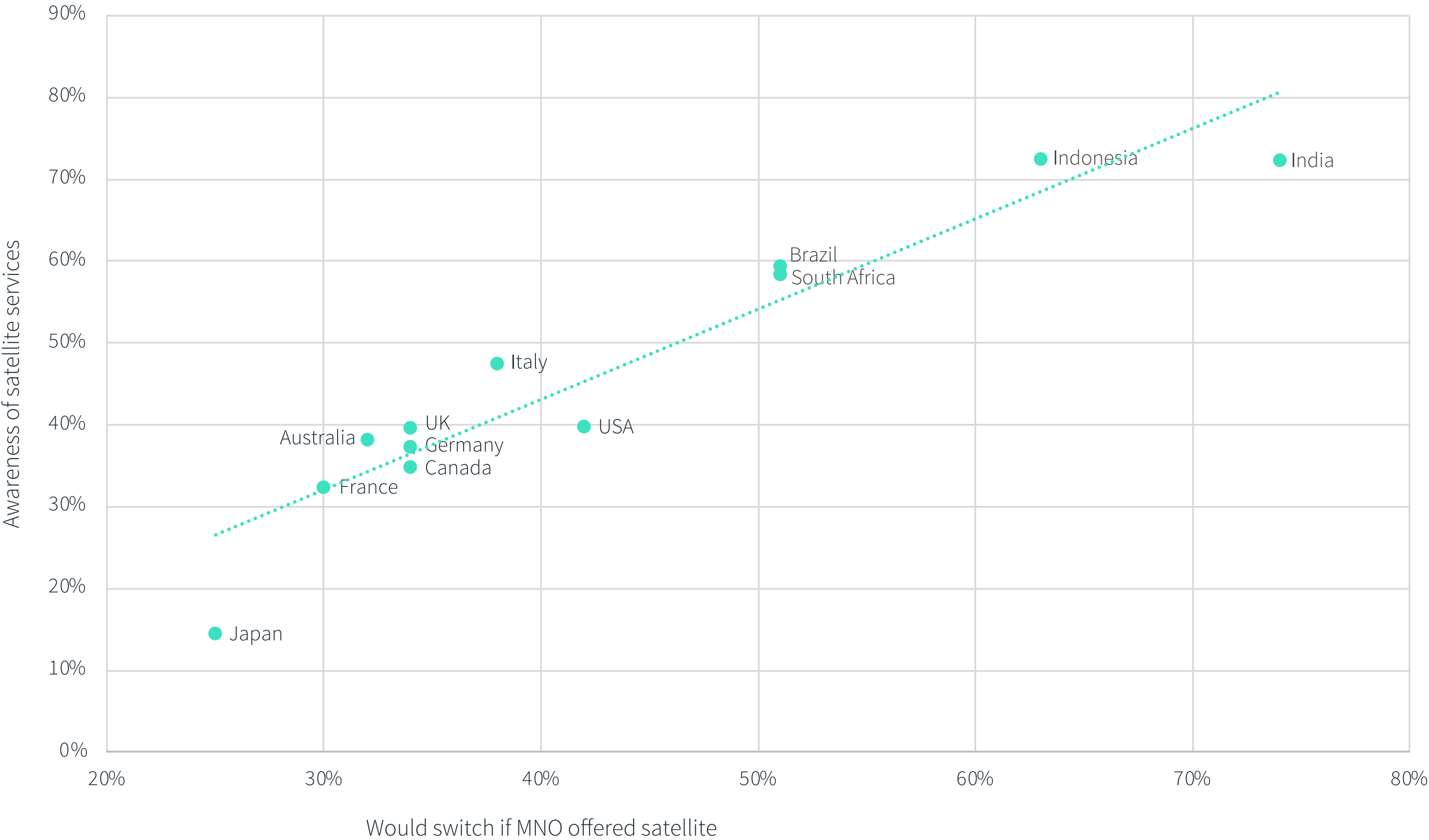


Crucially, attitudes vary by market, with demand closely tied to existing coverage levels: where it’s worse, interest in satellite-enabled services is higher.

More than 100 telcos already work with satellite (excluding satellite broadband and TV, but including satellite backhaul, D2D, and IoT), and an increasing number of those partnerships are tied to live and planned D2H deployments. Looking ahead, once live and planned agreements are combined, D2H is likely to account for around half of all MNO–satellite partnerships.

This will be a crucial factor as MNOs shape their commercial strategies — some targeting consumers in less connected regions with inadequate coverage, others focusing on premium segments where networks are already strong. Either way, by delivering reliability where it matters most, D2D offers operators a powerful way to differentiate, win customers, and unlock new growth.

Awareness of satellite connectivity in newer smartphones vs. willingness to switch MNO in favour of one that offers satellite services



Viasat's approach to D2H

They say that it takes a village to raise a child. A similar mentality can be applied to emerging technologies; to bring innovation to market in a way that benefits as many people as possible, you need an entire ecosystem.

You need infrastructure, a solid and dependable base to build upon. You need regulators and policymakers, to ensure the technology aligns with the needs of governments and the people they serve. And you need a raft of different businesses — from the builders who actually embed the technology into their products to the enablers who bring all the pieces together and help others tap into innovation.

This is why we believe in an open, standards-based approach to D2H. Shared standards create a common platform for growth, enabling a variety of players to take part in driving the technology forward.

And it's why we have tapped into our trusted relationships across government, regulators, and industry bodies — developed across four decades of connecting the world from space and keeping people safe at sea, in the air, and on land — to help drive D2H forward. With our global satellite network, our existing infrastructure, and our established relationships, we can help businesses navigate the world of D2H — and have already:

- › Shaped the Release 17 standard in collaboration with 3GPP
- › Co-founded the Mobile Satellite Services Association (MSSA), a non-profit industry association that seeks to advance the D2D, IoT ecosystems, and advanced MSS services as a founding member
- › Demonstrated D2H in Brazil, Hawaii (US), India, Mexico, Saudi Arabia, and the United Arab Emirates (UAE)

Viasat is helping enable SOS and two-way texting for consumers by making it simple for MNOs, MVNOs, and OEMs to incorporate native satellite-cellular connectivity switching into their offering.

By working within 3GPP Release 17 standards and GSMA international roaming frameworks, we help MNOs who want to pursue D2H tap into a growing ecosystem of satellite-enabled 3GPP compliant hardware manufacturers, as well as delivering interoperability. That makes it simpler for MNOs to integrate the technology, manage their networks, and deliver a consistent end user experience that drives growth.

We use Viasat's authorized L-band spectrum for the connectivity link rather than requiring MNOs to share their terrestrial spectrum, enabling MNOs to retain valuable cellular spectrum, avoiding cellular service interference and complex spectrum sharing or licensing agreements with regulators.

Over 7m devices already benefit from D2H-enabled SOS services, thanks to Viasat's capabilities. Speak to us today to learn how you can begin unlocking new growth opportunities.

