

The Future of Travel Mobility

A Vodafone whitepaper
prepared by Juniper Research

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Introduction

As international travel recovers from the impact of a global pandemic, there are significant new opportunities ahead for the travel mobility market. Beyond expanding roaming services, 5G networks and eSIMs are just some of the solutions shaping the future of travel mobility.

Our report addresses two key questions:

What does the future of travel mobility look like in a post-pandemic world?

What are some of the opportunities shaping the future of travel mobility over the next five years?

A survey of more than 180 mobile operators worldwide, including 96 Mobile Network Operators (MNOs) and 88 Mobile Virtual Network Operators (MVNOs), shows renewed optimism for the future of travel mobility and global roaming.

Our whitepaper is based on the findings of this survey conducted by Juniper Research in December 2021.

1.1 Strategic recommendations for mobile operators, travel SIM and travel mobility providers

Demand for roaming data is anticipated to grow by 10% to 20% over the next five years. Key drivers of this growth are expected to be economic recovery from the pandemic, increased 5G data demand and 5G-specific roaming agreements.

These increased demands pose the most significant challenge for **future travel mobility services**: they need to be **'digital first'**. This focus on 'digital first' offers mobile roaming service providers a wide range of possible services that enable the real-time management of roaming partners.

Hotspots and Mi-Fi devices are expected to present the greatest opportunity for travel mobility services. This takeaway from the survey is contrary to widely held opinions that these devices, which are well established, have little role to play in the connectivity space. **With the growing demand for cellular data and data whilst roaming, dedicated devices that provide Wi-Fi to multiple connections underpinned by cellular connectivity will experience an increasing adoption. There are two further technologies that will drive this growth:**



eSIMs: With the emergence of eSIMs, self-management portals and shared data roaming packages, these devices will create an appealing value proposition for international travellers.



5G: Increased consumer usage of data owing to 5G, recovery of the pandemic and 5G specific roaming agreements are expected to be key causes of this growth.



For the travel mobility market, it is crucial that this disruption is capitalised upon. The key theme built in this whitepaper is the **introduction of new services that meet changing consumer demands**; these new demands focus on **enabling mobile subscribers to have greater flexibility of their travel mobility solutions, including roaming.**

Wholesale roaming vendors must begin to support these emerging new services in order to gain traction. The whitepaper has identified support of the following technologies or services as key to growing travel mobility services:

- **eSIMs:** Whilst these are being rolled out into smartphone devices primarily, market stakeholders must not disregard the rise of inclusion of other consumer devices, such as laptops and Mi-Fi devices.
- **5G networks and 5G roaming:** The correct choice of roaming partners is key to launch all services, however, the demand for increasing data whilst roaming will be driven by expectations arising from home network 5G usage. Roaming will need to follow suit.
- **Data sharing/family roaming packages:** As the average number of devices per subscriber increases, offering these kinds of packages will provide a key differentiation point over competitors in the roaming market.
- **Real-time self-management portals:** These will allow both short-term and long-term travellers to better manage their travel mobility solutions.

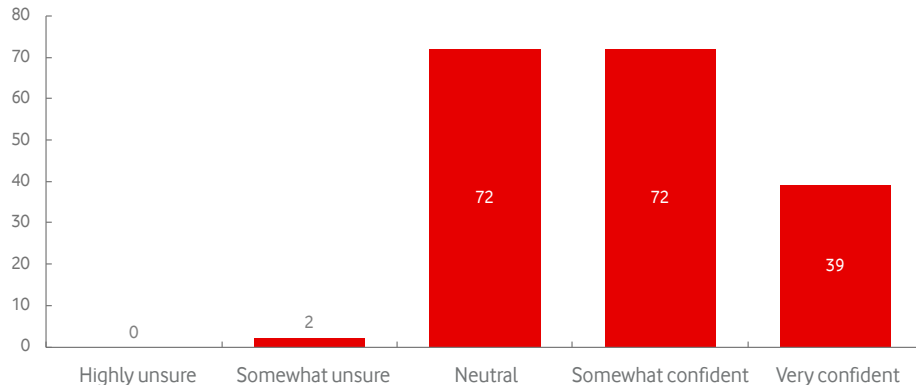


Future travel mobility services need to be 'digital first'.

1.1.1 Confidence in the travel industry

Overall, there is high confidence in the recovery of the international travel industry: 60% of respondents were either 'somewhat confident' or 'very confident' of a recovery in the industry. Notably, only two responses were 'somewhat unsure', both of which came from operators in North America. Globally, roaming revenue is not anticipated to recover until 2023. However, roaming revenue for operators in other regions will recover faster than others.

FIGURE 1: Responses to 'Overall, how confident do you feel about the future recovery of the international travel industry?'



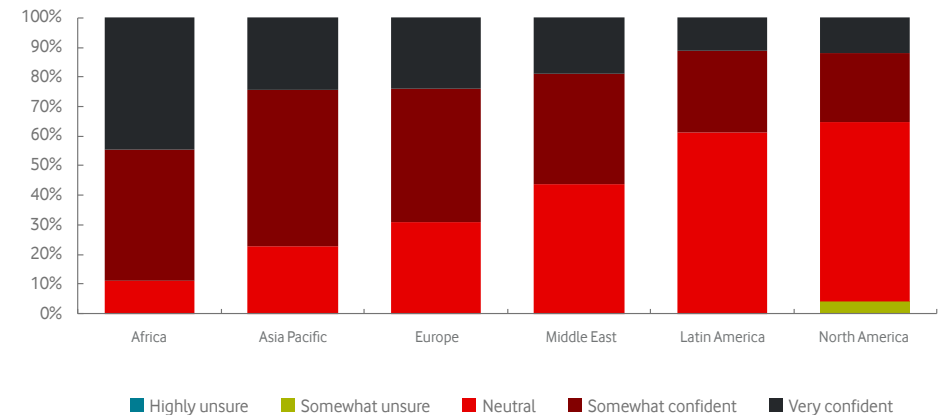
The most confident operators were those in Africa. On average, respondents who primarily operated in the region responded 15% more positively than the survey average. The respondents with the most negative outlook primarily operated in North America and were 10% less optimistic than the survey average. The demand for various travel corridors

in the aviation industry has changed since the start of the global pandemic. As a result, these responses are likely to be heavily impacted by both the earning potential of travel services before the pandemic and how this has altered, as the travel industry has begun its recovery.

Other findings:

- Asia Pacific: 5% more optimistic than the survey average
- Europe: 3% more optimistic than the survey average
- Middle East: 2% less optimistic than the survey average
- Latin America: 8% less optimistic than the survey average

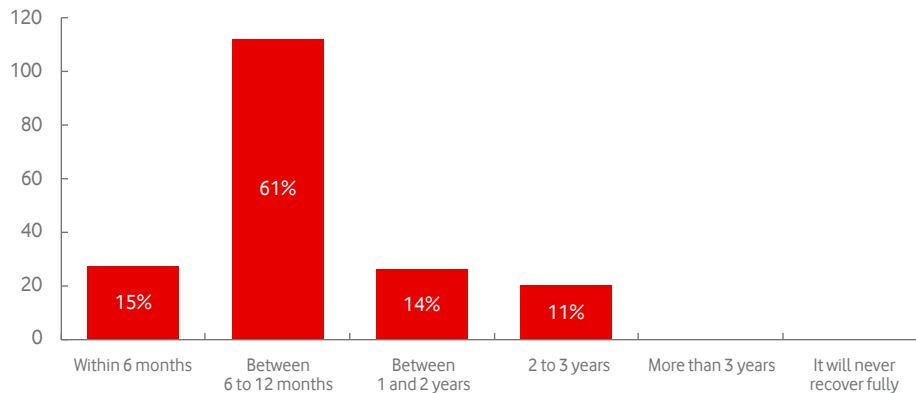
FIGURE 2: Regional responses to 'Overall, how confident do you feel about the future recovery of the international travel industry?'



RECOVER



FIGURE 3: Responses to 'How long do you think it will take for the international travel industry to recover?'



The majority of respondents believe that **the travel industry will recover in 6-12 months.**

The most important factor cited for the recovery of the travel industry was a reduction in COVID-19 cases.

The factors thought to impact the rate of recovery are ranked in order below (including average score out of 5):

- Reduction in COVID cases **(4.7)**
- High uptake of COVID-19 vaccinations **(4.6)**
- Government regulations around travel in light of the pandemic **(4.5)**
- Increased COVID-19 testing and quarantining **(4.5)**
- The return of business conferences **(4.5)**
- Offers on vacations to increase international travel **(4.4)**

Confidence in travel: key takeaways

It is evident that **confidence in the travel industry** is returning, with all regions reporting a positive outlook. This poses **significant opportunity to redevelop travel mobility services as international travel continues to reach pre-pandemic levels.**

Vodafone Roaming Services is well placed to be at the centre of this disruption. Emerging technologies, such as 5G and eSIMs, are prime examples of where this disruption will originate from.

There is an increasing desire to take a 'digital first' approach that enables international travellers to better manage their roaming service adoption.

An increasing demand for mobile data (including whilst roaming) **and the inclusion of cellular connectivity in more devices are driving the need for more appropriate roaming and travel mobility services.**



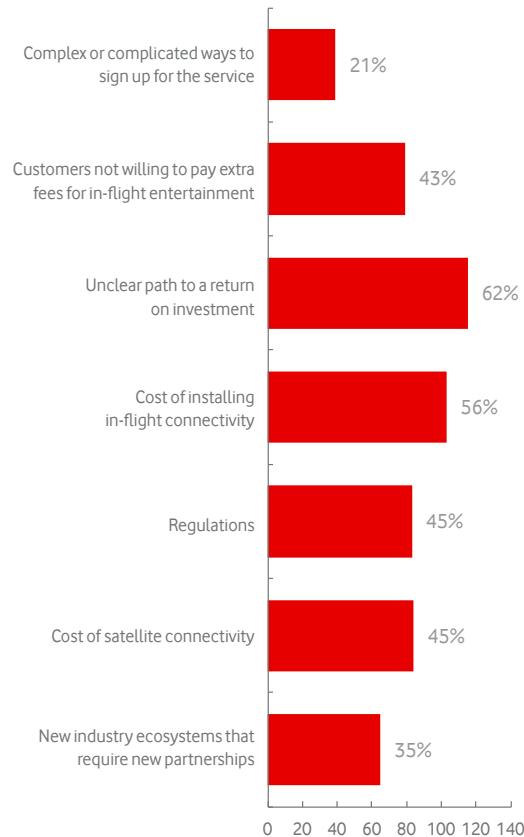
1.2 In-flight connectivity

IFE (In-flight Entertainment) has been the norm on long-haul flights for several decades and increasingly, in an age where permanent Internet connectivity is becoming the norm, **in-flight Wi-Fi and cellular connectivity is now becoming standard as well.**



Developing communications technology, the changing nature of the airline industry and the increasing desire for passengers to stay connected at all times are driving the roll-out of new services. This connectivity is drastically changing the consumer passenger experience, the business passenger experience and the operational challenges aircraft operators face.

FIGURE 4: Responses to 'What do you see as the barriers to adoption of in-flight connectivity at the current time?'



With airlines beset by heavy competition, developments in IFE are closely linked to differentiating airline services, driving new revenue or reducing operating costs.

Barriers to in-flight connectivity adoption

The biggest barrier to the adoption of in-flight connectivity services is an unclear path to a return on investment.

In Europe, Asia Pacific, Middle East and Africa, this is thought to be the biggest barrier to adoption. In North America and Latin America, the biggest barrier to adoption is considered to be the cost of installing in-flight connectivity.

The least concerning factor for operators is processes that are too complex for users to sign up for the service. As the international travel industry recovers, the demand for travel mobility services will also increase.

As a result, wholesale roaming partners must work with operators to provide a clear path to a return on investment. This must be done through optimising cost structure and innovating end-user pricing for travel mobility services, such as in-flight entertainment. Whilst these services are well established, **operators must now focus on these services more to provide a differentiation point in the telecommunications market.**

1.3 The future of roaming data

Mobile roaming allows customers of one operator (home network) to use the network of another operator (visited network) when coverage from the subscriber's home network is unavailable, such as when travelling abroad.

The COVID-19 pandemic has had a significant impact on operators' roaming revenue, as international travel has been severely limited over the last two years.

There is a consensus **roaming data will grow up to 25%**. Indeed, there were no respondents who anticipated no growth, or growth over 25% through to 2026. **The increasing adoption of 5G services amongst mobile subscribers is likely to further bolster the demand for roaming data.** In addition to this, **the formulation of bilateral 5G roaming agreements and the increasing amount of focus on 5G devices are likely to propel this growth to exceed 25%.**

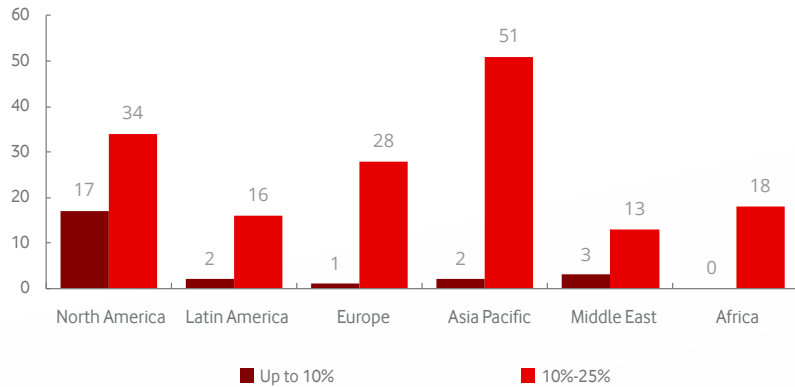
Key findings:

- Operators in North America feel that increased consumer usage will be the primary cause of growth as a result of 5G network launches.
- In Europe, Asia Pacific and the Middle East, the survey indicates that the recovery from the pandemic will be the biggest driver of roaming data growth.
- In Latin America and Africa, the biggest driver of roaming data growth is expected to be roaming agreements that cater to 5G data consumption.



Roaming data will grow up to 25% by 2026.

FIGURE 5: Responses to 'How much growth in total do you anticipate in international roaming data traffic between 2021 and 2026?'. Split by 6 key regions



Standalone 5G networks are essential for 5G roaming agreements, which will in turn drive roaming data increases.

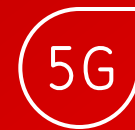
However, **these require significant investment. Despite this, operators continue to invest in rolling out SA network infrastructure.** Additionally, these roaming agreements will also take time to form, and as 5G networks grow, so will the number and complexity of 5G roaming agreements.



The future of roaming data: key takeaways

There is a clear consensus that **data generated whilst roaming will grow over the next five years.** As the impacts of the global pandemic subside, **roaming vendors are presented with opportunities to develop their travel mobility solutions to better differentiate themselves from competitors.**

With the rise of 5G roaming agreements, there is considerable scope for the growth of 5G roaming data. As a result, it is clear that **new solutions will be required to deal with changing expectations from mobile roaming subscribers. These services must be 'digital first' and leverage new technologies such as eSIMs and 5G to offer consumer-facing travel mobility services that focus on flexibility and real-time management of connectivity services when roaming.**



1.4 Future travel mobility services

The services expected to have the most potential to disrupt established services are data sharing services or family data packages, whilst real-time self-management portals are expected to be the second most disruptive services to travel mobility services. Interestingly, these two services are closely aligned and should be implemented in tandem, as they both offer the ability to better self-manage their roaming packages in real time. Therefore, the most disruptive services involve new roaming packages that present existing roaming services in a new way.



Future travel mobility services: key takeaways

An intriguing result of this question is that the most popular issue here is **enabling mobile roaming subscribers to better manage their roaming packages moving forward (family packages and real-time management portals)**. This highlights the need for roaming vendors to offer services that better enable mobile subscribers to manage their services.

Additionally, other services noted here are focused on the initial choice of services and local support. From this, it is clear that **flexibility is key for future roaming services**.

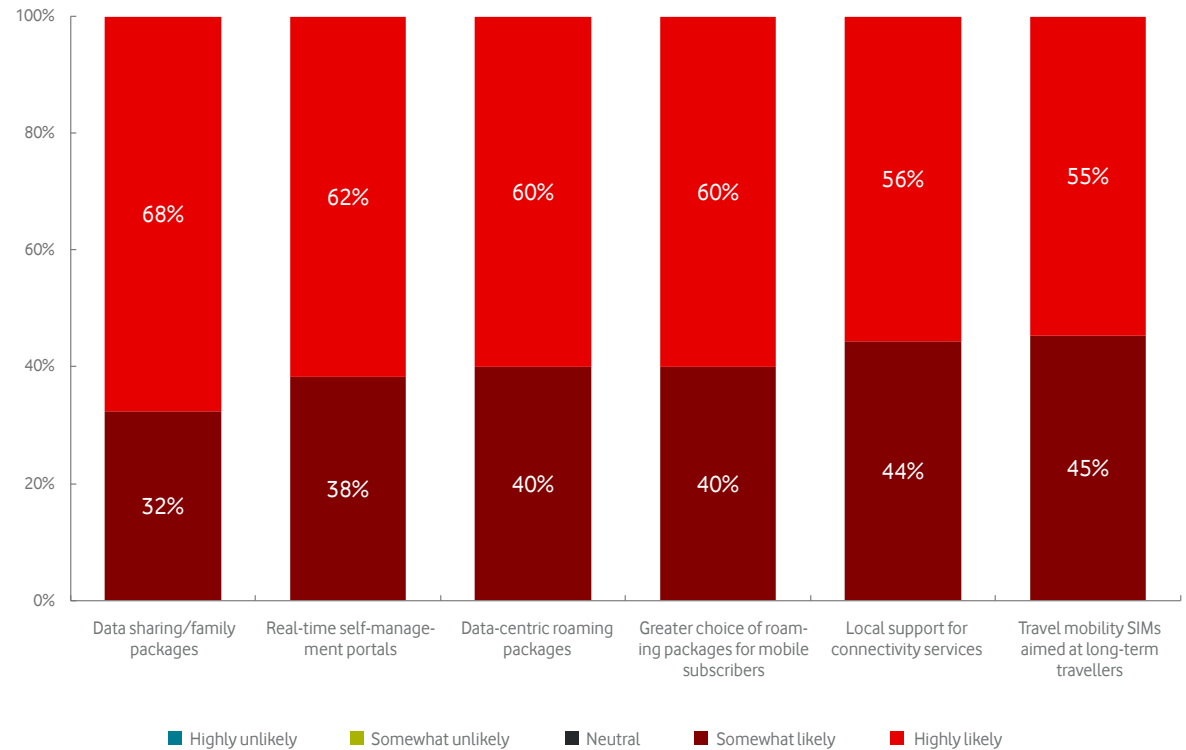
FLEXIBILITY

Conversely, **the least disruptive service to travel mobility solutions is a dedicated travel mobility SIM aimed at long-term travellers.** This most likely owes to the current state of the travel mobility market; despite the impacts of the pandemic beginning to lessen, many potential long-term travellers are likely to still be hesitant about travel.



However, **travel mobility SIMs for long-term travellers does not cater to short-term travellers (less than 90 days).** As a result, **roaming services are likely to remain the aptest travel mobility service that can provide them with connectivity when outside the remit of home networks.**

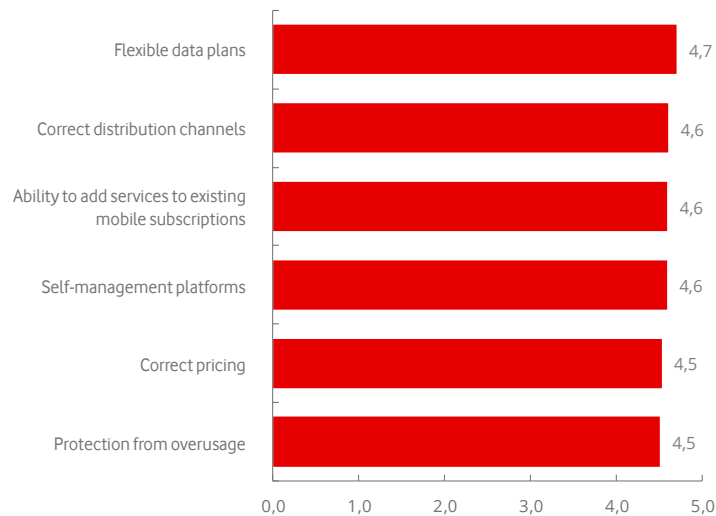
FIGURE 6: Responses to 'How would you rate each of these opportunities in terms of their potential to disrupt established connectivity services in the travel mobility sector post-pandemic?'



1.4.1 Important wholesale roaming partner services

Wholesale roaming partners provide operators with the necessary platforms to launch and manage B2C roaming services, through connection and processing of mobile roamers. Shown below are the responses to how important the support of specific wholesale roaming services is.

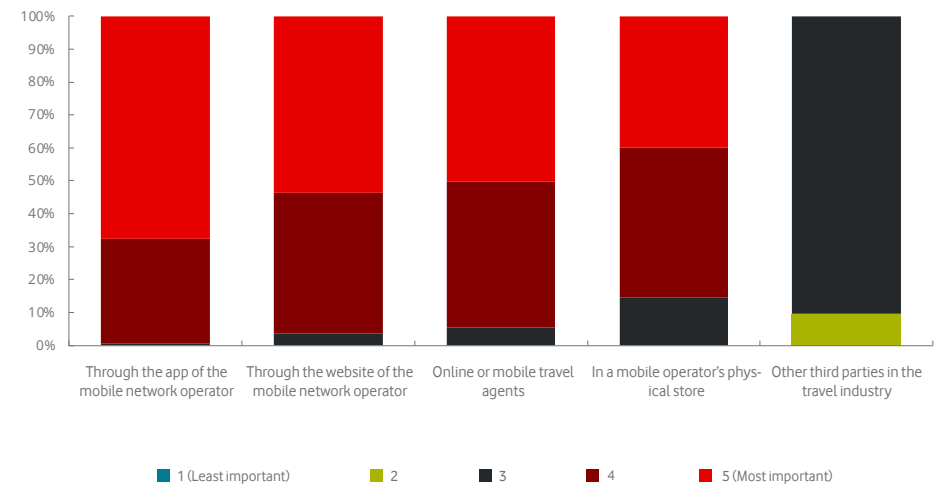
FIGURE 7: Average scores when asked 'How do you rank the following factors in importance for a potential roaming wholesale partner to support?' (5=High priority, 1=Low priority)



Interestingly, flexible data plans are deemed the most important service that needs to be supported by wholesale roaming partners. Content distribution channels are also anticipated to contribute significantly to the value of a wholesale roaming partner (see next slide for more information). Notably, no respondent marked any of these criteria as unimportant in the value of a wholesale roaming partner.

To offer these services to mobile subscribers, partnering with the correct wholesale roaming provider is essential. Operators must look to find partners who can provide flexible data plans to provide value to roaming subscribers.

FIGURE 8: Responses to 'How would you rate the following channels in terms of their importance in maximizing the reach of travel mobility services?'



OPERATORS

The most important channel for roaming services distribution is through the app of the mobile network operator. Operators can control and have full visibility of this channel; therefore, it would be preferred to move traffic through apps. Additionally, no operators believe that third-party channels will play an important role in the delivery of travel mobility services.

In the future, we expect digital channels to play the most important role, with operators placing increasing emphasis on development of in-house apps and websites.



Wholesale roaming partners: key takeaways

To increase the reach of travel mobility services, wholesale roaming partners are key to enabling this new array of consumer-centric services.

If wholesale roaming partners are not able to support these services over their home network, then the value of future travel mobility services will be greatly diminished. As can be seen from figure 7, **flexibility of data plans and correct distribution are key areas that wholesale partners must offer.**



FLEXIBILITY OF
DATA PLANS



CORRECT
DISTRIBUTION

1.5 Future disruptions from eSIMs on the travel mobility market

Whilst traditional SIMs are removable, an eSIM is soldered directly into a consumer or IoT device. If the owner of the device wishes to change the cellular profile, it can be done remotely.

Notably, **no service is expected to be 'negatively impacted' by the rising use of eSIMs**. Respondents rate an increasing number of devices under the same roaming subscriptions as something that will benefit positively from the rising usage of eSIMs in devices.

This aligns closely to a roaming subscriber's ability to manage their own roaming services through self-management portals. This is noted as the second most positively impacted service by eSIMs.

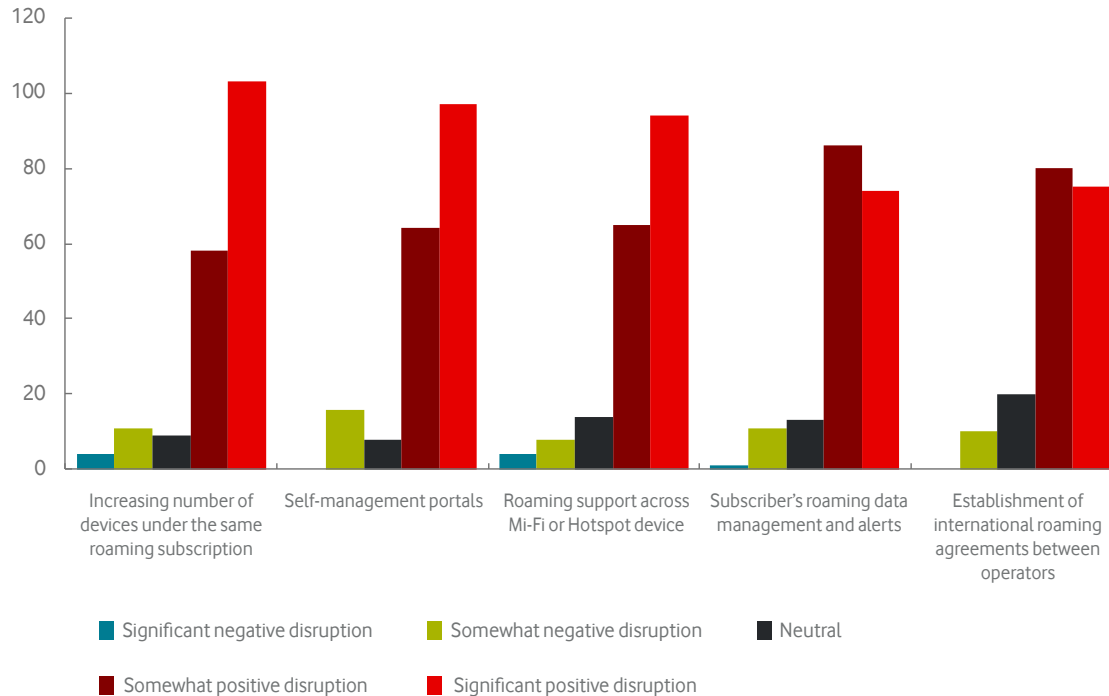
The least positively impacted market factor is anticipated to be the establishment of international roaming agreements. This is due to the newly enabled ability to add local profiles to eSIMs through management platforms.

According to Juniper Research:

- **Smartphones will account for over 90% globally in 2022.** Travellers will benefit from eSIM connectivity – enabling them to connect to local profiles and tariffs, and minimising roaming charges.
- **Hotspots and Mi-Fi devices are expected to present the most opportunity for travel mobility services.**
- With the emergence of **eSIMs, self-management portals and shared data roaming packages**, these devices **will create an appealing value proposition for international travellers.**
- Tablets and mobile gaming devices are anticipated to represent the lowest opportunities for travel mobility services.
- **Whilst mobile gaming devices are still emerging, and overall usage whilst roaming is low, smartphones will be used in favour of tablets when roaming.** Additionally, only a small proportion of tablets are cellular and therefore present minimal opportunities for travel mobility services.
- **Smartphones are anticipated to be the most disrupted device by the emergence of eSIMs in a roaming context.** This is likely due to the roaming install base of devices, which is comprised mostly by smartphones themselves.
- **Hotspots and Mi-Fi devices are expected to be the second most impacted device by the rise of eSIMs.** In the future, these devices will play an increasing role in travel mobility services by enabling multiple devices to connect to the Internet via a single roaming cellular connection.
- **Mobile gaming devices are expected to be the least impacted by eSIMs;** we believe that the low installed base of the devices is the cause of this expectation.



FIGURE 9: Responses to 'How would you rate the impact of the increasing use of eSIMs in the travel mobility market on each of these services?'



Future disruption from eSIMs: key takeaways

eSIMs evidently have the potential to disrupt established roaming models, however, the technology is not primarily driven by the roaming market. Yet, it is clear that eSIMs can be used in the context of travel mobility to temporarily load a local profile onto a specific eSIM, rather than incurring roaming charges.

However, a key challenge to this in a roaming context is the support of eSIM standards and frameworks. Whilst many tier 1 operators have already launched frameworks to enable the provisioning of profiles remotely, operators in other countries may have not yet done so. As a result, traditional roaming services or local SIM availability will still be needed.

Whilst eSIM penetration is most prevalent in the consumer smartphone market, it is important to recognise the value of other consumer devices such as Mi-Fi devices and laptops, which when the aggregate is considered, represent a significant opportunity within travel mobility.

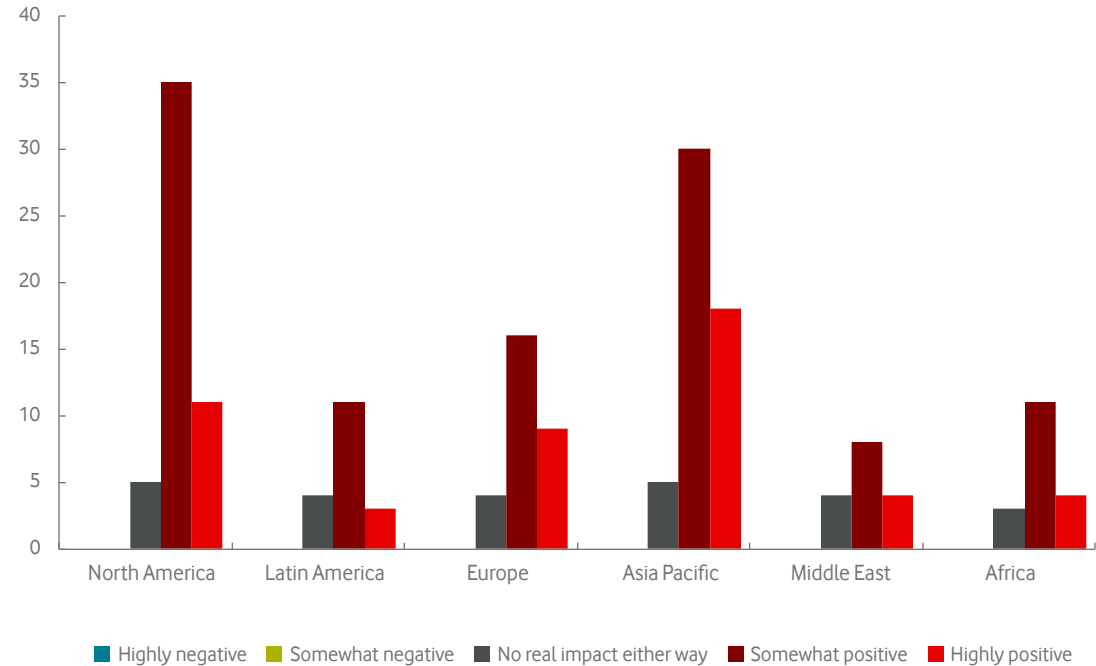
1.5.1 The impact of 5G on travel mobility

As an increasing number of 5G-enabled devices are on the market, the strain on visited networks will also increase. However, this does present a significant revenue opportunity, and operators must ensure that networks are able to serve these roaming connections without impacting their own subscribers.

Key findings

- Respondents in North America and Asia provided the most positive responses for the impact of 5G on the travel mobility market.
- 90% or more of respondents in these regions answered either 'somewhat positive' or 'highly positive' to the question: 'What impact will 5G network launches have on the travel mobility market?'
- Disparities in 5G launches, including NSA (Non-Standalone) and SA (Standalone), represent further barriers to providing a consistent 5G service at home and whilst roaming. However, the formulation of 5G roaming agreements has exceeded expectations from previous cellular technology iterations.

FIGURE 10: Responses to 'What impact will 5G network launches have on the travel mobility market?'



The impact of 5G: key takeaways

Standards for 5G networks have been developed in preparation for the large increases in data that will be demanded by consumer devices in the future. **The next step is connecting multiple devices to 5G networks to enable 'always on' connectivity.** This includes devices such as gaming devices, laptops and cellular Mi-Fi devices.



ALWAYS



1.5.2 Understanding the 5G hype

Much has been made about the impact of 5G networks on many industries. **With the exception of the Internet of Things, we believe that many consumers will be unaware or uninterested in the advances that the technology can bring to consumer devices, such as smartphones and tablets.** However, **the limitations of these devices often negate the increases in capabilities from 5G networks. As a result, some of the hype around the benefits of 5G networks are not expected to become reality.**

This also holds true for the travel mobility market. In addition to the limitations of devices, **not all operators will have bilateral roaming agreements that cover 5G subscribers. Whilst long-term travellers can adopt travel mobility services, short-term solutions over 4G networks will often suffice for the majority of use cases and devices.** We note that **Hotspot and Mi-Fi devices are likely to be the exception to this rule.**

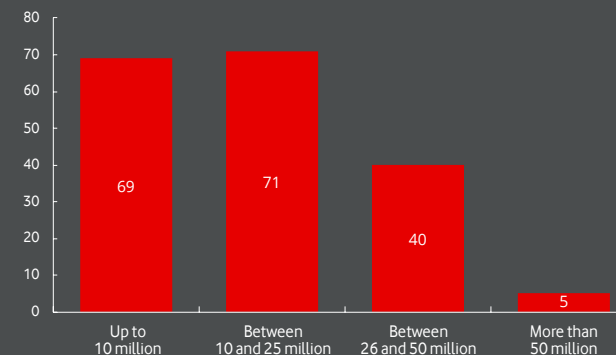


About the survey respondents

Juniper Research conducted an online survey of over 180 MNOs and MVNOs globally. The respondents were incentivised for their participation. The results were not weighted. The results are presented with a $\pm 3\%$ margin of error at the 95% confidence level.

The survey was conducted in December 2021. All respondents were asked if they represented an MNO or MVNO. If they responded 'neither', the questionnaire was ended, and results were not included. The survey was conducted in English, and all results from the questionnaire were checked for accuracy and completeness.

FIGURE 11: Responses to 'How many subscribers does your MNO or MVNO provide services to?'



Vodafone Roaming Services Global Roaming Connectivity Solutions

Vodafone Roaming Services commissioned this whitepaper from Juniper Research to help examine current and future trends of the travel mobility space. With this survey, we'd like to provide a clear insight into the future opportunities for roaming market stakeholders for the coming years.

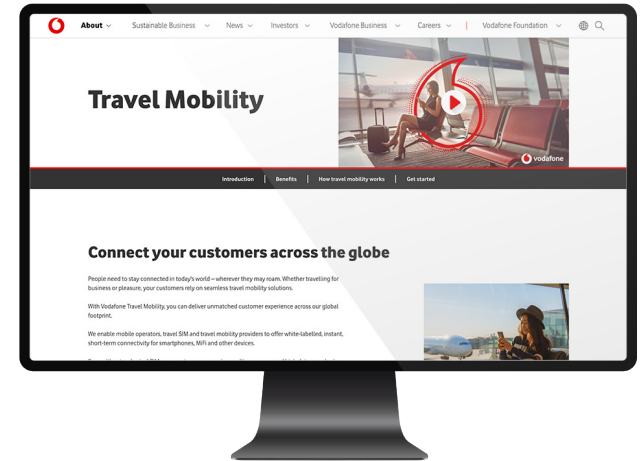
Digital transformation accelerated by the pandemic and the increasing demand for roamers to always stay connected are driving the need for innovation and expansion in roaming and travel mobility services.

At Vodafone, we integrate new technologies, like 5G, VoLTE, eSIM, blockchain and machine learning into roaming and strive to develop industry-leading innovations to make roaming work for everyone.

As a Sponsored Roaming, Roaming Hub, Maritime Mobility and Travel Mobility service provider, **Vodafone Roaming Services offers cutting-edge technology, competitive prices, coverage options and speeds, roaming expertise and high-quality roaming services.** As a trusted wholesale roaming partner, we support our customers with best-in-class solutions, tailored consultancy and professionally managed services.

With Vodafone Travel Mobility, you can deliver unmatched customer experience across our global footprint. Vodafone connects 95.6 million¹ roamers and devices in virtually every country every day. We enable mobile operators, travel SIM and travel mobility providers to offer white-labelled, instant, short-term connectivity for smartphones, MiFi, and other devices. Even without a physical SIM, your customers can enjoy quality coverage and high data speeds via our eSIM solution. You can tailor your offers through other benefits, such as our dedicated support team and fast resolution times, choice of roaming destinations, customisable bundle options and top-ups.

Our wholesale customers have access to world-leading networks and new innovations in roaming and device connectivity.



To learn more about our global roaming solutions, **visit our website** today.

¹ Data recorded in May 2022



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