

An aerial, top-down view of a busy city street. The street is filled with people walking in various directions. Overlaid on the street is a complex, glowing digital grid pattern in shades of orange, yellow, and white, resembling a network or data flow. The grid lines are irregular and interconnected, creating a sense of connectivity and smart infrastructure. The overall scene is vibrant and modern, suggesting a smart city environment.

The building blocks of smarter, more connected communities

Smart communities report 2022

In today's modern cities, many of the services we take for granted are underpinned by an interconnected ecosystem of networks, sensors and devices. All work behind the scenes to keep things running smoothly.

Creating these 'smart communities' is a group effort. They require private-public partnerships with investments and contributions from local businesses, government bodies and network infrastructure providers.

This report examines the interest in and understanding of smart communities by enterprises and venues in industries ranging from manufacturing and healthcare, to education and entertainment. It also looks at their willingness and preparedness to contribute to creating those communities. Its findings are based on a survey of enterprise and venue IT experts and senior decision makers across the United Kingdom and the United States.

Three key takeaways emerged:



Organisations understand the **value of smart communities** and are **ready to partner** with public and private stakeholders to build them.



Organisations recognise that **network infrastructure is critical** to unlocking the value of smart communities, but they often delay upgrading their own infrastructure.



Organisations are **familiar with the technology** needed to create smart communities and with the benefits of shared, collaborative network models.



Executive summary

This inaugural report represents an in-depth look by BAI Communications at the attitudes of enterprises and venues toward smart communities and the infrastructure needed to enable them.

Our survey included questions about respondents' interpretation of the term 'smart community', their relationship with advanced network technologies, their plans for collaboration and connectivity enhancements, and more.

The results showed that respondents are overwhelmingly in favour of smarter, more intuitive public infrastructure and are willing to contribute to building it, but they need the right partners to help and enable them.

Smarter communities bring real benefits

Respondents recognise the real-world benefits smart infrastructure can offer residents and visitors, which may in turn benefit them by attracting more investment and talent to their city or local area. They also believe they have a role to play in transforming their communities, which may include investing in initiatives, contributing skills and expertise, and realising big data opportunities. Many respondents are already collaborating with other businesses and/or public sector organisations, and even more have plans to engage in private-public partnerships to support community connectivity. Despite these plans, one of the key challenges to achieving them is a lack of awareness of potential partners and their capabilities.

73%

Believe connectivity enhancements will make their cities or local areas more attractive to business as a place to establish or relocate.

83%

Plan to or are already engaged in private-public partnerships to support connectivity enhancements.

Network upgrades are a critical step

Survey results show that respondents have multiple reasons for wanting to enhance their networks, from improving their resiliency to more effectively managing a remote workforce. Most believe faster speeds and lower latency are critical to solving their biggest connectivity challenges. At the same time, many respondents are yet to upgrade their networks, with just one-quarter currently running 5G networks. Many seem to prefer a 'wait and leap' approach, using older technology for longer before upgrading by multiple generations at once.

93%

Believe faster speeds and lower latency enable faster and greater adoption of cloud infrastructure and applications.

72%

Plan to upgrade their networks by at least two generations. 39% plan to do this within the next year, 78% within the next two years.



There is significant appetite for new technologies

Despite the tendency to delay upgrades, most respondents are interested in innovations and say their organisations are often among the first to adopt new technologies. They understand distributed antenna systems (DAS) and small cells as key technologies underpinning and enabling smart infrastructure. Most plan to, or are, already using these technologies to improve public connectivity and enhance data sharing. Almost all respondents understand the neutral host/shared infrastructure model and believe it can help them achieve their connectivity objectives. Many are in the process of upgrading their hardware, software and/or network infrastructure, creating tremendous potential for community transformation in the next few years.

78%

Describe themselves as innovators or early adopters of new technologies.

77–78%

Are using DAS and small cells to enhance connectivity within their organisations.

99%

Believe the neutral host model can help them achieve their business and connectivity objectives.

The right partners are the key to progress

Overall, our survey showed that respondents are eager to move forward with new technologies and solutions, and they are willing to work with a variety of stakeholders to build smarter infrastructure that will enhance the communities where they live and work. They understand the benefits of smart community transformation; all they need is the right partners to support and enable them with shared infrastructure and expert guidance.

Survey respondents included representation from industries such as oil and gas, manufacturing, energy, healthcare, agriculture, transportation and logistics, education, large-scale real estate developments (e.g., shopping malls, office complexes), and entertainment facilities. Venues include entertainment facilities as well as shopping malls, residential buildings and office complexes. All other respondents were classified as enterprises. Throughout this report, they are collectively referred to as 'respondents' or 'enterprises and venues'.

What does 'smart community' mean to you?



Smart communities are the building blocks of smart cities

Underpinned by connectivity, a smart community uses state-of-the-art technology and real-time data analytics to improve environmental sustainability, reduce the digital divide and enhance people's lives with smarter, personalised and more intuitive services and experiences.

Smart community applications can include:

Smart water monitoring tracks water levels in rivers and provides flood warnings to potentially affected residents.

Smart lighting offers precise control of lighting levels and timing, sends notifications when maintenance or repair is required, and can even serve as the physical backbone for Wi-Fi access points.

Smart security keeps people safe by sending automatic alerts to emergency services when something doesn't look right.

Smart education supports online and remote learning and equips students with the digital skills they need to succeed.

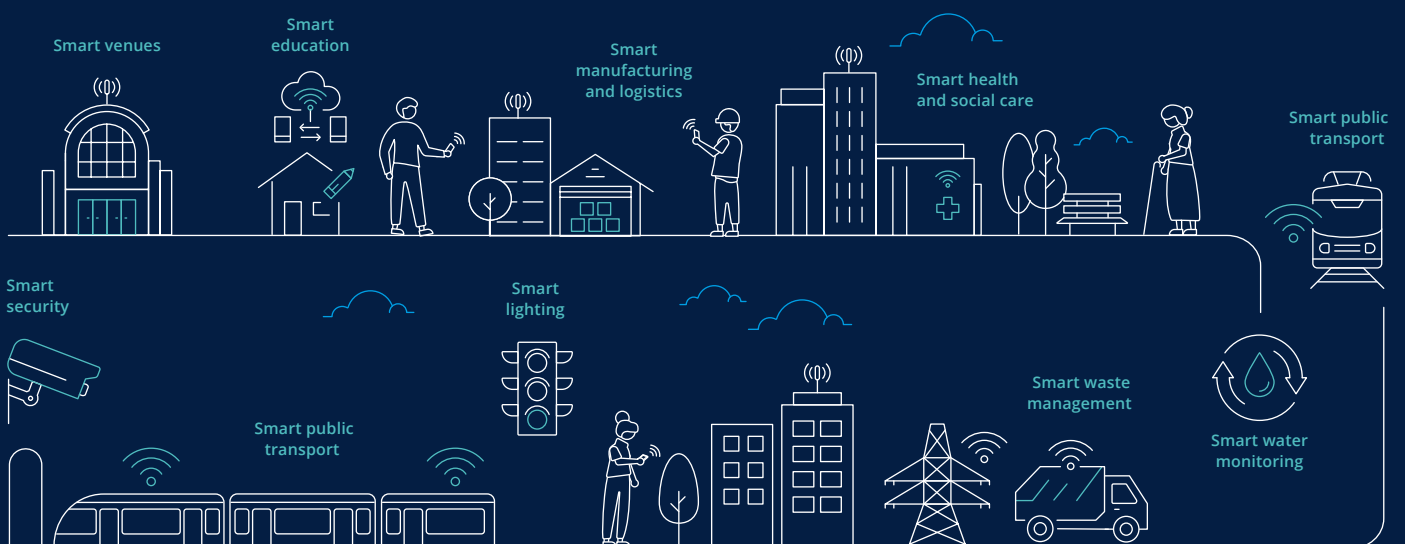
Smart public transport provides timely scheduling and routing updates, enables frictionless fare payment, monitors passenger loads to avoid overcrowding and maintain social distancing, and provides personalised recommendations based on riders' habits.

Smart health and social care use sensors and IoT devices to monitor refrigerators, door openings and other indicators of abnormal behaviour to help enable independent living.

Smart waste management relies on IoT sensors to monitor waste bins and optimise collection schedules and routes.

Smart manufacturing and logistics modernise operations with autonomous vehicles, agile supply chains, asset tracking, predictive maintenance, and more.

Smart venues deliver connectivity throughout their facilities and enhance the fan and guest experience with digital interactive experiences, kiosk solutions, responsive lighting, and functional apps to manage parking, traffic and public safety.



1. Smarter communities offer better experiences

Respondents have high hopes for the economic potential of smart community development. Innovative services that improve mobility for example, such as up-to-the-minute awareness of the status of commuter trains or the capacity of nearby parking lots, can make residents' and visitors' experiences smoother, with the ripple effects bringing substantial benefits to local businesses. Respondents also recognise the importance of collaboration and their own role in creating smart communities — and are ready and willing to partner with others to improve connectivity in their local area.

The value of a smart community

Nearly three-quarters of respondents (73%) say making their cities or local areas more attractive to businesses is one of the key ways connectivity improvements will bring value to their own organisations. Almost half (49%) acknowledge the value of being part of a conglomerate working to build out smart community infrastructure to spur local economic development. Many also see these enhancements as a way to attract talent and investors as well as meet their emissions targets.

It is a group effort

Almost all respondents are satisfied that their local areas are investing enough to build and upgrade the infrastructure required to enable smart communities. As seen in Figure 1, 97% of UK respondents agree or strongly agree that their local areas are investing enough. In the US, that number rises to a full 100%.

But they also know smart, connected communities don't get built by governments alone. It demands the coordinated efforts of many stakeholders, including public sector organisations, network service providers and private businesses. All respondents recognise their own responsibility to contribute to infrastructure development in their local areas, with 71% believing they should be investing in public connectivity around venues. Around two-thirds (63%) think they should provide specialised skills and expertise, half think they should contribute by realising big data opportunities, and 46% say they should provide financing and investment support (see Figure 2).

Figure 1. Most respondents think local areas are investing enough in public infrastructure

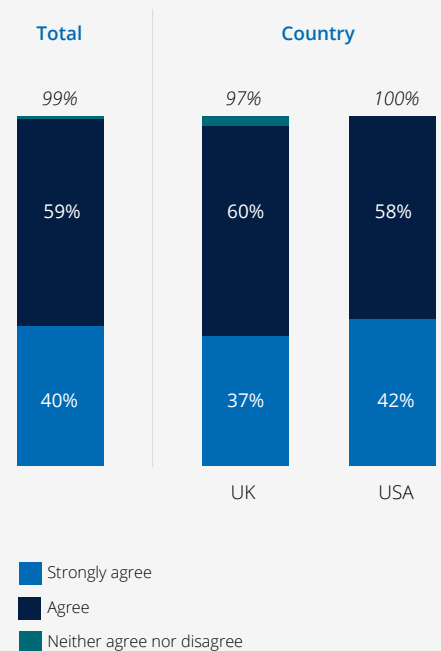


Figure 2. Respondents see a variety of ways they can contribute to building smart communities

	UK (n=100)	USA (n=102)	Total (n=202)
Investing in public connectivity surrounding venues	74%	69%	71%
Providing access to specialist skills, expertise, and consultancy	63%	63%	63%
Realising big data opportunities	48%	52%	50%
Providing financing and investment	51%	40%	46%
Lowering emissions through smart building technology	43%	25%	34%
Acting as testbeds for smart community policy	30%	35%	33%
Unlocking economic and business opportunities	23%	21%	22%
Providing access to infrastructure	17%	17%	17%
My organisation should not play a role in contributing to my city or country's smart community agenda	0%	0%	0%

All respondents recognise their own responsibility to contribute to smart community development.

A smart community takes a village



30%
are currently

engaged in a private-public partnership. A further 53% plan to engage in a private-public partnership



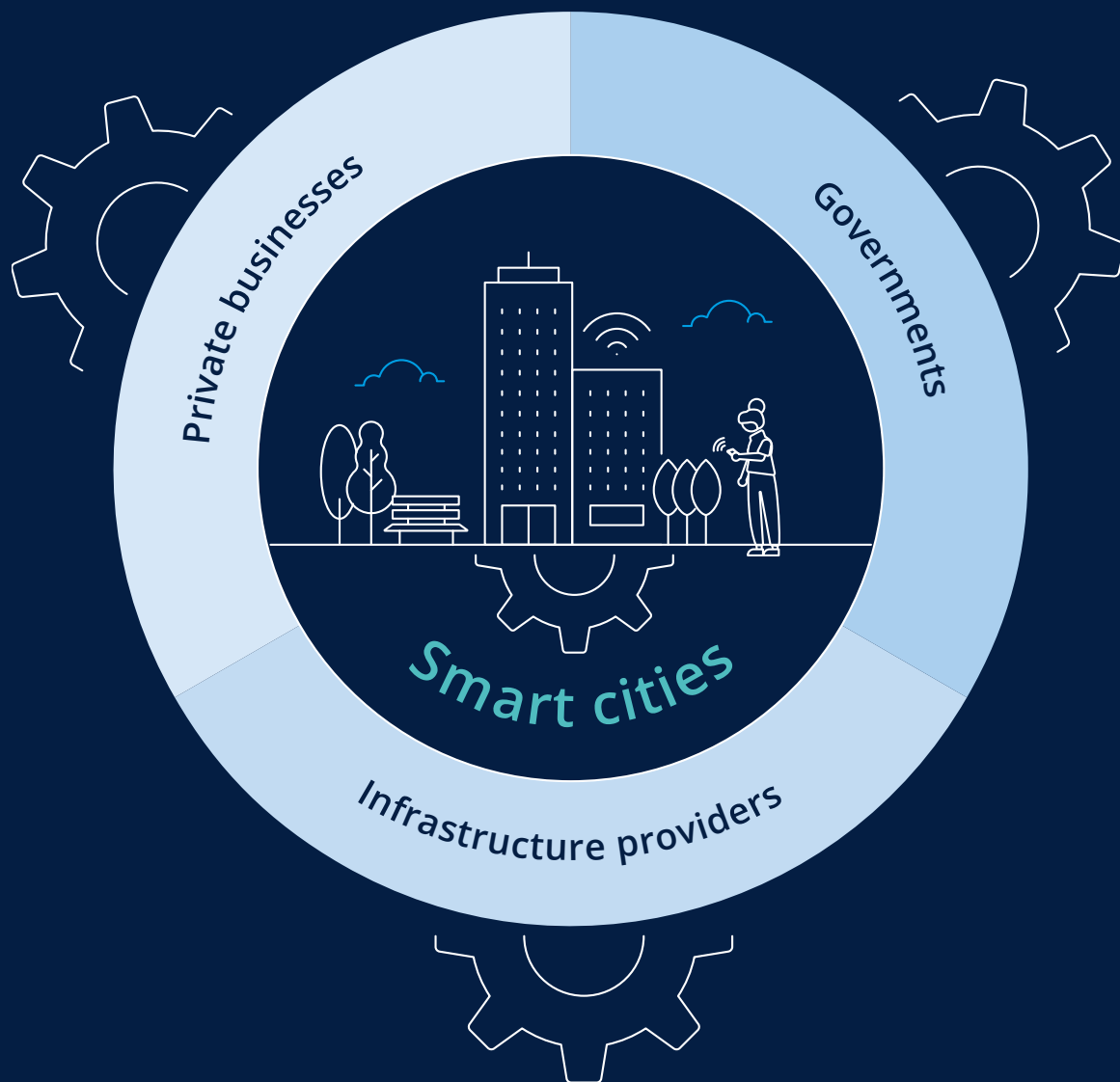
82%
of enterprises

and 57% of venues expect partnerships of 5-10 years



87%
of respondents

cite lack of awareness of potential partner organisations as a barrier to participating in smart community initiatives



There is an eagerness to collaborate

Enterprise contributions to smart community development are already taking place. One-third (30%) of organisations are currently engaged in a private–public partnership, another 53% have plans in place to enter such a partnership or collaboration, and a further 16% are considering it. Only 5% say they have no intention of working in a private–public partnership or with an infrastructure partner (see Figure 3).

Of those who are currently working or planning to work in partnerships, most expect those partnerships to last at least 5 years. Among enterprises, 82% expect them to last 5–10 years. Venues anticipate even longer partnerships, with 57% expecting 5–10-year partnerships and 29% expecting the partnerships to last more than 10 years.

Despite their enthusiasm, respondents expect challenges in their efforts to contribute to smart community initiatives. The main challenge: inadequate foundational network infrastructure, with 89% saying this issue would be somewhat or very challenging to deal with (see Figure 4). Another potential barrier is a lack of awareness of potential partner organisations and their capabilities, with 87% rating it as a challenge. This suggests there could be an opportunity for potential partners, particularly those with infrastructure capacity, to better communicate their capabilities and the kinds of solutions and partnerships they can enable.

Figure 3. Most respondents plan to be or are already engaged in public-private partnerships

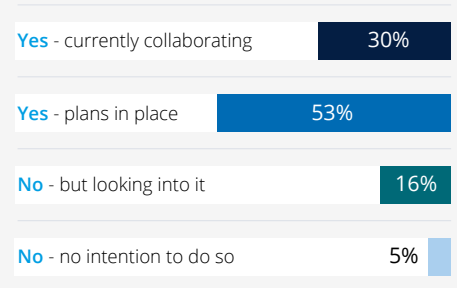
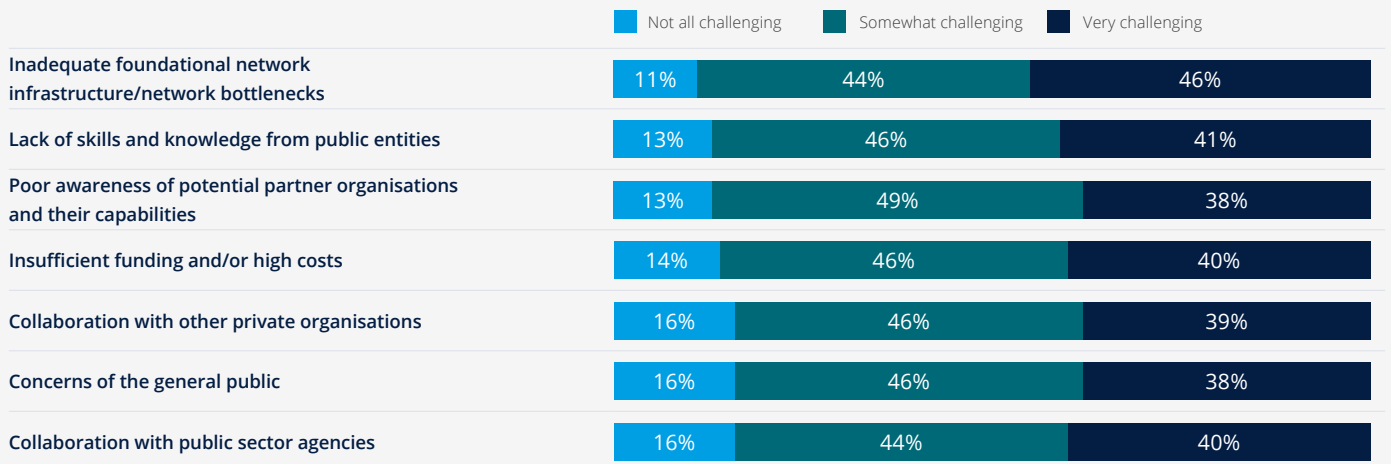


Figure 4. Network infrastructure is a critical challenge



The bottom line

Enterprises and venues want to see the development of smart communities:

- They recognise the value of connecting communities
- They understand the role they can play in delivering smarter services in their communities
- They want to collaborate with other public and private stakeholders to build smart communities

2. Network infrastructure is both an enabler and a challenge

Network- and partnership-related challenges are of particular concern to respondents because they understand how vital collaborative connectivity is. Without a robust network, smart sensors, devices and analytics platforms can't perform effectively. That connectivity is also critical to their own businesses and to their ability to be strong partners in smart community development. As a result, many organisations recognise the need to improve and future-proof their own infrastructure and networks so they can deliver safer workplaces, enhanced security and better access for customers. Despite this, many are putting off network infrastructure upgrades until they can improve by several generations at once.

Greater demands call for more advanced networks

As society becomes increasingly connected, the demands placed on enterprise networks grow ever larger. More and more people are accessing the network at the same time and expecting to be able to do more with it — from making video calls on the go to engaging with fully immersive virtual reality experiences. Meeting those demands calls for more robust networks and innovative connectivity solutions. Network resilience and business continuity are among the top connectivity-related concerns reported by survey respondents (see Figure 5). Accommodating flexible work arrangements (i.e. remote and hybrid work) has become a higher priority in the wake of the COVID-19 pandemic, and those arrangements heighten the need for more robust network security. Customers also expect more services and to receive those services faster than ever, so networks need to be able to deliver a great experience every time.

Respondents believe faster speeds and lower latency can help them achieve many of their business goals and solve a wide range of connectivity-related challenges. A significant majority (93%) believe faster speeds and lower latency would be somewhat or very useful for enabling greater or faster adoption of cloud infrastructure and applications.

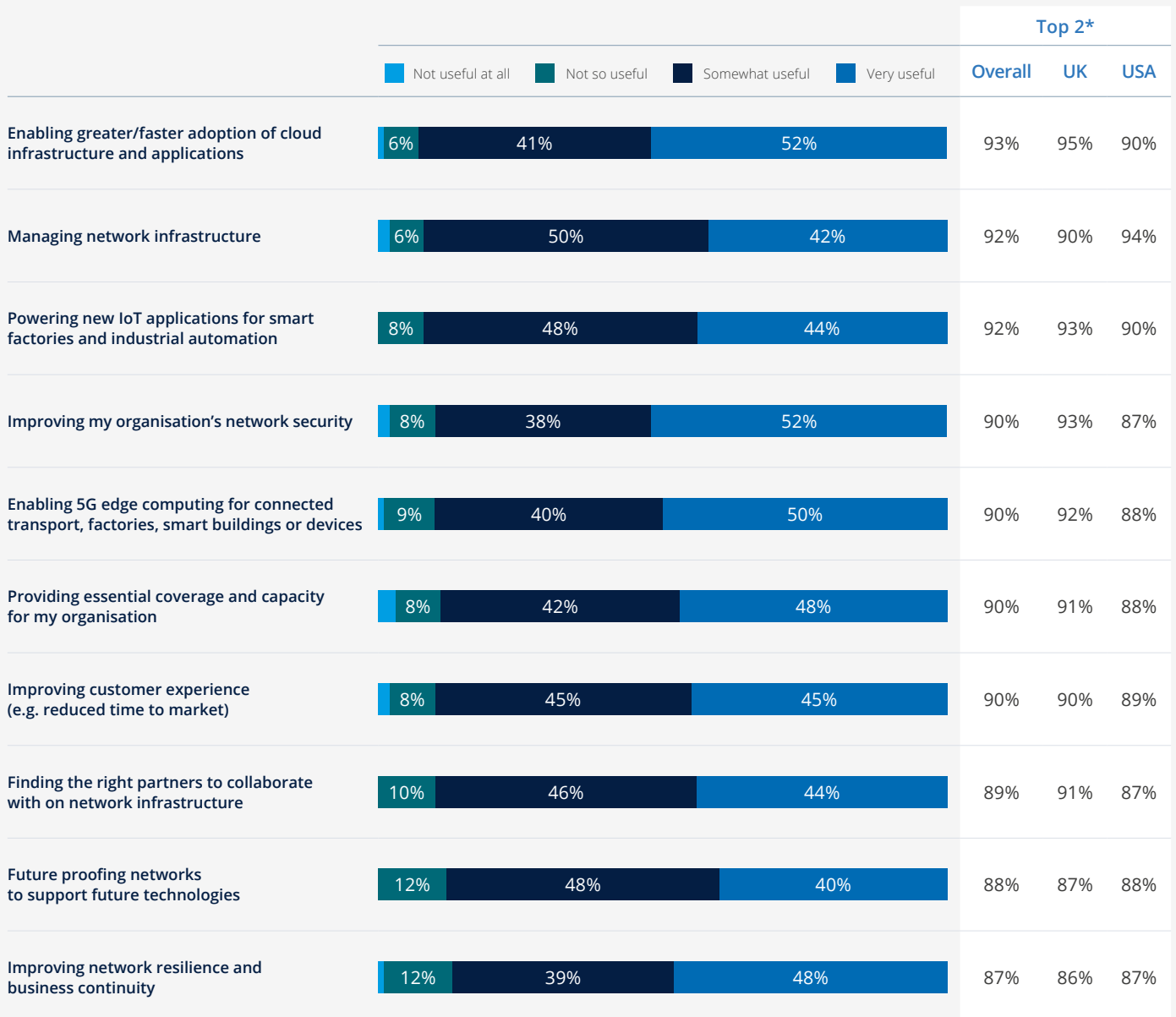
Almost as many (92%) believe these advances will help them enhance their network infrastructure management and power new Internet of Things (IoT) applications for smart factories and industrial automation. Other key benefits of faster speeds and lower latency include improved network security, the enablement of edge computing for smart buildings and vehicles, broader network coverage and capacity, and an enhanced customer experience (see Figure 6).

Figure 5. Respondents need resilient networks that can ensure business continuity

	UK (n=100)	USA (n=102)	Total (n=202)
Improving network resilience and business continuity	47%	41%	44%
Supporting flexible work arrangements	43%	42%	43%
Improving my organisation's network security	45%	37%	41%
Improving customer experience (e.g. reduced time to market)	43%	37%	40%



Figure 6. Most respondents believe faster speeds and lower latency will enable them to solve a range of challenges



*Combination of 'very useful' and 'somewhat useful' response data.



Network upgrades are being delayed

Despite the general belief that improved connectivity infrastructure is useful for solving a range of business challenges, that belief does not always translate into ongoing network infrastructure upgrades. Many respondents choose to continue using older generations of network infrastructure, even when newer generations are available, and then leapfrog multiple generations (rather than make incremental, iterative improvements) when they do upgrade. Figure 7 shows that 70% of respondents plan to upgrade to 5G, even though only 5% are currently operating one generation below that (4.9G/LTE). More than half (53%) are still operating 4G/LTE networks or below. In fact, a full 72% of respondents plan to upgrade by at least two generations, including 16% who plan to leap four generations in their next upgrade (see Figure 8).

Respondents choose to delay their upgrades for a variety of reasons, which could include associated costs, a belief that incremental improvements may not be worth the effort or a lack of internal capacity to manage advanced infrastructure. However, this 'wait and leap' strategy puts them in the position of having to deal with the challenges of maintaining older network generations longer and sets themselves up for additional challenges related to jumping ahead multiple generations at once, such as significantly higher implementation costs and lagging technology availability. As such, many would benefit from a network partner that could provide guidance and expertise.

Figure 7. Almost three-quarters of respondents plan to upgrade to 5G

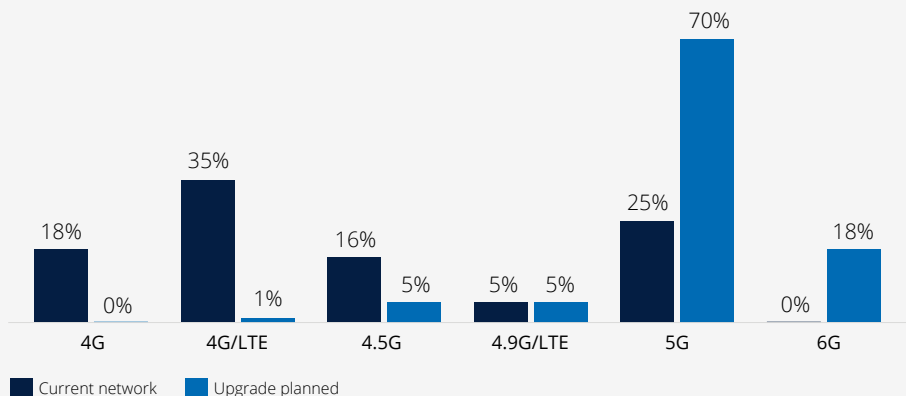
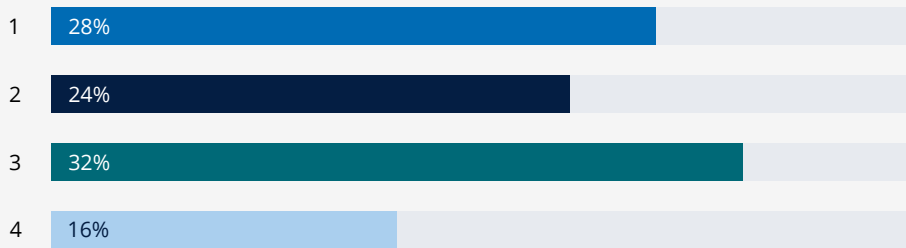


Figure 8. Almost three-quarters of respondents plan to upgrade by two or more generations

Average number of network generations upgraded per investment



The average number of network generations upgraded per investment is 2.4.

70% of respondents plan to upgrade to 5G, even though only 5% are currently operating one generation below that (4.9G/LTE).

The bottom line

Enterprises and venues recognise the need for advanced network infrastructure but aren't sure how to achieve it:

- They would benefit from more advanced networks to meet growing customer demands
- Many are delaying network upgrades within their own organisations

3. There is a readiness and eagerness to move forward with new technologies

In contrast to the demonstrated tendency to delay infrastructure upgrades, respondents say they are keen to adopt new technologies to enhance safety and security, expand customer access, and improve their bottom line. Most are familiar with and recognise the potential connectivity and operational benefits of distributed antenna systems (DAS) and small cell technologies, as well as the neutral host (or shared network infrastructure) model. Generally, respondents are motivated to improve their network infrastructure and most are in the process of doing so.

Motivated to improve speed and latency

More than half of respondents (56%) describe their organisations as ‘innovators’ that would be among the first to use a new product, technology or service. Another 22% view themselves as ‘early adopters’: they would not likely be the first to adopt new technologies but would adopt them earlier than most. Figure 9 shows that 74% cite better speed and latency as the primary driver for improving their networks. More than half also want to customise and add new networks (59%) and manage connectivity with built-in encryption (54%).

Figure 9. Most businesses believe upgraded networks will deliver faster performance with less latency

	UK (n=100)	USA (n=102)	Total (n=202)
Better performance in speed and latency	75%	74%	74%
Customising and adding new networks	61%	58%	59%
Managing connectivity with built in encryptions	50%	59%	54%
Spending less time managing my networks	47%	39%	43%
Connecting more devices	40%	41%	41%

Almost all respondents recognise DAS and small cells as key enablers of the ubiquitous connectivity that underpins smart communities. Many plan to use or are already using these technologies (77% for DAS; 78% for small cells), including 19% and 28% that are already using DAS and small cells, respectively. Among those that plan to use or are currently using these technologies, 55% believe they will help increase public connectivity across buildings, factories and campuses. Around half (51%) also expect these technologies to enable data sharing across multiple devices through fast, reliable and secure networks (see Figure 10).

56% of respondents describe their organisations as ‘innovators’ that would be among the first to use a new product, technology or service.

What are distributed antenna systems (DAS)?

DAS uses a network of antennas distributed throughout a given area to create seamless wireless coverage in spaces that are otherwise difficult to connect effectively, such as those with many walls or dead spots.

What are small cells?

Small cells provide low-profile, high-bandwidth coverage, helping deliver broad coverage with limited infrastructure and space constraints. They are critical in enabling high-performance coverage and capacity for 5G.

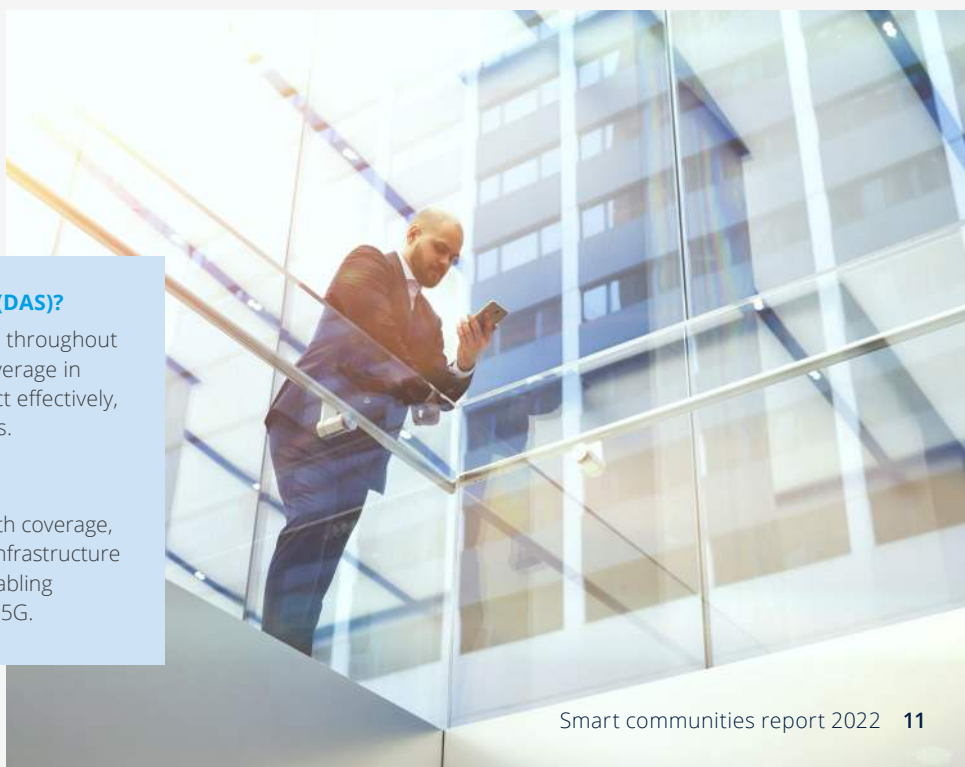


Figure 10. Respondents believe DAS and small cells can enhance public connectivity and data sharing

	UK (n=88)	USA (n=93)	Total (n=181)
Increase public connectivity across buildings, factories or across campuses	53%	57%	55%
Enable data across multiple devices through fast, reliable, and secure networks	53%	48%	51%
Enable cloud based apps to manage your operations	45%	47%	46%
Mitigate network outages and data breaches	53%	37%	45%
Add capacity to a network to enable connectivity indoors and outdoors	38%	45%	41%
Enable reliable connections from sensors to the backend network for IoT devices	43%	38%	40%

Neutral hosting offers key benefits

All respondents had heard of the neutral host model, with 90% considering themselves familiar with it — and nearly all of them (99%) believing it is relevant to their connectivity objectives. Some of the most important of those objectives are delivering reliable connectivity, servicing multiple networks, enabling coverage in areas with limited space for network assets and increasing coverage at lower costs (see Figure 11).

Figure 11. Respondents believe the neutral host model will enable many key connectivity objectives

	■ Not useful at all ■ Important ■ Very important	Top 2*		
		Overall	UK	USA
Delivering reliable connectivity across your organisation independent of public wireless infrastructure access (i.e. cell towers)	5% ■ 50% ■ 45% ■	95%	94%	95%
Servicing multiple networks using a shared network infrastructure	5% ■ 47% ■ 48% ■	95%	95%	94%
Enabling network coverage within venues with limited space for network assets	7% ■ 42% ■ 51% ■	93%	95%	91%
Increasing network coverage at significantly lower costs	7% ■ 44% ■ 49% ■	93%	95%	90%
Improving network coverage in low coverage areas	9% ■ 43% ■ 48% ■	91%	91%	90%
Increasing network capacity in congested locations	10% ■ 48% ■ 42% ■	90%	91%	88%
Simplifying the deploying and ongoing operation of indoor MNO signal propagation	12% ■ 41% ■ 48% ■	88%	89%	87%
Lower costs to design, deploy and operate networks	13% ■ 42% ■ 46% ■	87%	89%	85%

*Combination of 'very important' and 'important' response data.

99% of respondents believe the neutral host model is relevant to their connectivity objectives.

What is a neutral host?

What is a neutral host?

A neutral host is a company that deploys and operates connectivity infrastructure, including in-building DAS, macro cell towers and fibre-optic networks, and leases it to multiple other mobile network operators (MNOs) and other service providers. This gives MNOs access to reliable, advanced connectivity they can use to deliver their own services and accelerate 5G adoption without the costs of building and maintaining their own infrastructure. End users benefit from innovative, personalised services that make their lives better.

Neutral hosting enables smart communities

- Neutral host provides the network, including operation, maintenance and upgrades.
- MNO uses the network to provide innovative services.
- End users enjoy ubiquitous connectivity and personalised experiences.



Enterprises and venues say neutral hosting offers many benefits including:

95%

Delivering reliable connectivity across the organisation

93%

Enabling network coverage in venues with limited space

93%

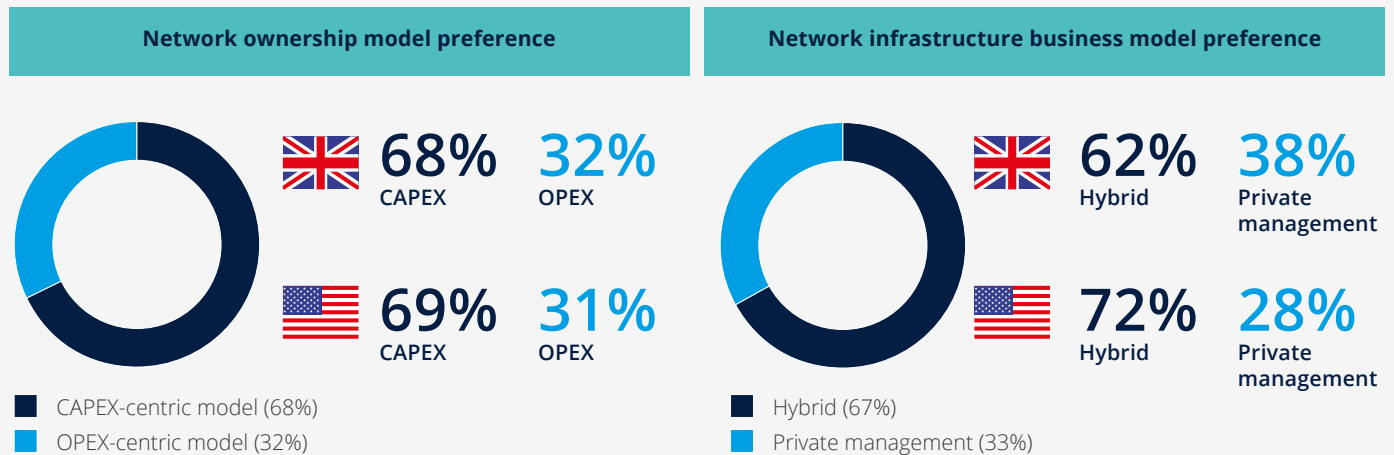
Increasing network coverage at lower cost

90%

Increasing network capacity

While respondents seem to largely agree on the benefits of the neutral host model¹, opinions are mixed on preferred ownership and business models for such arrangements (see Figure 12). Two-thirds (68%) prefer a CAPEX-centric ownership model over an OPEX-centric model, with similar numbers in both the UK and the US. Overall, two-thirds (67%) also prefer a hybrid business model over private management²; however, these numbers differ noticeably between countries. In the UK, 62% prefer a hybrid model and 38% prefer private management; in the US, the preference for a hybrid model rises to 72%.

Figure 12. Two-thirds of respondents prefer a CAPEX ownership model and a hybrid business model

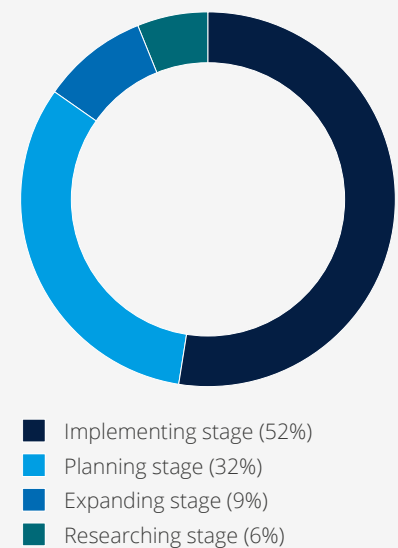


Upgrades are on the way

With or without other partners, most respondents are getting ready to adopt advanced network connectivity solutions. Half (52%) are in the process of deploying associated hardware and/or software, and 32% are actively planning to implement these types of solutions. A small number (9%) have already implemented 5G solutions and are now looking toward expanding toward 6G (see Figure 13). Generally, companies are further along in the US, with 56% implementing and 13% expanding, vs. 49% and 5% in the UK, respectively.

Most respondents (78%) anticipate upgrading their networks within the next two years. Only 4% plan to wait five years or more before carrying out their upgrades. For most (70%), their planned upgrades will bring them to 5G. Another 18% intend to upgrade to 6G. Through these evolutions, enterprises and venues have the potential to radically transform the communities in which they are located.

Figure 13. Half of respondents are currently implementing advanced network connectivity solutions



The bottom line

Enterprises and venues are preparing to move forward and adopt new technologies:

- They want to adopt new technologies that will improve the speed and latency of their networks
- They understand the neutral host model and its benefits
- They are in the process of upgrading their networks

1. In a CAPEX-centric model, an organisation purchases assets outright, requiring large upfront investment. In an OPEX-centric model, assets and services are paid for under a subscription model, with costs spread out over a longer period.

2. In a hybrid model, one organisation owns the network infrastructure but uses a third party to maintain and support it. In a private management model, the wireless infrastructure is owned, operated and maintained by a single organisation.



Conclusion

The right partners are needed to take the next step

In a smart community, a resident might leave work and be able to know exactly when their bus or train will show up or get a notification of delays so they can choose a different route. When they arrive at the transit station, their fare payment could be registered without contact. On the way home, seamless connectivity throughout their trip might let them enjoy their favourite streaming media, catch up with friends or order groceries — which could be ready for them to pick up when they get to the store.

For this to all happen, private organisations, governments and infrastructure partners all need to work together. This private–public collaboration enables stakeholders to leverage existing public infrastructure, alleviate budget constraints, deliver ubiquitous connectivity and securely enable high-quality services.

In general, the respondents to our survey want to be able to deliver these kinds of experiences and they recognise the potential benefits to their own organisations. Leaders and decision makers within enterprises and venues in the US and UK believe smart communities are the way of the future, understand the need for advanced infrastructure to enable them and are interested in being part of initiatives to transform their communities. But they are not always clear on what they need to do to make it happen, and they lack awareness of the partners that are available and what capabilities they offer.

Neutral hosting and shared infrastructure partners can help bridge these gaps. By drawing on their experience and expertise to know what's possible and what's required to make it happen, they can bring together the right partners to enable smart community transformations that enhance business outcomes and improve the lives of residents. With that guidance and support, enterprises and venues can confidently take the next step toward a new era of smart, connected communities.

95% of respondents are open to a private–public partnership or collaboration with an infrastructure partner.



bai communications

Methodology

BAI Communications conducted this survey to identify and examine the needs of organisations in the UK and US related to future connectivity and smart community objectives. We asked about the technology outcomes they are looking to achieve, the technologies they are considering to realise those outcomes and their willingness to engage in partnerships to meet their needs.

The research was commissioned by BAI Communications and conducted by B2B International. A total of 202 individuals were surveyed in the UK (n=100) and the US (n=102), including C-suite executives (n=61), vice presidents (n=104) and managers (n=36). The organisations they worked for ranged in size from 500 to 5,000 employees and were classified as either enterprises (n=188) or venues (n=14).

They included representation from industries such as oil and gas, manufacturing, energy, healthcare, agriculture, transportation and logistics, education, large-scale real estate developments (e.g., shopping malls, office complexes), and entertainment facilities.