E-BOOK

7 Critical Capabilities of Your IoT Cellular Connectivity Partner

twilio

ABOUT THIS E-BOOK

A guide to choosing your connectivity partner

The connectivity partner you choose to enable your IoT solution can fuel the success of your product. That is, if you deploy with the right partner. But how do you know exactly what to look for when evaluating a connectivity provider?

Including a buyer's checklist and examples of real companies, this e-book will show you the 7 capabilities for your IoT connectivity partner, how they drive your product, and why they are critical to your success.

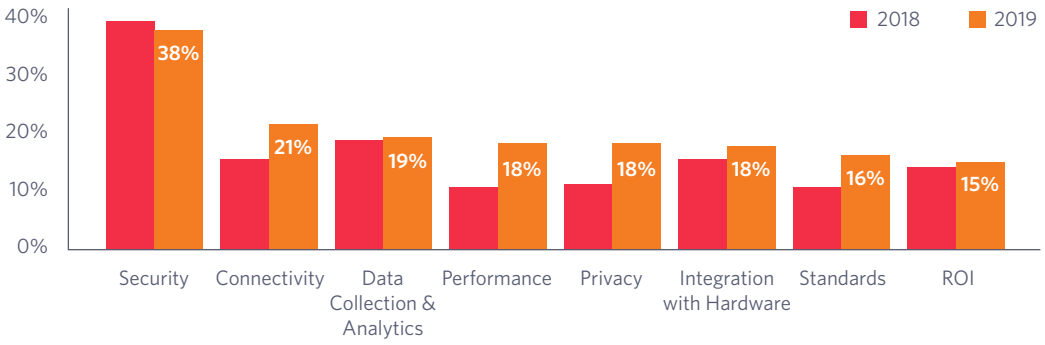
What's inside

Connectivity: a fuel for IoT acceleration

The opportunities and benefits of IoT are well established: road sensors for better traffic management, pollution monitoring for healthier environments, and elderly tracking for independent living — just to name a few.

Whether you're an IoT product manager, developer, or technical team member, you probably also know the complexities of making these solutions work. Connectivity is among the hardest layers of IoT architecture. According to developer communities such as the Eclipse Foundation, connectivity is ranked as the second most critical concern, following only security, when it comes to IoT projects.[1]

Top developer concerns over time



Selecting the right connectivity partner is pivotal for the success of your business. We spoke with developers, product managers, and business owners of IoT solutions, and found the top seven critical capabilities they look for when selecting a connectivity partner. Each chapter of this e-book will provide you with a checklist of what to look for, a pro-tip, and a case study example of how IoT solutions were enhanced by each capability.

[1]Eclipse Foundation: IoT developer survey results April 2019

CHAPTER 1

Quality

The viability of your IoT solution is, by nature, dependent on connectivity. It's hard to raise your standards on high quality connectivity when it feels like you are limited in your choices. But it doesn't have to be this way. The checklist below includes everything to look for when validating that your connectivity partner can offer you the highest network quality.

What to look for when checking for network quality:

- One SIM that works on multiple networks worldwide.
- Good coverage wherever you operate or plan to operate in future.
- Ability to choose the networks your devices can access.
- Redundancy across network paths and the ability to automatically switch to another network if one goes down.

Pro-tip: Traditional operators "steer" your connectivity to cheaper roaming networks in order to save on their costs. But this can adversely impact your service if the network your devices were steered to has poor quality connectivity or the radio technology is incompatible with your device. Ensure your provider does not practice this form of network steering and puts the choice in your hands to decide which network is best for your device type and location.

Why do you need it?

Many things can impact the success of your IoT solution, but the quality of connectivity is the most critical. That's because it directly impacts your customer's experience, operational efficiency, and overall telecom costs. When your solution is not available, you're exposing your customers to a negative experience.

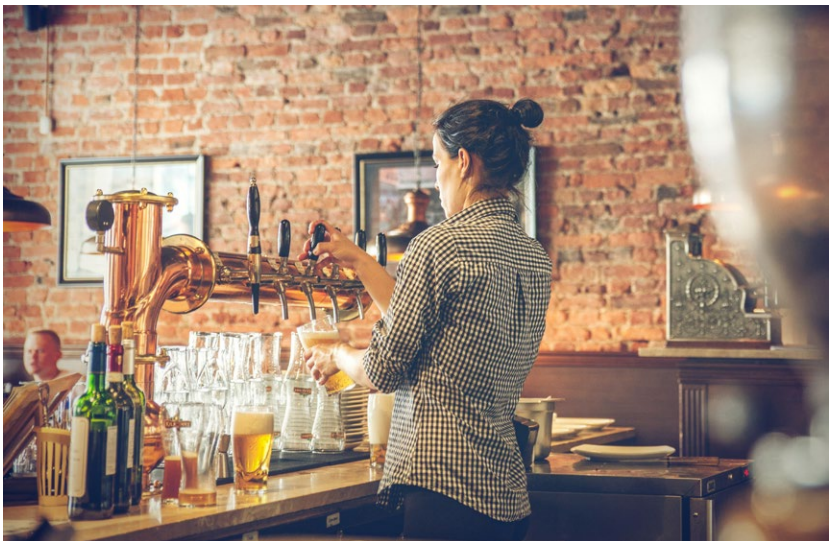
To mitigate that and make your product more reliable, you have to contract with multiple carriers in every region you want to operate in. At the end of it all, you're still left with frustrated customers, the headache of many carriers to manage, and heavier operational costs overall.

CASE STUDY

Bar Analytics controls their network quality to reliably monitor beer taps globally

Bar Analytics provides a beer flow monitor and data analytics solutions for breweries. Their beer flow monitor attaches to beer taps in bars and tracks sales, pouring yield, beer temperature, and product quality — all in real time. Large breweries love this IoT-enabled product because they can leverage data for enhanced efficiency, marketing, and a superior customer drinking experience.

When Bar Analytics first deployed, coverage was the biggest challenge they faced. They needed to work with all carriers in an area to ensure that their product was highly available to breweries.



When working with traditional operators, Bar Analytics discovered that their connectivity was being pushed to a network that wasn't compatible with their radio technology, resulting in their solution being down and major delays in their data transmissions in several locations.

For example, one of their customers sells Pilsner in Germany and uses the Bar Analytics data to plan how much beer they need to brew. Oftentimes, this data is needed within a week's notice since the ingredients don't have a long shelf life. Even 10 hours of lost data would have a huge negative impact on the customer's business. If the Bar Analytics system goes offline, the brewery loses trust and will no longer use the system. By selecting a connectivity partner that gave them the choice to select their networks, Bar Analytics could offer their customers trustworthy, real-time insights into beer consumption in over 100 countries.

"Within 6 months of working with high quality connectivity, we've had 6.5 million pours recorded. Having the ability to choose our networks was a key advantage, and there's no way we'd be able to gain the trust of some of the biggest breweries in the world without it."

Marc de Vos
Founder
at Bar Analytics

Bar Analytics' results

6.5M
pours tracked within 6 months with high-quality connectivity

100+
countries can now be tapped for beer insights

CHAPTER 2

Scale

Whether you're introducing a new solution, or thinking about your next-generation deployment, you're probably nervous about your ability to scale your solution. Your connectivity partner plays a critical role in your ability to do that. Their role is evident in their network availability, connectivity debugging tools, and data latency.

This can be seen in the presence of a cellular network backend, also called a mobile core. It's not quite that simple, though. Too often, IoT solutions are simply 'bolted on' to a mobile core designed for consumer mobile handset traffic, which isn't optimized for IoT workloads. You want a connectivity provider who built, owns, and continues to manage their own mobile core exclusively for IoT solutions.

What to look for when checking for scalable connectivity:

- A provider who owns and manages their own network infrastructure (mobile core), without 3rd party vendor dependencies.
- A completely cloud-native mobile core.
- Highly available, with no planned maintenance windows that cause disruptions to your business.
- Low latency Internet access around the globe, so you can deliver responsive experiences to your customers.

Pro-tip: Check to see if your connectivity partner develops, operates and manages their own mobile core. If they do, dig deeper into how well they do it. The key here is to make sure it's fully managed, highly available, and is constantly improved. Do they author the code, or rely on vendors with competing priorities?

Why do you need it?

There's no doubt that you have dreams to grow your business. As you think about new use cases or locations for your IoT solution, you need to consider network performance and speed to scale.

When your connectivity partner offers you a fully managed, cloud-native mobile core, you can build new use cases that weren't possible — or economically feasible — before. And it gets even better. You don't have to manage multiple carriers, nor pay outrageous roaming costs. You could manage massive workloads anywhere.

CASE STUDY

SystemOne leverages network quality at scale to accelerate disease detection

SystemOne enables fast disease intelligence for the developing world. They provide cellular-enabled diagnostic devices for testing patients in remote clinics that can be hundreds of miles from cities. This critical health data from the devices needs to be sent for lab analysis and the results need to be delivered back to the doctors and patients quickly to cure and curb the spread of life-threatening diseases like tuberculosis, HIV, Zika, and Ebola.

SystemOne found that connectivity and scalability are complicated in low and middle income countries.

Initially, SystemOne worked with local providers, but that approach was unscalable. It was too complicated to manage relationships with multiple providers in dozens of countries.

To navigate this challenge, they switched to a single SIM that offered access to multiple networks anywhere they wanted to operate. In this way, when a device is dropped from a network for any reason, their device could reroute to another network. With superior, global connectivity and a scalable platform, SystemOne was able to rollout more than 3,000 cellular-enabled diagnostic devices in 43 countries.

Millions of people now have access to faster diagnosis and better patient care. As SystemOne scales their solution, they will also leverage their provider's cloud-based mobile core for their mission critical transmissions of disease diagnostic data.

"Because our devices work everywhere through one SIM, we were able to easily expand to new countries with extreme simplicity. Today, we deliver over 10 million diagnostic results to patients."

Aaron Oppenheimer
Vice President of Product Design
at SystemOne

SystemOne's results

3K+
cellular-enabled diagnostic devices

43
countries now have access to faster diagnosis

CHAPTER 3

APIs

Simply put, IoT means scale, scale means automation, and automation means APIs.

Operational APIs to look for from your connectivity partner:

- Detailed API documentation that is publicly available online.
- Your provider should be capable of handling billions of transactions per day, demonstrating operational excellence. Check sites like Stack Overflow to see how popular your provider's APIs are within the developer community.
- APIs should cover all the major functionality of the connectivity management platform, including configuring SIMs and groups of SIMs, defining network access permissions, querying historic usage, etc. At scale, you'll want to instrument all these functions into your supply chain processes and internal management tools.
- An SMS API will enable you to exchange simple M2M SMS messages with devices, which is a critical function when a device's Internet access is performing poorly.
- A provider with great operational experience offering cloud-based APIs at scale will be able to offer an SLA on the APIs themselves.

Pro-tip: You can use crowdsourcing to validate how well your provider's APIs work. Do a quick online search for your provider's company name and "API error." The results will give you a glimpse into what it's like to work with their APIs in real life.

Why do you need it?

One word — automation. At nearly every phase of your product lifecycle, APIs can streamline, optimize, and automate your processes and the day-to-day management of your fleet. For example, you can automate the testing of your SIMs during manufacturing or automatically suspend rogue devices that start using high data. For this to work, however, the APIs must be of high quality and be frequently maintained.

No developer wants to be left with error messages, 404 links, or no response at all. The business impact is pretty clear: automating your operations with high quality APIs can significantly reduce your support costs and operating expenses.

CASE STUDY

Rently uses APIs to gain market share in rental property management

Rently provides a self-touring IoT solution for residential rental properties. They created a cellular-connected smart hub for vacant rental properties that lack WiFi.

The hubs connect to smart locks that enable renters to enjoy self-guided property tours without coordinating with a property manager. Property managers who are busy or manage properties from hundreds to thousands of miles away love the convenience of this solution.

Rently was one of the first players in a new market and they wanted to quickly grow to establish market leadership. Working with well-designed and reliable connectivity APIs helps Rently to automate their device provisioning process. This allowed new and existing Rently customers to instantly mass-activate connectivity to smart hubs. As a result, Rently substantially reduced the provisioning time previously required, and scaled to over 10 million self-tours within the first year of using their provider's connectivity APIs and developer resources.

"Leveraging high quality APIs and easy to consume documentation allows us to provision even our largest customers 10x faster."

Andre Sanchez
VIce President of Operations
at Rently

Rently's results

10M
self-tours within year one

3X
faster device activations via connectivity APIs

CHAPTER 4

Acceleration

Picture this: you get a brilliant idea — a potential rocket ship. So, you draw up the plans, allocate resources, and prototype your product as fast as you can. You want to be the first to market, so you eagerly yet meticulously build your IoT solution. In that scenario, your connectivity partner should be helping you, not holding you back. The two critical areas where your connectivity partner can help you get to market faster are, first, get you SIMs ASAP, and, second, give you developer resources to build with ease.

What you need to get to market faster:

- An online shopping experience to order a few SIMs to test.
- No up-front contracts or commitments just to get started.
- Simple online SIM fulfillment, with the ability to ship directly to your manufacturer.
- Ability to use the same SIMs and platform for both prototyping and production.
- Evaluation kits to test if the connectivity works and is the right fit.
- High quality API documentation available in multiple common programming languages, blueprints, and tutorials.

Pro-tip: Bringing your ideas to life, your developers are among the most important people on your team. Check to make sure your connectivity partner can offer the same platform for both SIMs and connectivity management. This will make prototyping and production much easier for your developers.

Why do you need it?

As a product owner or developer, you know that time to value helps you quickly prove product viability and potential success to your stakeholders. Your connectivity partner should not be your weak link. Getting your hands on SIMs immediately, allowing you to start testing right away, is an obvious driver of faster time to market.

The less obvious? Excellent developer resources to assist in API implementation. This will help you avoid hidden setbacks in your development cycle. Frequently updated, clearly written, and easy-to-follow documentation will help reduce your time-to-market.

CASE STUDY

Lime accelerated their new scooter business and reached 100 million rides

Lime is one of the leading micromobility operators whose e-scooters are revolutionizing mobility in cities and campuses by providing residents with a greener, efficient, and affordable transportation option. In less than two years, Lime surpassed 100 million rides, with growth faster than any other micromobility operator.

When Lime wanted to expand from bikes to a new product — the now very popular electric scooters — at first, their development cycle of this new product came to a screeching halt. Their initial connectivity partner could not give them SIMs fast enough. Consequently, Lime could not test to see if this new product idea was a viable option.

After identifying a new connectivity partner, Lime not only got the SIMs they needed, but they also got dev kits and APIs to be able to quickly prototype, test the connectivity and deploy their new product. As a result, Lime expanded their scooters all over the world, being the first mover in many geographical markets around the world.

"Developer resources and self-service features from our connectivity provider allowed us to move as fast as we wanted, bringing our scooters to 30 countries within 2 years."

Dr. Mu Qiao
Tech Lead Manager
at Lime

Lime's results

30

countries expanded to within two years

100M

rides in two years, faster than any other micromobility company

CHAPTER 5

Expertise

Unless you happen to have a professional background in wireless telecommunications, it's very challenging to navigate the complexities of connectivity requirements for your IoT solutions. For example, how do you know which telecom network will be best for your solution? How do you build a model to assess what your rate plan should look like? How can you ensure that you've optimized the data usage?

To be considered as experts, your connectivity partner should have:

- A solid understanding of the differences across IoT use cases to help you choose the right network type for your solution.
- A long tenure in telecommunications to help you pick the best rate plans and ensure you're getting the best value for connectivity.
- Ability to maintain the network and help you resolve any connectivity issues quickly to minimize impact.
- Ability and willingness to help you troubleshoot issues in far-flung corners of the globe, where the network itself is likely controlled by a third-party.

Pro-tip: Read the provider's case study examples and search for proof of cellular expertise from existing customers. If needed, search the web for videos of existing customers to hear it directly from the customer, and don't be afraid to ask for references.

Why do you need it?

With expert advice from your connectivity partner, you'll be better informed on how to optimize your current fleet of devices, plan for future growth, and design your product roadmap. IoT services don't work when connectivity fails, and it can be detrimental to your customer experience and bottom line if you can't get assistance quickly. Furthermore, your IoT solution is sophisticated, so when you have an issue with connectivity, you can't always solve it digitally via chats and forums. When something goes wrong with your service, you need a partner to fill the knowledge gaps and quickly restore your IoT service.

CASE STUDY:

Telemax relied on telecom expertise to develop a differentiated fleet solution

Telemax is a fleet tracking telematics solution that collects real-time data about vehicles, equipment, and drivers. They share the data with their customers — rental car companies — who then gain a stronger understanding of the behavior and performance of their vehicles, assets, and drivers.

The Telemax team dreamt of reinventing the fleet tracking market with a new offering. Traditionally, trucking companies and rental car companies were required to BYO-SIM (bring your own SIM) to fleet software solutions. That didn't sit right with Telemax.

Instead, they wanted to bundle connectivity with fleet management to ensure that their customers did not have to worry about managing connectivity. But simply adding connectivity wasn't enough for Telemax to make their IoT-enabled solution differentiated. They needed to also deliver a superior quality of service and a simple business model.

To make their dream a reality, Telemax worked closely with their provider's team of telecom experts. Having a provider who can advise on which rate plans to pick, how they should bundle their technology with connectivity, and how to optimize data usage allowed them to validate their new business model with confidence. But the guidance didn't stop there; their provider also helped them resolve and troubleshoot connectivity issues that ultimately drove their market success.

"Getting a telecom expert on the phone when we needed it allowed us to troubleshoot connectivity issues 5X faster and increase the quality of service that we provide to our customers."

Ash Phayer
General Manager
at Telemax

Telemax's results

10%
growth in monthly subscriber base

5X
faster resolution of connectivity issues

CHAPTER 6

Pricing

Pricing doesn't have to be a drawn out, painful negotiation. If pricing is holding you back in any way, you may have to continue your search for a connectivity partner.

What to look for in your connectivity partner's pricing:

- No hidden fees and no need to negotiate with a salesperson in order to run your PoC.
- The choice to use pay-as-you-go pricing.
- No requirement of minimum spend commitments.
- Access to discounted pricing at high data consumption volumes.
- One global bill for your entire IoT fleet across the world.
- Data billed per byte, allowing granularity in only paying for what you use.

Pro-tip: When assessing your connectivity partner, check their website to see if their pricing is published online for a tell-tale sign of how transparent they are. You should be able to easily view the pricing by country and estimate your monthly cost, without negotiations.

Why do you need it?

You're probably familiar with "the pricing norm" in the telecom market today: pooled pricing and gotch-ya fees. The challenge with pooled pricing is that there are hidden costs. You're either always paying extra for unexpected usage, or you're paying for data that you're not using.

And those gotch-ya fees? Those are completely unnecessary, unexpected charges on your telecom bill. When you're free from obscure, rigid pricing models, you can better predict your costs and work with your provider to optimize for future scale.

CASE STUDY:

Raven's connected car solution benefits from predictable telecom pricing

Raven created a connected car system with a dash-mounted device that turns any vehicle into a smart vehicle. Now fleet managers have instant access to everything they need to know about vehicles in their fleet, including real-time vehicle diagnostics, location updates, and two-way video monitoring.

Raven's devices live-stream videos and consume high volumes of data, so they needed an IoT data pricing model that could scale with them.

Thanks to their predictable telecom costs, Raven knew precisely what to expect for its operating expenses, ensuring the success of their business. Once they were up and running with 100% predictable telecom spend, they were able to operate profitably and even offer flat rate pricing to their customers. Passing off the simplicity of pricing to their customers helped Raven increase the adoption of their product across the United States.

"The ability to predict our telecom bills let us run our business profitably and grow by double-digits annually."

Dan Carruthers
CEO
at Raven

Raven's results

100%
predictable telecom bills

Double Digit
growth due to differentiated product in market

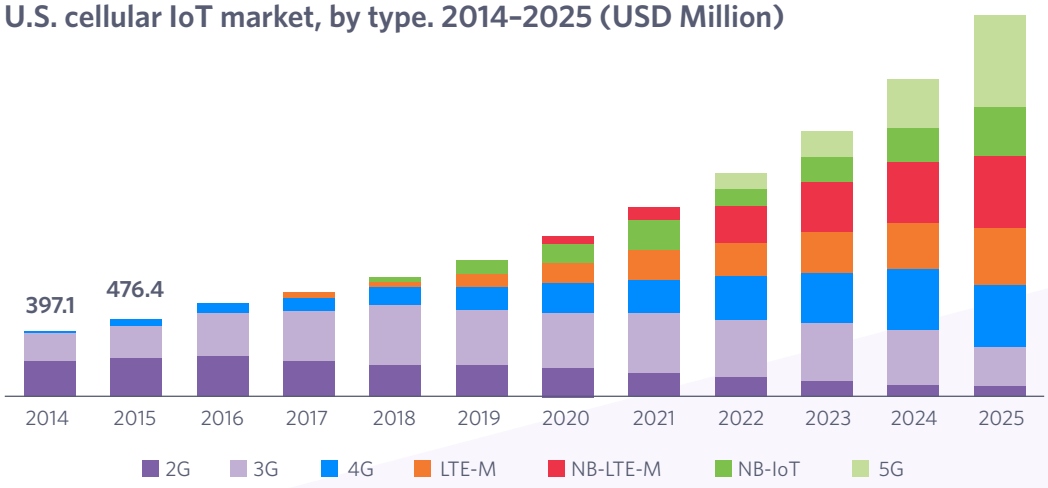
CHAPTER 7

Innovation

The connectivity market is ever evolving. We are seeing the emergence of newer cellular technologies such as 5G that supports ultra-low latency for a variety of high bandwidth applications and narrowband (NB-IoT) that supports low power, low bandwidth applications for massive IoT.

According to analyst reports[2], within the next five years, older 2G and 3G cellular technologies will level off and 5G and NB-IoT networks will see an uptick. Your connectivity partner should provide the latest cellular technologies to support your need to access the best connectivity for your use case.

U.S. cellular IoT market, by type. 2014–2025 (USD Million)



[2] Cellular IoT Market Worth $9.65 Billion By 2025: Key Industry Players ZTE Corporation, Gemalto NV

What to expect from an innovative connectivity partner:

- Choice of a range of cellular IoT technologies including 3G, LTE and LTE-M.
- A product roadmap of new cellular capabilities that could enhance your product or business model.
- Reputation of being an innovative organization and their pace of new product or feature enhancements.

Pro-tip: Ask questions about emerging technologies. Check to see if your connectivity partner has been first to market with a new cellular technology. This tells you that they have their eye on the future, and are always looking for ways to further decrease latency or give you greater control over network quality.

Why do you need it?

If you're not leveraging the latest technology, then you are already behind in the market. The right cellular technology can help you win the competitive race by operating more efficiently and creating delightful customer experiences.

Suppose you own an IoT-enabled surveillance business with cameras in remote areas. You're probably struggling with low bandwidth issues of legacy wireless technology, and incurring high support costs to meet customer expectations. As 5G begins to rollout, you'll want a connectivity partner that can quickly offer high throughputs to give you a competitive advantage. Your connectivity provider should be one step ahead of all things related to communications, so that you can be too.

CASE STUDY

Sensoneo uses NB-IoT to extend their waste management solution across geographies

Sensoneo is a Slovakia-based smart waste management solution provider that enables cities and businesses to manage waste cost-efficiently. Their cellular-connected sensors are placed in waste bins to monitor waste levels in real-time, creating optimized routing for waste collection trucks.

Sensoneo has over 200 smart waste projects across 40 countries and is delivering 30% savings in operating costs to customers and a 60% reduction in carbon emissions.

When Sensoneo wanted to expand into the U.S. market, they faced a roadblock. With an average of 50,000 battery-powered sensors deployed per city that transmit small packets of data, they require a U.S. cellular network that can not only handle the high number of IoT devices, but is also low cost and low power-consuming.

Sensoneo benefited from a provider who offered the first narrowband IoT connectivity platform in the United States. This Low Power Wide Area Network (LPWAN) helped Sensoneo expand to the U.S. market while also reducing their connectivity costs.

"There's no way we would be where we are today with basic 3G/4G cellular offerings. Finding a connectivity partner that could provide us with narrowband was a clear choice for us, resulting in easy and quick scaling."

Martin Basila
Founder and CEO
at Sensoneo

Sensoneo's results

30%
reduction in operating costs provided to customers

60%
reduction in carbon emissions

Fuel the success of your IoT solution

While practically every business is embracing IoT, assembling the right infrastructure to build, manage and scale an IoT solution is no simple task. Product managers and developers face the challenge of choosing the right hardware, software, and applications to sustain their business into the next generation — and they need to do so at the speed that technology evolves.

This checklist is your quick reference of what to look for as you validate that your connectivity partner possesses the seven critical capabilities discussed in this e-book.

Quality
One SIM that gives you access to the best networks across the globe and lets you choose which networks your devices connect to.

Scale
A globally distributed, pure-software mobile core with the ability to handle massive workloads with low data latency across the world.

APIs
High-quality APIs that let you automate your connectivity management operations.

Acceleration
Ability to quickly test and deploy solutions with a platform that eliminates all developer roadblocks from prototyping to production.

Expertise
Experts who can advise on all your connectivity-related decisions that impact your business.

Pricing
Transparent, pay-as-you-go pricing and one global billing relationship.

Innovation
A partner who's ahead of the pack, providing solutions that leverage the emerging telecom technologies.

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Thanks for reading.

Want more resources on choosing
an IoT connectivity provider?

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