bics

Creating the mobile network of IoT

Introduction

There are now 12.3 billion active IoT devices. By 2025, this is estimated to be 27 billion[1].

Enterprises are playing a pivotal role in driving this uptake in IoT. As they discover new use cases for connected devices, they help achieve greater operational efficiencies, improve customer outcomes, increase business intelligence, deploy new services, and develop more efficient business models.

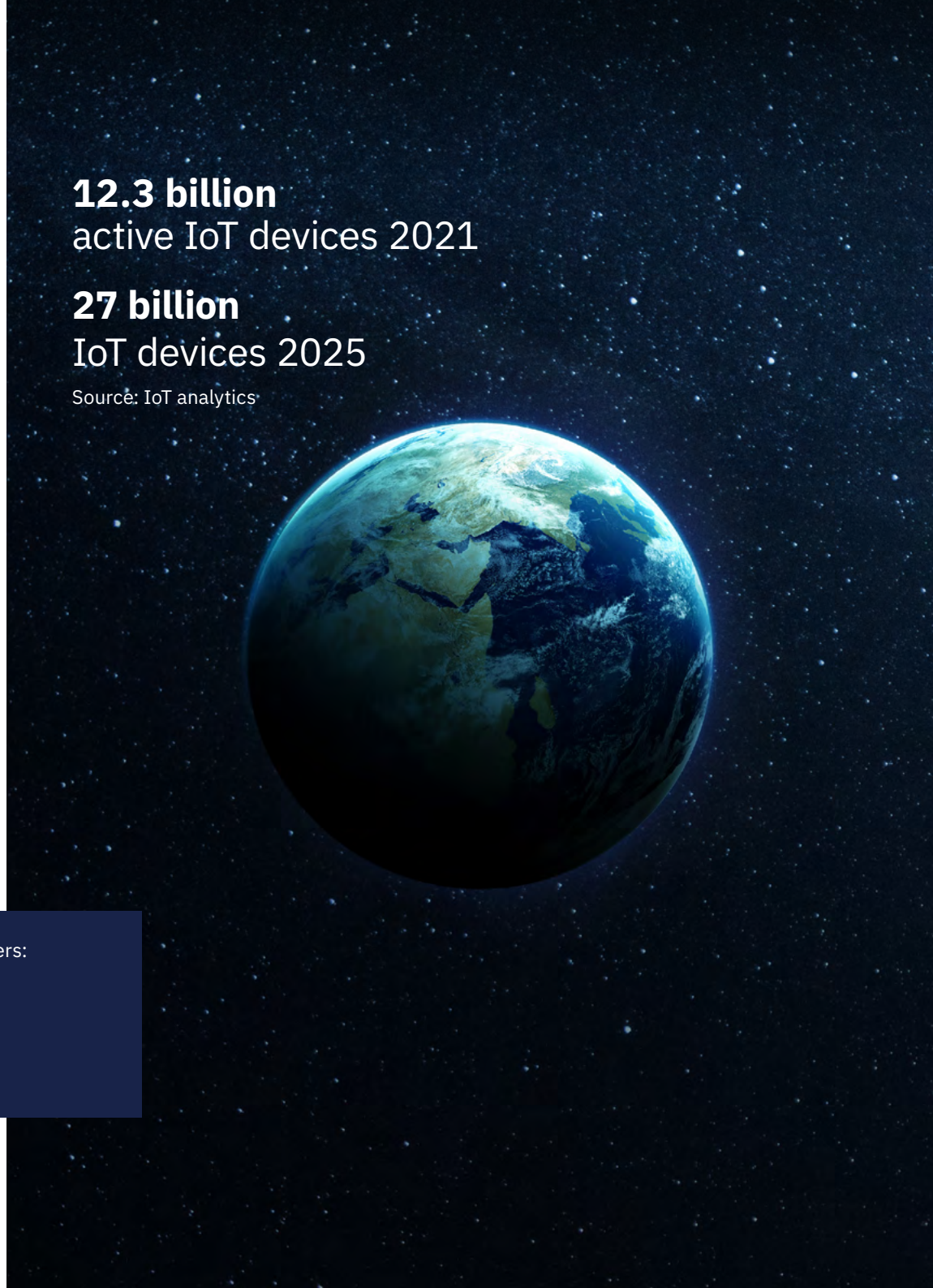
With all these benefits in mind, businesses are adding more and more connected devices to their networks. And while doing so, they are looking for a system integrator who can help them achieve their IoT goals. Above all, they want to work with an integrator who can connect them to the correct network and provide the right solutions to manage it all.

But what does this network look like, and what solutions are needed?

First, the network needs to match the global nature and size of today's enterprises. It must scale to millions of devices, even as they become more widely distributed around the world. And to make this global reach simple and profitable for the IoT integrator, it also needs to be easy to deploy and offer the right monetization capabilities.

In summary, IoT players need a network that offers:

1. Global, network-agnostic mobile connectivity
2. Efficient network management
3. Simple integration
4. Monetization capabilities



[1] https://iot-analytics.com/product/state-of-iot-summer-2021/

What is the IoT opportunity?

Gartner defines the Internet of Things (IoT) as “the network of physical objects that contain embedded technology to communicate and interact with their internal states or the external environment[2].”

The rapid growth of IoT is being driven by the tangible results that businesses (of all sizes and from all industries) are seeing as a result of IoT projects. By using embedded SIMs, connected devices can engage in two-way communications with central systems: either transmitting real-time data from sensors or receiving instructions on how to behave. This opens unlimited possibilities for companies across all sectors, such as achieving higher efficiency, launching new connected services and business models, improving customer success management, or gathering advanced business intelligence.

Worldwide spending on IoT grew by 24% in 2021, totaling $128.9 billion[3]. This is forecast to grow to $411.9 billion by 2025. Mobile networks must urgently evolve to provide the connectivity needed to be its backbone.

Source: iot-analytics.com

[2] https://www.gartner.com/en/information-technology/glossary/internet-of-things

[3] https://iot-analytics.com/2021-global-iot-spending-grow-24-percent/

Case study: automotive

The automotive industry is poised to capitalize on the IoT opportunity. Recent research by KPMG reveals that 68% of high-level car company employees agree that traditional purchasing criteria will become irrelevant.

The reasoning behind this shift is the advent of connected cars and the benefits they pose to consumers. From IoT sensors to improve passenger safety to predictive maintenance and automated roadside assistance, connected cars promise to improve the entire driving experience. Likewise, businesses are set to benefit when connected cars become a reality, with 76% of respondents saying connected cars generate tenfold what a standard vehicle can produce in terms of available revenue streams.

However, connectivity is again the most important element of the success of connected cars. Drivers cannot be restricted by either borders or connectivity “not spots” and it is vital that networks deliver true, universal coverage to ensure both quality of experience and driver safety.

> A connected car generates tenfold what a standard vehicle can produce in terms of available revenue streams.[4]
>
> Source: global automotive executive survey

[4] https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2017/01/global-automotive-executive-survey-2017.pdf

What do enterprises need to make IoT work?

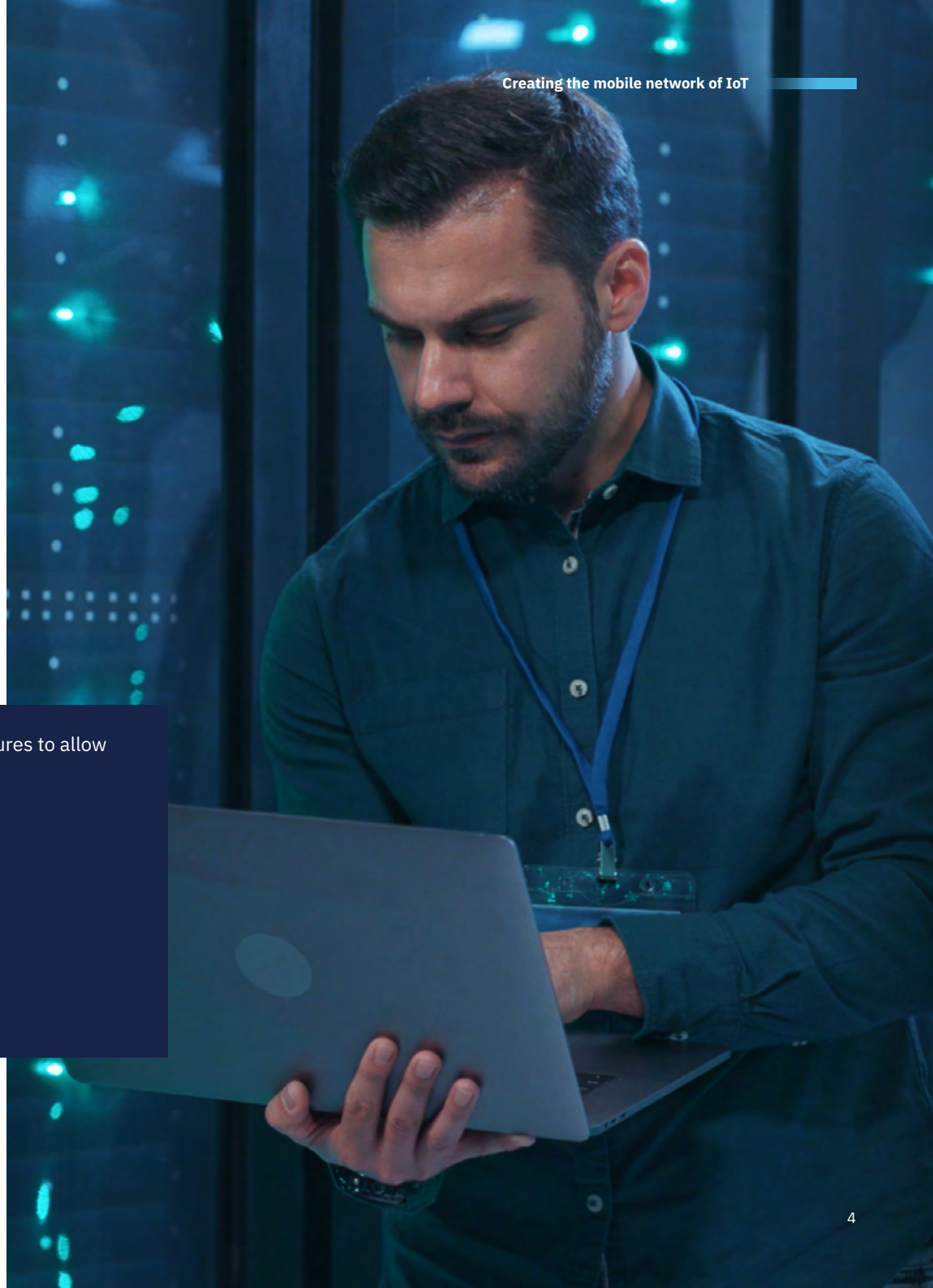
Connectivity is the critical success factor for any enterprise IoT project. Global organizations need to be able to connect their devices to a network at every stage of the lifecycle, and manage this connectivity easily, remotely, in bulk, and anywhere.

Mobile networks are the natural choice for IoT connectivity. Almost ubiquitous around the world, they enable devices to remain connected anytime and anywhere. They offer other crucial advantages as well: high data speeds, low battery consumption, and are inherently one of the most secure communication types.

However, to enable IoT management to be more efficient, autonomy over SIM management is essential. Enterprises need to be able to autonomously provision, deprovision, and troubleshoot SIMs anywhere in the world, rather than depending on mobile operators to do this. This effectively converts the mobile network into a software asset for enterprises and allows it to become part of their IoT infrastructure.

Networks must deliver four fundamental features to allow enterprises to realize the potential of IoT:

- Network-agnostic, global connectivity
- Efficient network management
- Simple integration
- Monetization

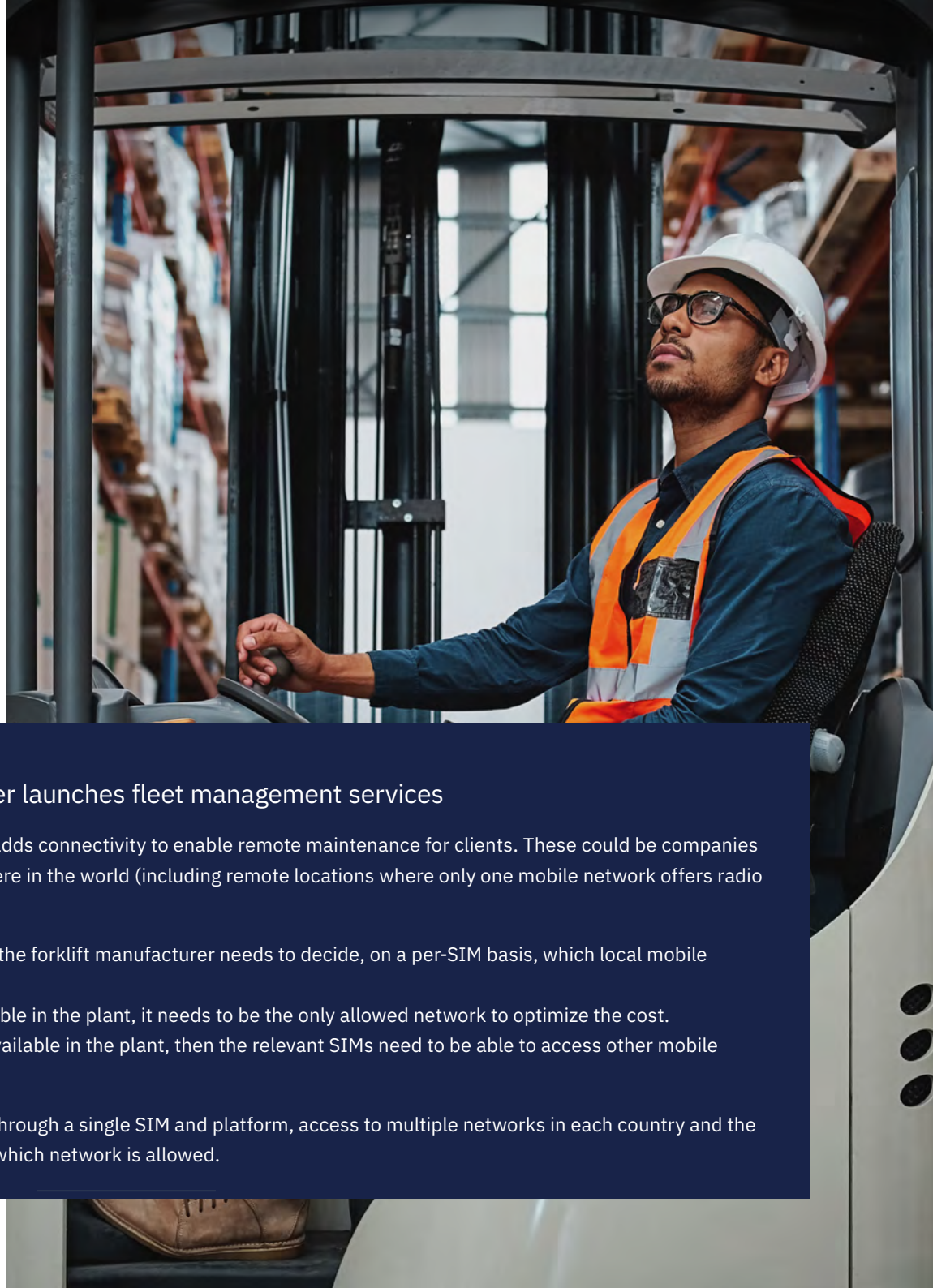


1. Network-agnostic and global mobile connectivity

With many enterprises using IoT to support critical business functions, constant connectivity is essential. To function effectively, no matter where in the world the device roams, this connectivity must work across all types of mobile networks with the freedom to select which country and network is used for each device.

Businesses can have a number of different priorities when it comes to connectivity. In applications such as smart metering or traffic, the main consideration is reliability. In others, such as security or healthcare, high data speeds and bandwidth are more important. A delivery service that travels to remote areas where coverage is unreliable must be able to switch between networks to ensure it stays connected. In cases such as logistics, enterprises might want to be able to choose the most cost-effective connection in each location.

Enterprises need the flexibility to define the type of network or connection best suited to their location and purpose, and to alter this as required.



Case Study

A GPS device manufacturer launches fleet management services

A forklift manufacturer company adds connectivity to enable remote maintenance for clients. These could be companies in any vertical and located anywhere in the world (including remote locations where only one mobile network offers radio coverage).

To deliver its connected services, the forklift manufacturer needs to decide, on a per-SIM basis, which local mobile operator to use:

- If the preferred network is available in the plant, it needs to be the only allowed network to optimize the cost.
- If the preferred network is not available in the plant, then the relevant SIMs need to be able to access other mobile networks.

The forklift manufacturer needs, through a single SIM and platform, access to multiple networks in each country and the capability to decide for each SIM which network is allowed.

2. Efficient control and management of millions of connected devices

Enterprises will need to deploy up to millions of devices with embedded SIMs, depending on their use case. Management of these SIMs must be put into the hands of the enterprise, with granular visibility and the ability to bulk manage as essential features of their network of devices.

(i) They need real-time tools to provision their SIMs, set device parameters, monitor quality, and control data usage across their entire fleet.

(ii) They need to be able to manage connectivity on a device-by-device level to allow for troubleshooting and automated updates on specific data usage.

Flexibility is key. Enterprises may wish to manage their SIMs in different ways: from full self-management by the enterprise itself, to a complete managed service model provided by an integrator. The mobile network provider needs to offer a solution that fulfils the different delivery models.

Enterprises need the flexibility to define the type of network or connection best suited to their location and purpose, and to be able to alter this as required.

Case study

An IT integrator offers a managed service that includes smart meter management to a large utility company

The integrator needs to commit to SLAs on the availability of applications running on smart meters. In this situation, the IT integrator needs to:

- **Manage rollout of smart meters and activation of connected services**. This activation can happen in bulk (if a new city is covered) or can be for a single smart meter (case of a new house). In both cases, the integrator needs to identify which mobile network is used in order to predict costs.
- **Ensure that each smart meter remains connected over time**. For this, it needs the IoT platform to trigger an alarm if connectivity is lost, as well as efficient remote troubleshooting tools to avoid costly engineer visits.
- **Manage connectivity costs** and invoice the utility company appropriately.

In this situation, the integrator needs to behave like a Mobile Virtual Network Operator (MVNO), taking over SIM provisioning, monitoring, and troubleshooting of the connectivity services and their billing.

3. Integration of connectivity management with back-end systems

The network must be customizable and flexible enough to integrate with enterprise back-end systems.

81% of businesses say IoT can only deliver real value if enterprises effectively use the data they generate[5]. SIM management must be able to integrate with back-end systems, providing enterprises with the data needed to see maximum return on IoT deployments.

Also, in an IoT world, each enterprise might manage anything from thousands to millions of different connected devices. This can only be achieved if complete end-to-end automation is possible. This includes the integration of connectivity systems and enterprise operational systems such as enterprise resource planning, customer relationship management, and other systems.

Finally, this integration needs to be as simple as possible to minimize cost and time-to-market. For this, the mobile network provider needs to provide the largest panel of ready-to-use APIs.

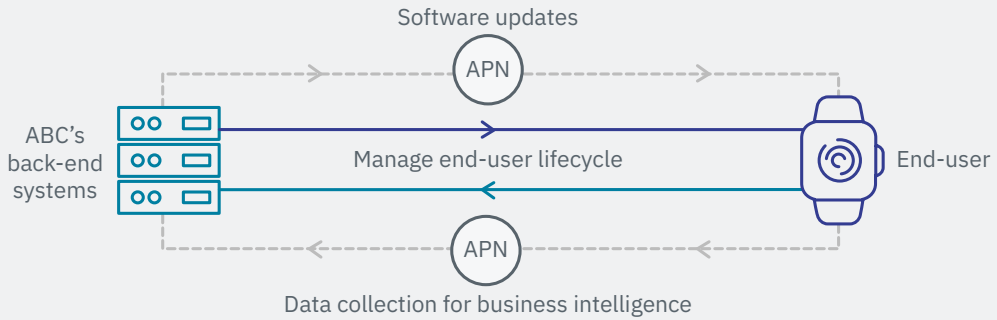
Case study

A watch manufacturer ‘ABC watches’ sells embedded connectivity with the watch.

When a buyer purchases the watch, he selects a data plan with a capped monthly data allowance and ‘ABC’ invoices him on a monthly basis.

ABC’s back-end systems must be integrated with the connectivity platform to:

- Manage the end-user lifecycle: if a change in plan is requested by the customer, the new data plan needs to be updated in real-time
- Perform software updates: A specific APN will need to be set up to remotely update SIM software. This specific APN should be separated from the regular end-user connectivity services so that it is not counted in the data plan
- Collect data for business intelligence: Another APN must be set up to collect details on data usage by the end-users (which app is used when and where).



[5] Vodafone IoT Barometer

4. Direct monetization of mobile connectivity

At the heart of all IoT deployments is the need to generate ROI and new revenue streams from connected services and business models.

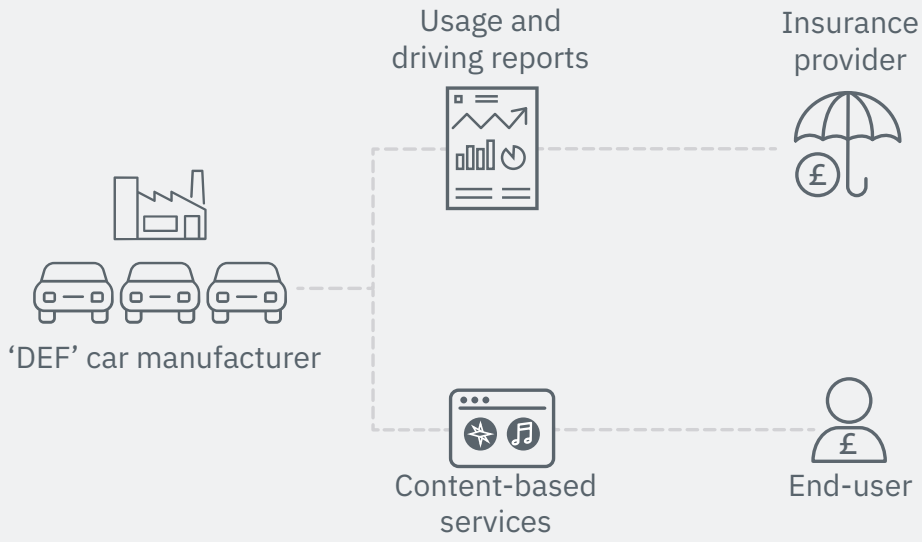
Therefore, the mobile network must have the built-in capability and flexibility to support the monetization model that best suits the deployment. There is no simple one-size-fits-all model, with options including post-paid, prepaid or package billing, or a combination of the three. Enterprises must be given the flexibility to monetize their IoT projects in a way that suits their needs and those of their customers.

Case study

A car manufacturer ‘DEF’ embeds connectivity in its cars and launches a range of new services.

- For the end-user: The manufacturer provides content-based services such as navigation and entertainment, which it charges as a monthly or prepaid data package.
- For the insurance provider: The manufacturer provides usage and driving reports, which it charges on a post-paid basis for the overall volume of traffic across the fleet.

‘DEF’ needs the best flexibility from the IoT connectivity platform to support its different IoT business models.



The limitations of the traditional network operating model

Although it may make logical sense for enterprises to turn to MNOs for IoT connectivity, their legacy infrastructure does not allow the level of flexibility needed to become an invisible **Mobile Virtual Network Enabler (MVNE)**.

Traditionally, mobile networks have been built to keep control of SIM management and billing in order to cater to the traditional mobile services for phones, tablets, or laptops. They operate legacy systems that:

- Do not allow enterprise customers to manage dynamically and in real-time thousands of SIM cards. Legacy BSS are built with heavy provisioning systems fully controlled by operators and not open to third parties.
- Do not allow enterprises to tailor the service for each SIM; whether that be in terms of network services, data packages, rules engines for alerts, suspension, etc. Enterprises are forced to adapt their SIM management to predefined standard packages and rules.
- Do not offer enterprises the tools they need to resell the connectivity bundled with their connectivity services. This forces enterprises to offer plain reselling of MNOs' standard plans, with no value addition in business models.
- Do not enable enterprises to provide consistent support to customers for the connectivity part of their connected services. Their advanced monitoring and troubleshooting tools are restricted to MNO customer care and not available for enterprise.
- Offer international roaming – but only through a set of predefined offers.

To support the connected enterprise, mobile networks need to completely transform their networks, processes, and systems. This requires significant time, funding, and expertise.

The role of mobile networks in making IoT a reality

As the most effective and widely available solution that can offer ubiquitous, long-term, and reliable connectivity, mobile networks will form the backbone of IoT. However, to successfully realize the full potential of IoT, mobile networks need to transform to give enterprises the flexibility and autonomy required to manage the growing number of IoT networks.

Why should enterprises manage the IoT network?

Operators have always had complete control of their networks, including sole responsibility for every device connected to them. In a scenario that serves traditional mobile services, where the only connected devices are mobile phones, laptops, and tablets, this model is viable. However, as IoT innovation sees the number and scope of connected devices skyrocket, this model is no longer fit for this purpose.

Management of connected devices is the responsibility of the enterprise. They need to be able to manage their devices and the SIM cards embedded in them, without using the operator as an intermediary. Enterprises that may often need to manage thousands or even millions of SIMs will find it inconvenient and expensive to use the mobile operator as a gatekeeper.

Enterprises not only want, but urgently need, real-time control of their connected devices. This includes the ability to set, analyze, troubleshoot, and change device parameters. As IoT expands and the number of devices continues to increase, lack of control of the network may turn into an inhibiting factor to the success of IoT.

Case study

A GPS device manufacturer launches fleet management services.

Customer type	Car leasing company	Taxi company
Connected service needed	Monthly reports providing basic usage information on each car	Real-time traffic flow data
Number of SIMs (connected devices) needed	10,000	10,000
Data plan needed	A few hundred Kb per month per SIM	Hundreds of Mb per month per SIM
Network access allowed	One network per country in Europe to get basic connectivity across the region	Three local networks to get full coverage in just one country

This customization is possible only if the GPS manufacturer has the tools to manage the SIMs, customize the connectivity and service it offers, and control the billing for each type of customer.

How can mobile networks deliver?

Mobile networks need to transform to become truly valuable enablers in the IoT revolution especially in terms of flexibility, virtualization, and user empowerment.

Turning enterprises into MVNOs

The type of connectivity enterprise IoT projects need – with SIM provisioning and management capabilities, flexibility, and monetization – is comparable to that received today by a Mobile Virtual Network Operator (MVNO). Just as with traditional MVNOs, the mobile network has to become as self-managing as possible, and the enterprise needs to own a true network billing system.

Enterprises must become MVNOs for IoT transformation:

- They provision global and local connectivity.
- They control millions of devices (SIMs) with high granularity.
- They bill and monetize the connectivity needed for their services.
- They control every function of the mobile core network, such as monitoring and troubleshooting, as these are integral to connected services.

These functions should be as easy to integrate as possible through ready-to-use programmable interfaces or APIs, transforming the mobile network into a true extension enterprise system.

Virtualized core network functions

The mobile network also needs to offer the cost structure that makes an IoT business model possible.

Core network technologies traditionally have been an area of high cost and low flexibility. However, by shifting to a virtualized and software-driven environment, they become agile and cost efficient.

A virtualized core network is also fast to deploy and integrate with enterprise systems. It is highly flexible and allows self-provisioning through ready-to-use APIs.

Global connectivity as a key differentiator

Winners in the IoT space will be the connectivity enablers that succeed at making international connected services as simple as possible by controlling cost and reducing complexity. Companies cannot afford to integrate with the M2M/ IoT platforms of local mobile networks in each country of operation.

A highly reliable global solution with a single SIM and platform is critical.

The IoT connectivity provider that succeeds at offering this international connectivity with simplicity, flexibility, and reliability for the enterprise customer will gain share rapidly in the connected services space.

BICS global IoT solution

The BICS global IoT solution turns enterprises into MVNOs for their IoT transformation with a virtualized mobile core network. The network can be fully self-managed and easily integrated into back-end systems through extensive APIs and with all the billing capabilities needed to sell connected services.

The platform incorporates all the functionalities needed for comprehensive lifecycle management for connected device SIMs: from manufacturing, customization, and distribution to setup, deployment, and real-time management of all network and usage events. It provides a complete package for built-in connectivity related to SIMs, customizable for each IoT use case.

The platform is designed with the business requirements of the M2M/ IoT transformation in mind. All its functions, including the virtualized core network, are available through APIs, making it ready to support the widest panel of IoT use cases. The platform also offers all the tools for enterprises to monetize their connected services: from reseller management to the flexibility to define prepaid offers, data packages, or post-paid plans.

The fully virtualized solution is delivered as-a-service in the cloud, making it cost effective to deploy with pay-as-you-go implementation models that scale with enterprise business needs. It also allows for the flexibility to outsource elements of SIM management, thereby enabling them to focus on their core business proposition. The entire end-to-end IoT solution is created to support the needs of each enterprise, with the MVNE an invisible enabler of connectivity.

For enterprises with international business models, BICS offers a unique combination of a fully owned roaming solution for optimized quality and cost. As a market leader for all solutions required for roaming, direct trusted commercial relationships with the vast majority of all live mobile networks and a global organization with regional Network Operation Centers in all time zones, BICS is optimally positioned to offer reliable international connectivity for IoT.

The BICS SIM for Things

Conclusion

Enterprises will drive the growth of the IoT market and define the connectivity solutions that underpin it. Although enterprises may be tempted to look to networks directly to provide these parameters, MVNEs hold the answer to flexible, seamless, and global connectivity lies with MVNEs.

Enterprises – and even networks – should start working with specialized MVNEs to deliver IoT connectivity tailored to suit the needs of enterprises rolling out more expansive and complex projects.

The BICS platform has been specifically designed for the IoT market. Purpose-built to cater for the specific needs of enterprise IoT, BICS offers an IoT-only virtualized network. This can be easily integrated with enterprise systems via API to offer a level of flexibility that a traditional MNO network cannot match. Leveraging BICS' unique roaming capabilities, the platform enables enterprises to support clients across multiple countries, bringing simplicity, reliability, and peace of mind for international IoT connectivity.

For more information, please visit:
www.bics.com