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Sparkle and floLIVE collaborate to support sophisticated, global IoT connectivity

IoT organisations are becoming more advanced as they launch richer, global IoT products onto the market. When it comes to connectivity the market has moved on from simply thinking about cost per megabyte to more carefully assessing how to handle regulatory compliance, how to balance differences in mobile network performance from market to market and how to manage the more complex latency, security and failover requirements of IoT devices. Daniele Mancuso, chief marketing and product management at Sparkle, and Luigi Capobianco, the senior vice president and head of Europe and the Middle East at floLIVE, explain to George Malim, the managing editor of IoT Now, how the companies have collaborated to create compelling, compliant sophisticated, global IoT connectivity services that level the playing field across the entire planet

Daniele Mancuso
Sparkle

GM: How does your partnership with floLIVE align with Sparkle's strategy?

Daniele Mancuso: floLIVE was for us the missing piece, a reliable partner. One of the unique strengths of floLIVE has always been that it is a customer of Sparkle's outbound worldwide connectivity solution. floLIVE being interconnected with us already as a customer was one of the enabling factors and floLIVE is an excellent developer with an excellent platform. We are finding a lot of synergies, both from a technical point of view and from a commercial perspective. The success of Sparkle using the floLIVE platform is creating benefits to floLIVE itself and also enabling further benefits to Sparkle because, if we are able to increase the traffic that floLIVE can push towards our international mobile subscriber identity (IMSI), we are creating mutual benefit for both companies.

I would say that floLIVE is enabling us to realize our product pitch from when we launched our global IoT suite and we presented the idea of venturing into the IoT market to our CEO. We created a kind of double strategy. On one side, we want to target multinational enterprises directly and address some specific verticals that are striving to enter the mobility ecosystem. We target multinational enterprises and we tend to go up the value chain to those that are producing the objects that will onboard the SIM cards, either plastic SIMs or embedded SIMs (eSIMs), it doesn't matter.

The other side of the strategy was to enable Tier-2 and Tier-3 MNOs and MVNOs to develop an international IoT market based on the fact that they were already our global connectivity customers. This is enabled by floLIVE's connectivity management platform (CMP) because the platform can independently serve either enterprises, where we go directly with the Sparkle brand, or allow us to go to market with floLIVE's white-labelled solution. We can go to a Tier-3 MNO, for example, and give them our IMSIs and a customised floLIVE platform and they can resell this to their own customers using their own brand, with their own look and feel and their own commercial rules.

I think this new collaboration is a first in terms of commercial launch of an IoT solution with data localisation. There were several workgroups in international standards trying to address the topic of critical IoT. We are basically avoiding the need for SIM cards that are travelling in the US to connect back and forth with Europe ▶

There will be three big gateways that we are going to localise: one in the US, one in Europe and one in Asia

or vice versa. This is going to be unique and the strengths of the partnership between floLIVE and Sparkle enable it.

There will be three big gateways that we are going to localise: one in the US, one in Europe and one in Asia. The unique factor is that it's not just a simple gateway localisation, it's a localisation in places where we have Sparkle local connectivity through peering with local carriers. Basically, we are going to provide a zero-latency IoT service for SIM cards that connect to those points of presence. This, I believe, is really a market first.

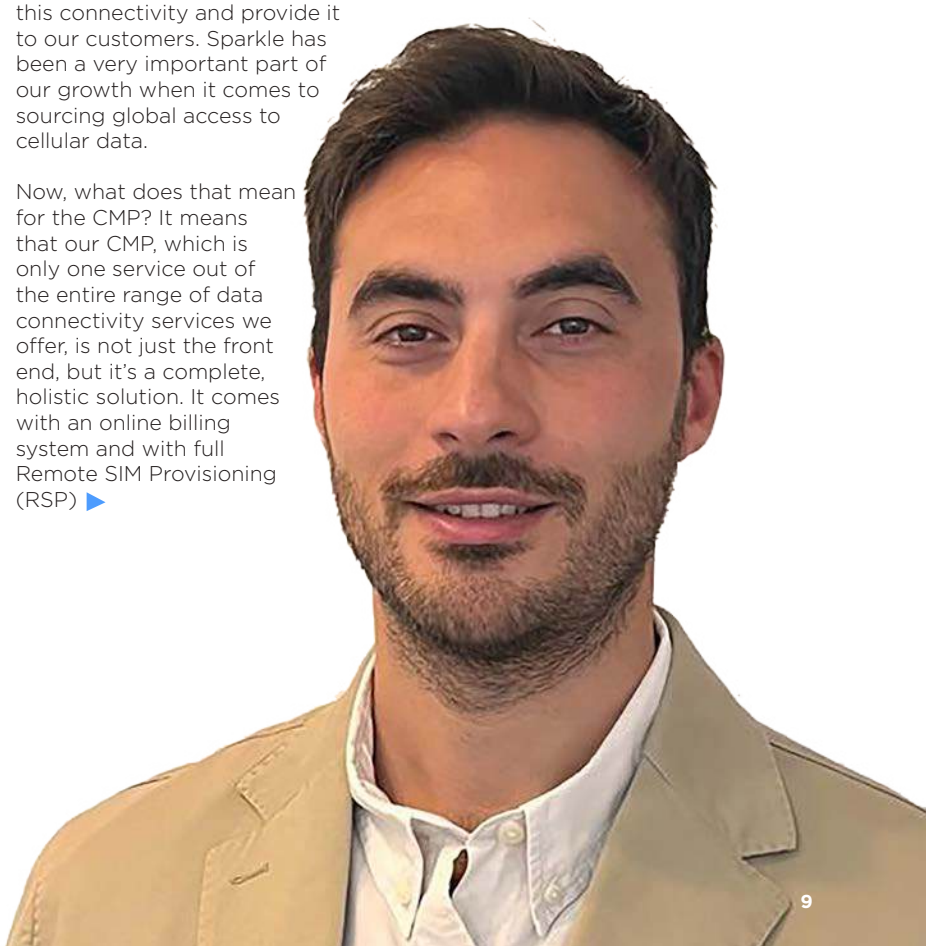
Of course, it's a combination of several factors. As we said before, let's not forget that our mobile platform runs over our 600,000 kilometres of fibre optic cables around the world, on top of our Seabone IP transit platform. We believe that we are going to see a lot of positive returns both in market appreciation in terms of revenues and margins, but what concerns us most is the customer experience. This is our main objective.

GM: floLIVE has built an impressive global IoT network; can you explain how this extensive data network benefits mobile operators compared to traditional connectivity management platforms (CMP)?

Luigi Capobianco: Our global IoT network has been designed and built in a way that allows us to constantly introduce new services and offerings both quickly and in a cost-effective way; this is because we developed the entire platform in-house using modern software architecture approaches and design guidelines. We have used Sparkle's global presence, not only for connectivity needs, but also for global presence in terms of data centres and physical interconnections globally, to access this connectivity and provide it to our customers. Sparkle has been a very important part of our growth when it comes to sourcing global access to cellular data.

Now, what does that mean for the CMP? It means that our CMP, which is only one service out of the entire range of data connectivity services we offer, is not just the front end, but it's a complete, holistic solution. It comes with an online billing system and with full Remote SIM Provisioning (RSP) ▶

Luigi Capobianco
floLIVE



Our IoT offering is based on global connectivity because of our history and because we strongly believe that being able to be connected anywhere in the world is an important foundation for the IoT business for multinational customers

capabilities for both M2M and consumer use cases, multi-IMSI capabilities and more. Our distributed network around the world enables all floLIVE customers, which could be MNOs, MVNOs and IoT service providers, to access our global data network and consume the advanced services we offer.

I think the advantage of our approach is that we do not only provide mobile operators a means for operating a profitable IoT business, but we've added two very important capabilities - one is the ability to extend their global reach even to highly regulated countries such as China, Brazil, Turkey and others. In addition, we're also enabling them to generate new revenues from advanced services that are made available via our global platform. These services include MVNE, mission-critical IoT, advanced IP data management, satellite connectivity and more. One of the new and very interesting things that we're doing with Sparkle is distributing our network capabilities and global presence.

A car maker, for example, doesn't just connect its cars in the old-fashioned roaming model. That works well when you're connected in Germany with a European MNO, but when you move to Canada or China with the same MNO, the user experience falls short. What we're going to do with Sparkle is build something that allows cars and other connected devices to have the same experience, performance, service level and security all around the world regardless of location. This is only possible when you put together a CMP for sure, but also the capabilities and the global presence of Sparkle.

GM: What makes Sparkle stand out from the competition and what impacts have you had on the success of IoT solutions?

DM: Our IoT offering is based on global connectivity because of our history and because we strongly believe that being able to be connected anywhere in the world is an important foundation for the IoT business for multinational customers. IoT by itself for us is a means to address the connectivity needs of things that are on the move. We strive to provide connectivity to things that are moving, and Sparkle is a multinational carrier with the strongest offering.

GM: Please can you tell us more about Sparkle's IoT strategy and offering?

DM: We started to develop the strategy roughly a year ago and we have already achieved good results. First of all, we had a list of requirements that are driven by our worldwide connectivity and machine-to-machine priorities. We don't need to negotiate an entire roaming agreement from scratch that is based on the full paradigm of human communication, but we can really focus on selective agreements that are related to the machine-to-machine market. Either we extend already existing partnerships and introduce a specific price list for machine-to-machine connectivity or we enter a new partnership dedicated to the machine-to-machine sector. This is already a good differentiator from other carriers that operate in the same space but I will say that the basic foundation of our global connectivity proposition, the technical foundation, is really a differentiator compared to the competition.

Our global connectivity has always been based on the concept of multi-operator service. Our platform is based on a multi-IMSI paradigm that allows us to offer to any customer wherever they are the best connectivity in terms of price, coverage or diversification. For IoT this is really a unique advantage. When you have an automotive manufacturer that needs to ship cars everywhere in the world, they need to guarantee that the vehicles they are producing can connect in all the countries and always find the best coverage at the best rates. There is also always the possibility to switch to another operator, either by failover, or by applying steering policies.

This multi-IMSI solution is corroborated by the over the air (OTA) capabilities to reconfigure a single SIM card or a set of SIM cards. If there are changes to the customer requirements or the commercial scenario in that specific country, we can still guarantee the customer that the coverage, the rates and the failover level agreements are respected over time. We can do everything with an OTA campaign. The technical capabilities that we just described with our commercial strength, part of it inherited from the TIM Group and part of it because we established this new roaming team, make us stand out. In addition, the coverage that we have with our 170 points of presence is spread around the world where we can do IPX peering with basically all the interconnect carriers. I would say that creates a unique solution in the market.

GM: How does floLIVE's solution enable mobile operators to manage and monetise IoT connectivity more effectively?

LC: The IoT connectivity market is quite competitive, so there are two things you can do: One is to try to bid the lowest possible price, which is not always easy and probably doesn't always bear the right fruits in the long term. The other is to move up the value chain to serve higher-value use cases with the connectivity they need in terms of latency, security and location. ▶

We're not telling MNO customers to do one or the other, but we are empowering them to do both. What does that mean?

First of all, as one of the world's leading IoT CMP providers, floLIVE was the first to differentiate between high ARPU and low ARPU use cases, meaning we launched an offering that distinguishes between the volume of megabytes per month and charges a platform fee accordingly. For example, with smart meters, the platform fee is a fraction of a high ARPU service's platform fee. We did this to allow mobile operators to run a profitable IoT business and compete in this challenging market.

Second, our platform, built using the latest software design, architecture and deployment practices, ensures a lower marginal unit cost as more and more devices are onboard our global, cloud-native network. In both the short and long term, this allows mobile operators to increase their profitability and obtain a strong presence in the growing IoT space.

The importance of owning our entire software stack, from the core network through SIM management, real-time multi-tier billing engine and CMP, comes into play when we deploy since we don't have fixed third-party licence costs.

Another key benefit that floLIVE brings to mobile operators is a new, constant revenue stream generated by floLIVE's global customers who seek connectivity in the mobile operator's footprint. As I stated earlier, this is how floLIVE and Sparkle began the relationship – by offering Sparkle's coverage to our global customers. This is another pillar that empowers MNOs to not only operate a profitable IoT business but also increase their revenues inorganically.

GM: How does floLIVE ensure compliance with diverse regulatory requirements across different countries, and why is this crucial for mobile operators?

LC: The world is going in a direction in which permanent global roaming is going to become more and more complex. Accessing all countries around the world, without any temporary restriction through a single IMSI is already a challenge today, but it is going to be more of a challenge in the future. Let's say you have a track and trace application for containers – you don't really care about permanent roaming. However, there are numerous use cases that where this does matter, such as smart metering, automotive, POS, credit card readers, alarm systems, video cameras and dashcams, which are all interesting use cases. These applications are more prone to requiring permanent roaming. If you deploy one of these use cases in Turkey, for example, the devices are likely to stay in Turkey for more than 90 days, and that is not allowed. Additionally, privacy regulations like GDPR and CCPA require that data remains within the country of operation, which conflicts with roaming. For example, a device operating in California but using a European SIM/profile violates CCPA regulations because data, which is protected as private, is routed through Europe instead of the device's actual location. To address this, we started cooperating with the 15 different IMSI providers we support today. We have a global bootstrap, via Sparkle, which has by far the largest coverage in the world and also reliability. Then, whenever a customer says they need to localise in Brazil we have two Brazilian IMSIs so that you can access Brazil on local networks owned by floLIVE, compliantly accessing different local operators. ■

The world is going in a direction in which permanent global roaming is going to become more and more complex

www.flolive.net

Mobileware turns to floLIVE for Darby platform connectivity

Delivering connectivity is crucial in the Internet of Things (IoT) market. While the ecosystem is comprised of many key players, such as hardware, software and computing providers, the tie that binds these is connectivity to ensure that wherever or however devices are deployed, they can connect to the internet to communicate data

IoT solution providers (ISPs) stand at a vital juncture in providing the very critical connectivity for IoT use cases but also helping stitch together the other very important components of IoT, including data and hardware management, security, integration and maintenance and support. **MobileWare** is an IoT solution provider that enables IoT solutions in key verticals such as restaurants, retail, education, security, transportation and logistics.

Business impact of floLIVE:

- Single pane of glass for device management
- Simplified management of multi-carrier relationships
- Single stock-keeping unit (SKU) SIM
- Global connectivity designed for IoT complexity

MobileWare is successfully delivering solutions in the IoT segment but found managing the complicated connectivity ecosystem burdensome. "MobileWare developed its Darby platform to help integrate the components of the solutions we were providing to customers, which was further refined and enhanced through its partnership with **floLIVE**," says Steve Higgins, the chief executive of MobileWare. "We were trying to manage all the different carrier agreements, multiple stock-keeping units (SKUs) and who has the best SIM cards."

The nature of IoT is very different from consumer connectivity. Typically, with consumer connectivity, a user only needs a single SIM from a single mobile network operator (MNOs) but even still, an ISP generally will contract and resell connectivity from multiple carriers. However, with IoT, the complexity of that can easily multiply for several key reasons:

Coverage and availability: Network operators may have different coverage areas and service availability. In some regions, certain operators might offer better coverage or have stronger signals, ensuring that IoT devices can communicate effectively across diverse geographical locations. Multiple operators increase the chances of finding suitable connectivity options for different deployment scenarios.

Redundancy and reliability: Relying on a single network operator introduces a single point of failure. If that operator experiences outages or issues, all devices connected to that network may be affected. Having multiple network operators allows for redundancy, improving the reliability of IoT solutions. If one network faces problems, devices can switch to alternative networks, ensuring continuous operation.

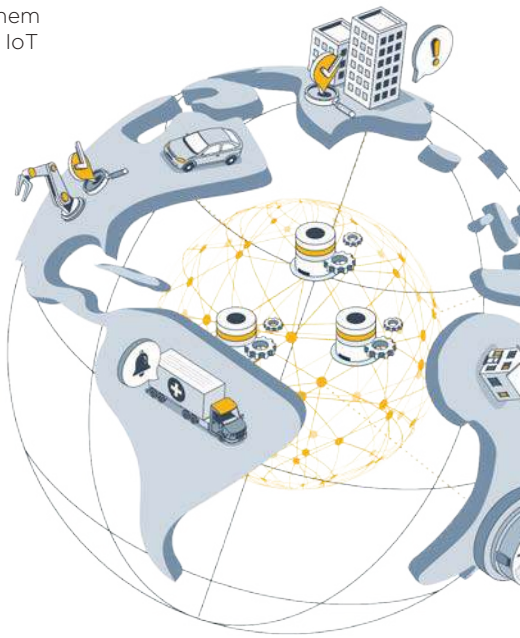
Cost optimisation: Different network operators may offer varying pricing structures and plans. Having multiple options allows businesses to choose the most cost-effective solution based on their usage patterns, scalability requirements and budget constraints. Competition among network operators can also drive down prices and improve service quality.

Global deployment: For IoT solutions with global deployments, relying on a single network operator may not be practical due to regional variations in network infrastructure and regulations. Multiple operators allow for more flexible and scalable global deployments, ensuring connectivity across different countries and continents.

Technology evolution: The field of IoT is rapidly evolving, and new connectivity technologies continue to emerge. Having multiple network operators allows businesses to adapt and integrate the latest and most suitable connectivity technologies as they become available, ensuring future-proofed IoT solutions.

Customisation for specific use cases: Different IoT applications have unique requirements, such as low latency, high bandwidth or long-range connectivity. Multiple network operators enable businesses to choose the network technology that best aligns with the specific needs of their IoT use cases.

MobileWare was successful in delivering its diverse connectivity offerings to customers and helping them save money and tap into IoT success, but behind the scenes, it was a logistical challenge. "We were asking ourselves how do we continue to grow this and have a platform – we were doing it on spreadsheets," adds Higgins. ▶



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A platform for growth

MobileWare integrated Darby with floLIVE's connectivity management platform (CMP), which has allowed MobileWare to provide its customers with a single pane of glass to view all data usage and device activity, as well as activate and deactivate SIMs anywhere in the world. Darby's functionality ties in with hardware management so customers can utilise one platform for granular management in their IoT use cases.

floLIVE's holistic cloud-based CMP is designed to deliver a suite of services for making IoT businesses global, coherent and profitable. floLIVE fully owns its technological infrastructure and software stack, enabling it to provide full customisation and additional functionality to meet the advanced requirements of large-scale IoT deployments. This means providing more customisation, visibility and control over the network, which is essential for enterprises with sophisticated and demanding IoT use cases.

MobileWare also uses floLIVE's core network, which is a unified approach to global connectivity through key mobile network operator (MNO) partnerships. The floLIVE robust international mobile subscriber identity (IMSI) library allows for broad carrier access across the globe from a single source.

As an ISP, value-added services are paramount in differentiating services and driving service level agreements (SLAs) and quality of service (QoS). In partnering with floLIVE, MobileWare achieves:

Seamless coverage: Sourcing connectivity operator-by-operator leaves organisations in a logistical bind, but accessing a library of more than 15 IMSIs allows for coverage from a single source.

Single SKU: Multiple SIMs from multiple carriers introduce complexity, but using a single SIM that can host numerous carrier profiles creates a unified approach.

Global reach: Worldwide connectivity access from a single source that operates at the local level ensures global connectivity without the headaches or local agreements or roaming SIMs.

Full visibility: Not being incumbent on carrier's connectivity management platforms that are not designed uniquely for IoT is paramount to MobileWare in not just internally having visibility into devices, but also handing that visibility down to its customers.

Superb customer support: Offering complete customer support throughout the customer journey is imperative to MobileWare.

The results

"We like to provide service levels that spoil our customers rotten. Customers can call me day, night or during the week - I will answer," Higgins says. "Companies today really struggle with finding a way to have simple, secure connectivity, always. We provide them just that."

The complexities of IoT connectivity don't often arise until deployment or afterwards during management. Higgins said a question he sees from customers or prospects is: what is the point of partnering with an ISP when the organisation can just use two SIMs from two different providers. If one network were to fail, the second SIM provides failover connectivity.

He said that is an expensive alternative (paying for two different data plans just for a failover plan) to adopting a multi-profile solution, like the Single SIM that MobileWare offers. Powered by floLIVE multi-IMSI technology, MobileWare offers customers the ability to seamlessly switch networks over the air (OTA) in case of a network failure, network event, coverage gaps or as a device moves along networks and needs to connect to the most available network. This simplified, more cost-effective solution hosts numerous profiles, not simply two networks via two SIM cards.

MobileWare also differentiates itself through comprehensive customer support, which – in the complex sector of IoT – is important as devices must be connected and communicating consistently. Troubleshooting is supported through granular visibility provided via floLIVE's CMP and MobileWare's Darby, allowing for faster problem resolution than using multiple MNOs and the associated numerous support systems. MobileWare can confidently turn to floLIVE for top-tier support for escalated issue resolution.

"We're only as good as the team behind us," Higgins says of floLIVE. "The responsiveness on the network level – we springboard from that and provide this great experience for our customers."

Altogether, MobileWare's partnership with floLIVE enables the organisation to provide:

24/7 management and support: MobileWare's ability to provide exceptional customer support is enhanced through floLIVE's support and responsiveness.

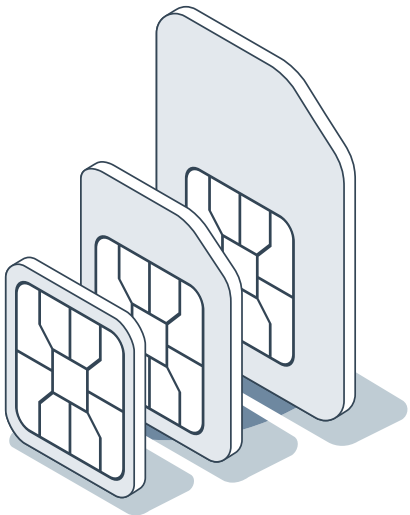
Single pane of glass: MobileWare customers can access broad connectivity and network options through floLIVE's robust IMSI library from a single source instead of carrier-by-carrier and SIM-by-SIM.

Comprehensive management: Integration with floLIVE's CMP allows MobileWare to provide the unique value proposition of granular insight into and management of connectivity and hardware components.

Connectivity across the globe: Accessing worldwide connectivity is simplified for MobileWare customers.

Reliability and redundancy: OTA switching allows customers to access the right network at the right time for optimised connectivity.

Simplified logistics: MobileWare's Single SIM opens up numerous carrier networks without the need for additional SIMs.



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ANALYST REPORT

The future of fleet management: Expanding use cases and connectivity requirements

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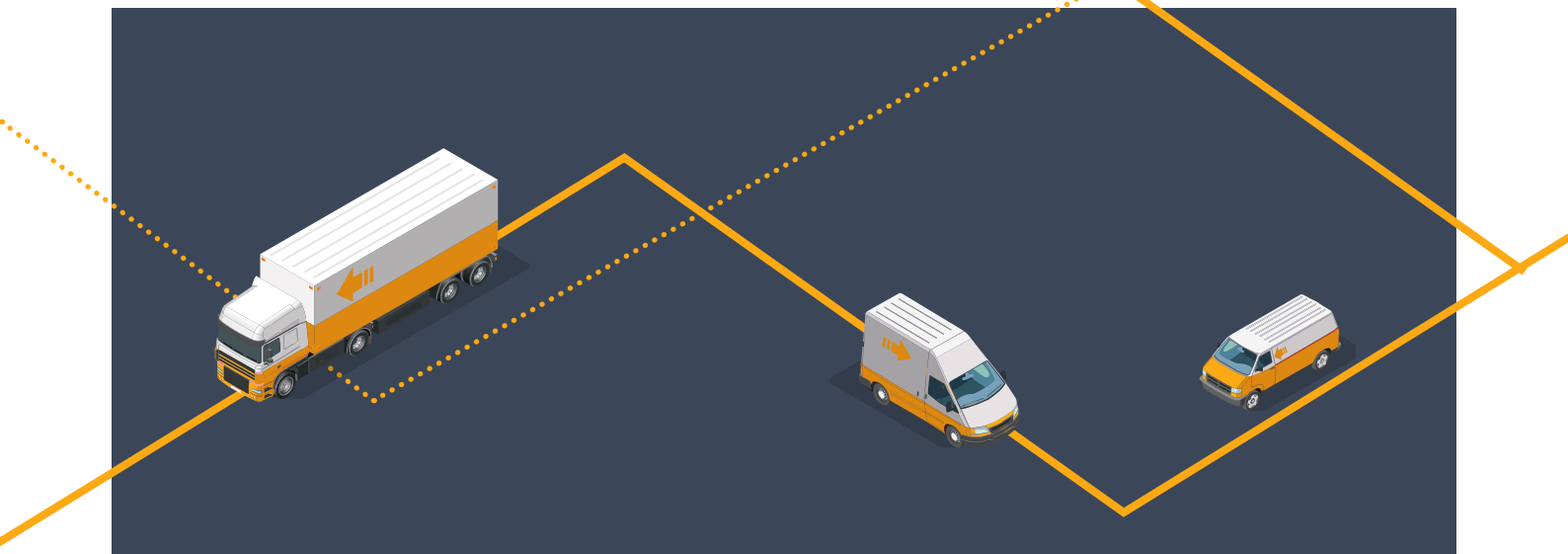
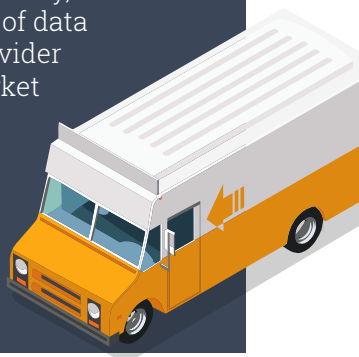


The future of fleet management: Expanding use cases and connectivity requirements

Introduction

The fleet management market has undergone a rapid digital transformation, write ABI Research's Elizabeth Stokes, a senior analyst for IoT Network and Platforms, and Dan Shey, the vice president of Enabling Platforms. The industry has evolved from simple location-based tracking to an ecosystem of advanced IoT applications that require cutting-edge cloud and communication technology. Advanced use cases, including video monitoring for driver safety, are quickly becoming standard in the industry, paving the way for the highly-anticipated future applications of commercial vehicle electrification and autonomous driving. These future use cases will drive even greater demand for advanced IoT devices, data management platforms and, perhaps most importantly, an unprecedented level of localised global connectivity.

As fleet managers prepare for this future, many find that their internal infrastructure and connectivity services are underperforming. Many fleet operations still depend on manual processes, and many fleet management use cases continue to rely on low power wide area (LPWA) networks, even as video-based applications and other future fleet management use cases demand the throughput of 4G and eventually 5G networks. Given these developments, fleet managers in the future will require a completely different type of network and connectivity service provider, one that can offer a range of highly available networks and a connectivity management platform designed for advanced IoT applications. Local connectivity on a global scale is going to be a boon for the demands of low latency, battery-optimised connectivity that meets the increasing regulatory requirements of data sovereignty, privacy and roaming restrictions. Choosing a connectivity service provider equipped for the future will be integral to enterprises as the fleet management market prepares for another wave of innovation and use case expansion. ▶



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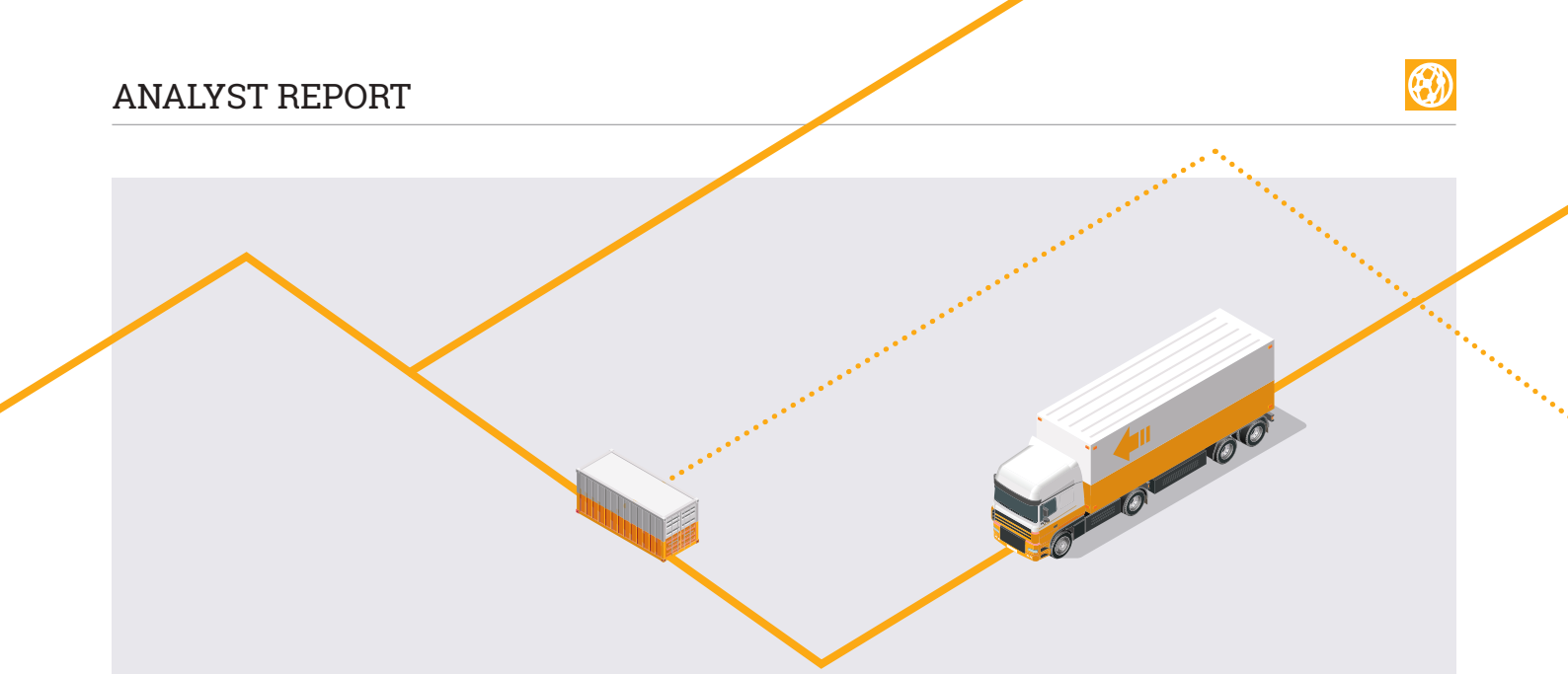


Use case expansion

The telematics space is at a unique convergence of tried-and-true use cases that will remain pivotal within the industry. In contrast, newer use cases arise, creating the opportunity to develop technologies and more accessible hardware and connectivity costs.

Traditional use cases

These familiar use cases will continue to have a stronghold in the industry, supporting a range of benefits from efficiency, cost-saving and regulatory compliance adherence:

Track and trace: Track and trace is a baseline use case for fleet management and a building block for the most advanced fleet application technologies today. At its most basic, track and trace refers to using global positioning system (GPS) technology to track vehicles and assets in transit. Track and trace is a legacy use case, first made possible by the commercial introduction of GPS in 1993. By the early 2000s and with the removal of selective availability (SA), major companies began to rely on GPS and fleet management systems (FMSs) to receive remote updates from their fleets on the road, ushering in a new age of enterprise telematics.

Improvements in cloud services, machine-to-machine (M2M) communications and edge compute have greatly improved track and trace technology since its early adoption at the turn of the century. Fleet managers now have unprecedented, granular visibility into a vehicle's performance, allowing for insight into individual components of the car and a holistic understanding of the vehicle, its route and the driver at its helm.

Regulatory compliance: Enterprises must navigate various state and federal regulations that require fleet managers to log vehicle maintenance, driver hours of service and behavior, load weight and more. Failure to comply with these reporting standards can lead to heavy fines or harsh penalties.

Fleet management technology can offload these data collection and analysis activities to sensors and fleet management platforms. Many fleet managers rely on LPWA networks like LTE-M to send sensor-based compliance data to FMSs that can package it into ready-made reports. This process eliminates the manual reporting tasks these regulations previously required.

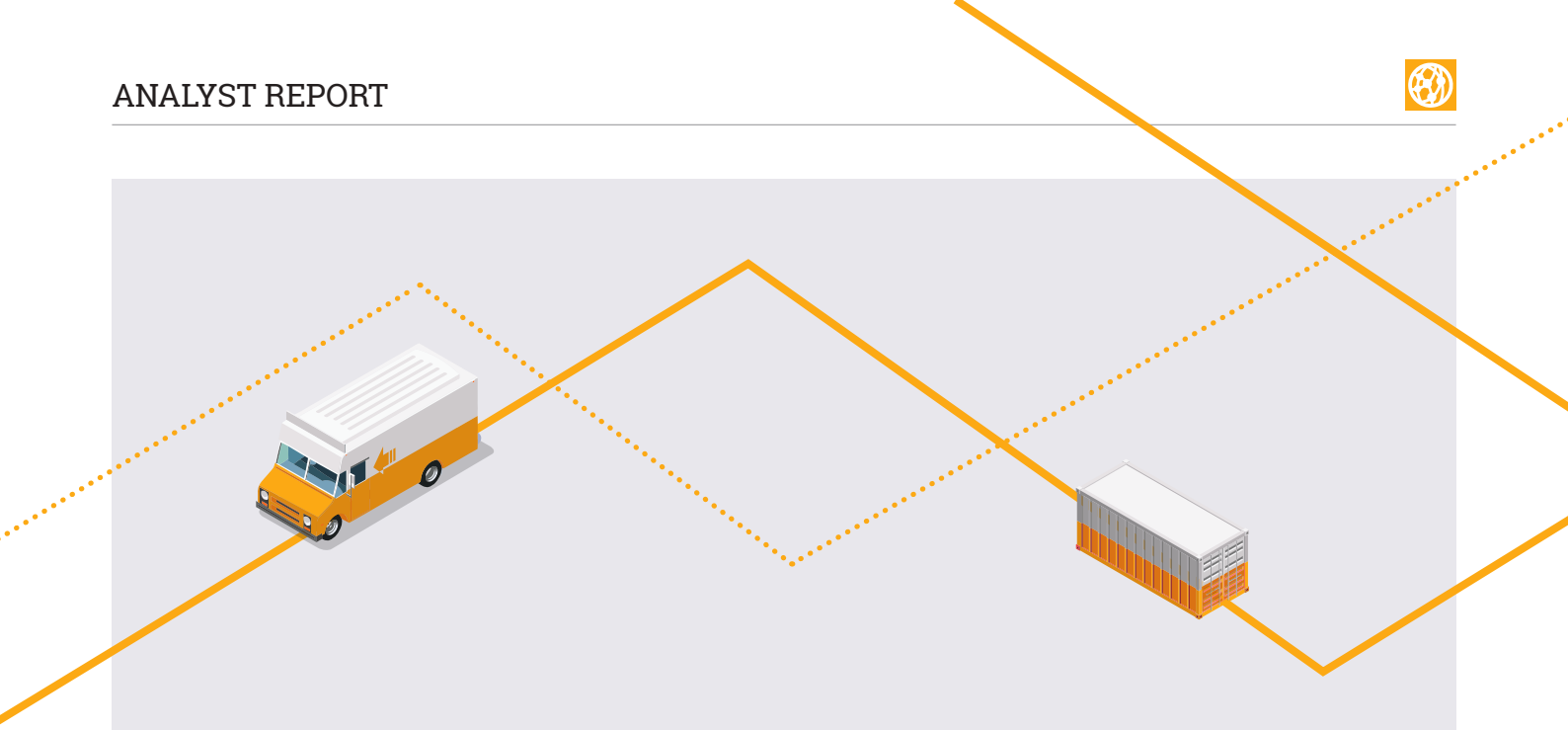
Asset tracking and protection: Like those used to prevent vehicle theft, GPS sensors on assets can track fleet cargo movements in real time, assuring asset managers that goods are moving on their designated routes. Additionally, condition-based monitoring (CBM) sensors can track a trailer's condition to protect environmentally-sensitive assets, typically using LPWA networks to relay important data points like moisture levels and trailer temperatures back to fleet managers.

Emerging use cases

These communication and technology advancements have created a range of cutting-edge fleet management use cases that build on the foundational principles of track and trace.

Vehicle theft prevention: Vehicle theft is an ever-present threat to enterprises and is increasingly likely as incidents of carjacking climb. The National Insurance Crime Bureau (NICB) in the United States recently reported that over one million cars were stolen nationwide in 2023, stating that vehicle thefts have steadily grown since 2019. GPS-based sensors and FMSs that track vehicles and cargo at all times on a virtualised map are critical tools to protect company assets. GPS tracking also enables enterprises to employ geofencing, which sets virtual boundaries for a vehicle. Geofencing technology can help fleet teams stay vigilant against suspicious movements by sending real-time alerts to the proper teams if a vehicle exits the virtualised perimeter.

Driver safety: The Federal Motor Carrier Safety Administration's (FMCSA) most recent Large Truck and Bus Crash Facts report reveals how truck driver behaviour impacts the safety of those on the road. According to the 2021 report, at least one driver-related factor, like speeding and distracted driving, "was recorded for 32% of the large truck drivers in fatal crashes." Driver safety is a critical fleet management use case, requiring various technologies to monitor both a driver's physical state and their behaviour on the road. FMS solutions often feature driver scorecards based on telematics data from sensors that monitor their average speed, lane changes and ▶



braking. The scorecard can help coach drivers and ensure they are not driving aggressively and putting themselves or others at risk.

Telematics data can also help alleviate fatigue, a common risk factor for professional drivers. Fleet management solutions often collect relevant data to determine the most efficient routes of travel, playing a crucial role in ensuring drivers are not on routes that are too long or accident-prone.

Video surveillance: In both driver safety and vehicle theft prevention, use cases offer a significant opportunity to integrate video capabilities. More robust connectivity through cellular as primary or failover creates a chance to mobilise video surveillance and lower hardware costs, making implementation much more possible. In both these use cases, video monitoring capabilities can capture surroundings to provide detailed insights. In driver safety, unsafe behaviour can be flagged. In theft monitoring, real-time and historical data can help track down culprits and help recover equipment.

Business Process Integration: Fleet business operations have historically been forced to rely on inefficient manual processes. Yard management, for example, has been plagued by manual gatekeeping and documentation, leading to costly congestion and transport delays. According to ABI Research, 80% of transportation delays occur because of yard inefficiencies, with experts predicting that the situation could worsen as global supply chains and distribution networks become more complex.

Fleet telematics are critical in streamlining yard management and other operational processes. GPS technology, sensors, and LPWA and 4G communication enable vehicles to transmit vital data from the road to the yard, such as alerting yard managers to potential delays or cargo movements within the yard. These insights can prevent stockouts and improve the efficiency of the yard and the supply chain.

IoT applications, devices and technologies

Sensor technology and wireless communication advancements have transformed commercial vehicles into epicentres of IoT innovation. A single truck can now incorporate an entire ecosystem of devices and sensors, giving fleet managers access to the workings of individual vehicle components like engines, tyres and trailers. The next section explores how IoT devices have improved remote monitoring use cases and led to new, advanced fleet management applications incorporating video.

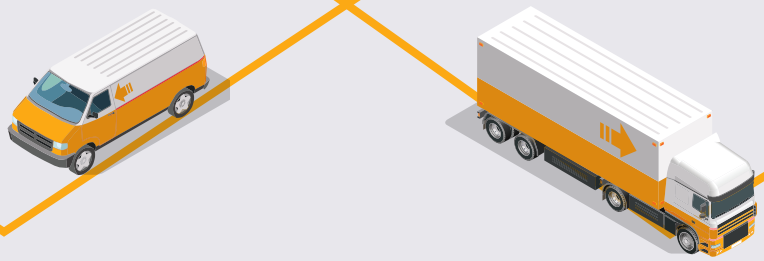
Sensor-based monitoring

Many fleet management use cases require sensors to collect and send crucial performance and condition-based data to FMSs. The sensors - often placed on fallible components like tyres - usually use Bluetooth to send these data to the vehicle's telematics control unit (TCU), the on-board diagnostics (OBD) system or a gateway. The TCU, the OBD and the gateway is likely to use an LPWA or 4G cellular network to ferry the sensor data to a cloud-based application.

Most engine diagnostic and GPS location data go through the TCU, which is built into the vehicle by the original equipment manufacturer (OEM). Other data that need to be aggregated, like data from the tyres, fuel lodge or camera system, will likely go through either a gateway, the TCU or both.

Tyres: Monitoring tyre health is a crucial task for fleet managers. Using sensor data sent through a cellular connection, an FMS can alert relevant maintenance teams if a tyre requires maintenance, allowing fleet managers to plan for potential downtime before an unexpected event like a flat tyre or blowout occurs. Such unexpected incidents usually result in expensive in-field maintenance that can keep a vehicle out of commission for a while. According to one 2016 survey[1], the average fleet experiences around 97 flat tyres per year, each costing around US$338.42 for downtime ▶

[1] https://www.automotive-fleet.com/157115/cost-of-flat-tire-to-a-fleet-detailed#:~:text=Of%20the%20survey%20respondents%2C%20the,tires%20fleets%20face%20annually%20%E2%80%94%2097.



and replacement. This would mean that fleets spend approximately US$32,800 on flat tyres annually. As a result, companies are increasingly investing in sensor-based solutions that can predict tyre incidents before they happen. **Geotab** estimates that businesses can save 10% to 20% on maintenance costs with data-driven, predictive maintenance solutions. These solutions often work best when backed by a strong connectivity partner that can facilitate real-time diagnostic data transfers from the road.

Engines: Sensor-based solutions and telematics data can digitalise engine monitoring, saving engineers' time from the manual processes of the past. For example, an hour meter is a sensor that counts the hours an engine has been running. The sensor signals to fleet managers when maintenance is required based on the hours it records. Collecting the hour information from the meters was historically a clunky process. Staff had to log the hours from the sensor manually and only had access to the meter when the vehicle was stopped. Modern fleet management solutions and improved LPWA coverage have simplified this process, with hour meters now sending automatic hour logs to maintenance software as the vehicle runs.

Fuel: Remote fuel management gives fleet managers access to information once reserved for drivers. In the past, business owners did not have much visibility into vehicle fuel levels or the fueling process. Now, fuel sensors can send relevant data to remote teams, giving fleet managers insight into fuel levels and sending alerts if low fuel or abnormal fuel usage is detected. Telematics solutions predominately used for driver safety can also monitor for driving behaviours that waste fuel, such as speeding. Some studies have shown that fleet managers can save up to 20%[2] on fuel and maintenance costs by investing in connected fleet management solutions. Cost savings in this area have become even more important as fuel prices rise. According to a recent American Transportation Research Institute (ATRI) report[3], average fuel costs per mile for fleets rose almost 54% from 2021 to 2022, the largest increase of all fleet cost centres.

Video monitoring

Video telematics represents a leap forward in fleet management technology. New gateway technology and better cellular coverage enable vehicles to send video footage from the field to remote teams, giving rise to a new category of telematics use cases that require reliable, high-throughput connectivity. According to ABI Research, commercial video telematics solution shipments will reach 17.8 million units by 2030, with shipments growing almost 24% from 2020 to 2030[4].

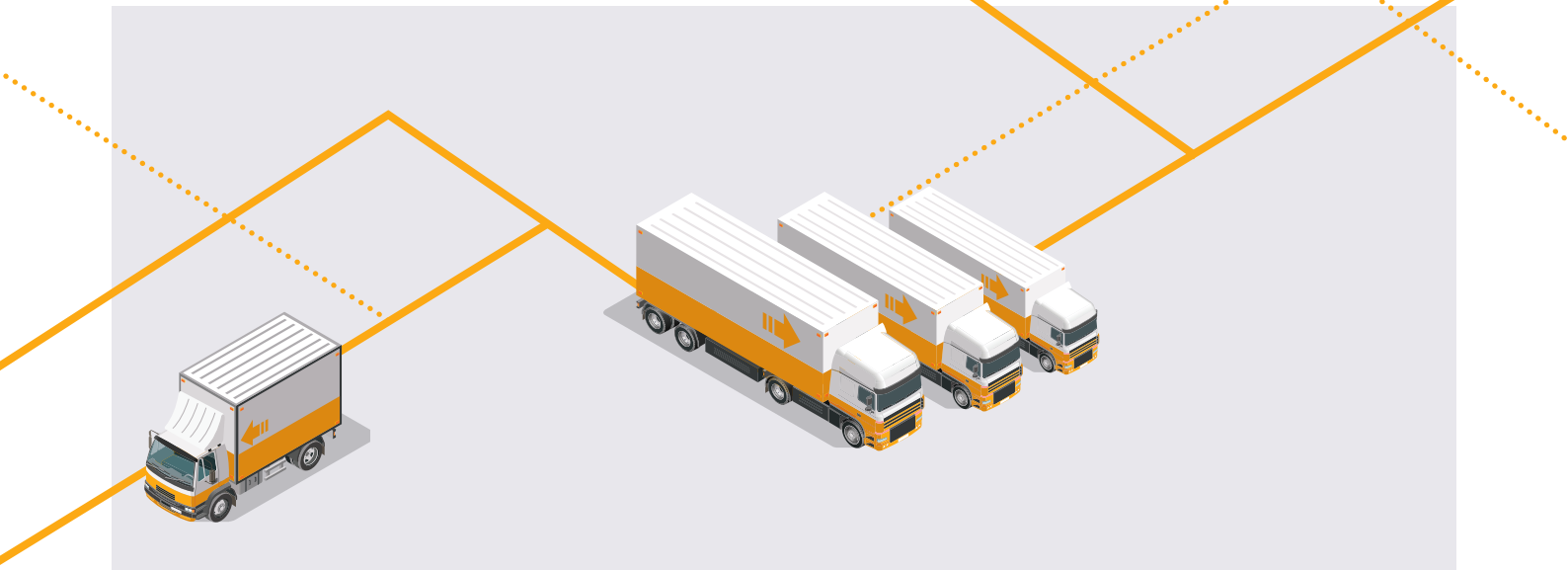
A video telematics system typically includes a deployment of road-facing, load monitoring, back-up or driver-facing cameras. Unlike other track and trace-related use cases that predominantly rely on LPWA networks, the use of video will require more fleets to utilise highly available, high-bandwidth networks. A fleet's camera system typically connects to a vehicle's diagnostics port or telematics gateway through Wi-Fi, Bluetooth or a wired connection. The chosen gateway is then likely to use a 4G network to send relevant footage to the cloud.

Two main video monitoring applications in fleet management include asset loading and unloading monitoring and driver supervision. Both use cases escalate a fleet's connectivity and coverage requirements.

Asset loading: Load monitoring cameras monitor employees as they load and unload cargo from a vehicle's trailer. These cameras are increasingly popular, as they can monitor cargo movements and ensure that cargo is not damaged or stolen in the docking process. The footage can also serve as evidence to exonerate employees and enterprises from any potential accusations of damage or stealing.

Driver safety: In the past, dashcams in commercial vehicles were passive instruments, capturing footage that could only be reviewed after an incident occurred. ▶

2 https://www.tourmo.ai/resources/guides/the-essential-guide-for-fleet-management-cost-savings-tm#:~:text=The%20well%2Dknown%20benefits%20of,analysis%20and%20taking%20corrective%20action.
3 https://www.fleetowner.com/operations/article/21268287/fleet-costs-rise-213-with-fuel-the-leading-expense-atri-reports
4 https://www.abiresearch.com/news-resources/chart-data/commercial-video-telematics-solution-shipments/



Now, smart dashcams equipped with video analytics and artificial intelligence (AI) can recognise predefined events in real-time. For example, AI-enabled driver-facing dashboard cameras can monitor drivers and autonomously recognise pre-defined prohibited behaviour, including smoking or mobile phone use. If concerning behaviour is detected, the cameras will automatically begin recording and can alert the proper teams. Forward-facing cameras can have similar triggers, recognising potentially dangerous road conditions. Advanced driver assistance systems (ADAS) enabled by video can take driver coaching even further through real-time, in-cab alerts like forward collision or lane departure warnings.

Having footage of driver behaviour and the areas surrounding the vehicle can be particularly helpful in the case of accidents. According to the US Department of Transportation, 162,529 large trucks were involved in crashes in 2023. Video monitoring systems can help prevent such accidents and also protect drivers and companies from false claims should a crash occur. According to **ASIS International**[5], businesses with connected telematics solutions like in-cab dash cams can reduce insurance claims by at least 25% and crashes by around 50%. To maximise cost savings and minimise accidents, fleet managers need a reliable connectivity partner to support the throughput and coverage requirements of such advanced, video-led applications.

Shared mobility

The shared and micro-mobility market, featuring rental rideshares, e-bikes and e-scooters from companies like **Uber** and **Lyft**, is a relatively new fleet management vertical with unique connectivity considerations. Micro-mobility devices like rental e-scooters and e-bikes require high-uptime connectivity, as customers expect to pay for these devices through a mobile app and gain immediate access to them. This real-time transaction requires low-latency connectivity, often in urban areas crowded with other connected devices. These connected e-devices also must provide constant, real-time location data so micro-mobility companies can accurately track their scattered fleets. Locating every e-scooter and e-bike in dense urban areas requires resilient connectivity and wide-area coverage - poor connectivity or inaccurate location data could lead to missing units and loss of revenue.

These companies' shared vehicle services similarly depend on reliable mobile connectivity to complete customer transactions. The importance of flexible and reliable connectivity to this market is showcased by the recent news that Uber could potentially offer in-app embedded subscriber identity module (eSIM) solutions in the future to facilitate transactions, even in areas where customers have no mobile data.

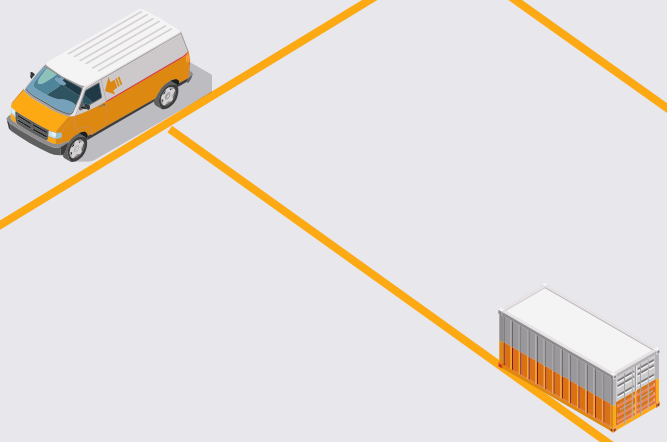
Implementation struggles for advanced fleet management use cases

Fleet management use cases like asset tracking and protection, tyre and engine monitoring, and video monitoring can greatly enhance a company's fleet operations and efficiency. However, like all digital transformation projects, several implementation roadblocks can slow a solution's time to market, impacting a fleet manager's ability to adopt the latest fleet management use cases.

A primary concern of fleet managers when implementing a new fleet management technology is cost. In one survey conducted by ABI Research, 45% of enterprises with fleets cited cost as their biggest barrier to tech implementation. Many also cited a lack of internal infrastructure as the biggest challenge in becoming a more data-driven organisation. Purchasing the necessary infrastructure for advanced fleet management use cases - like new dashcams or thousands of new battery-powered sensors - can be a costly endeavour for enterprises that is hard to justify.

In addition, fleet managers often do not know where to begin when trying to digitalise their fleet, with some ▶

[5] https://www.asisonline.org/security-management-magazine/articles/2023/10/road-safety/telematics-road-safety/#:~:text=Reduce%20insurance%20premiums.,crashes%20by%20around%2050%20percent.



relying on trusted system integrators (SIs) for guidance. Vendor ecosystem confusion can also lead to vendor lock-in, as some fleet managers would prefer to have one solution vendor for tyre, engine, fuel and video monitoring use cases. Though this reduces the complexity of an FMS, it can limit a customer's choices and capabilities.

Future fleet applications

Fleet management applications have undergone unprecedented digital transformation in the last two decades. Use cases quickly graduated from simple location tracking to real-time vehicle performance monitoring. The fleet management industry is now preparing for another wave of innovation as fleet electrification, autonomous driving, and vehicle-to-everything (V2X) communication demand even better data management and wireless connectivity capabilities.

Electrification considerations

The transportation industry is in the midst of an electric revolution. Commercial fleets are transitioning to electric vehicles (EVs), with forecasts predicting that three million commercial EVs will be on the road worldwide by 2030[6]. Fleet operators who have yet to make the switch are preparing for this approaching transition by collecting reams of data from their diesel or gasoline-run vehicles, seeking to understand their fleet's average mileage, fuel capacity and fuel consumption to anticipate how their routes will change when adopting EV vehicles. Fleet operators must also collect and analyse data about fleet engine health and vehicle lifecycles to determine the best time to retire their fuel-based vehicles. Fleet electrification has, therefore, created enormous amounts of telematics data, driving demand for advanced cloud applications that can do this type of analysis.

Low latency in EVs is crucial for enhancing the responsiveness and reliability of real-time communication. This includes reducing data transmission errors, ensuring data integrity, enabling vehicle systems to react quickly to changes in the environment, potential malfunctions and road safety situations. By improving latency, EVs can better manage critical functions like adaptive driving assistance, collision avoidance and other safety systems, thereby improving overall vehicle performance and safety.

Autonomous driving

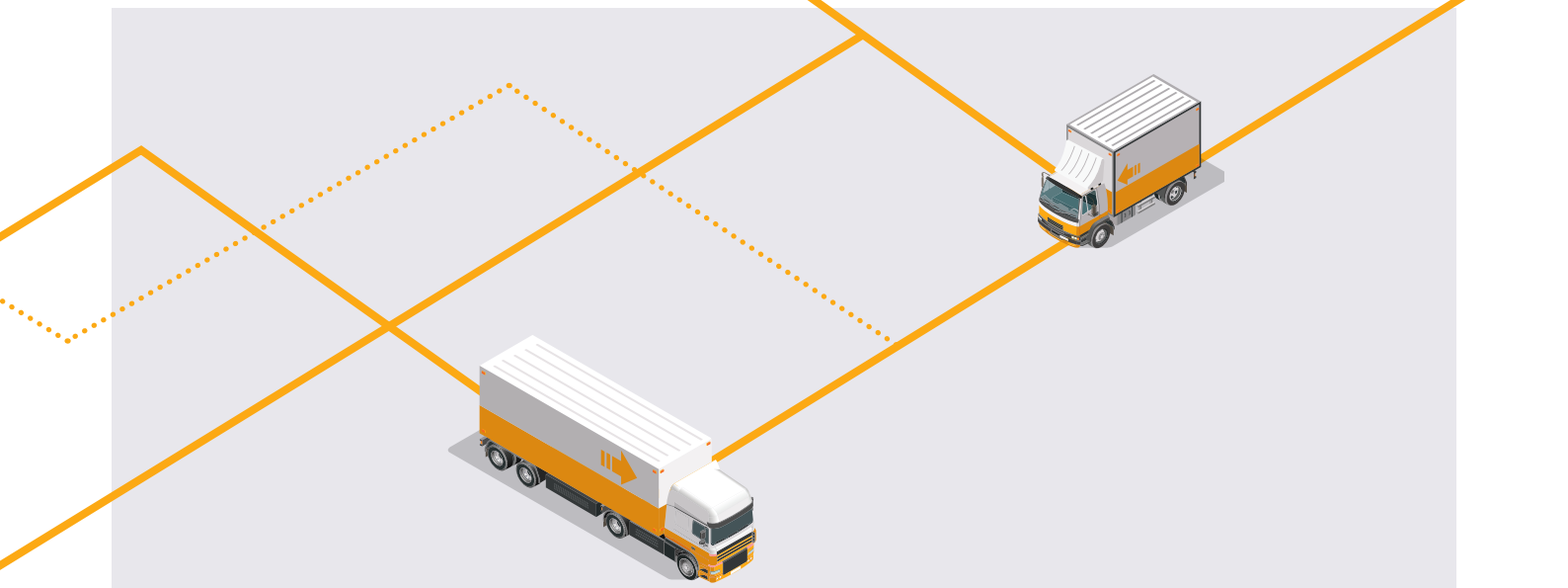
Creating autonomous trucking and commercial fleets has become a significant strategic goal for vehicle OEMs like **Volvo**. While fully autonomous vehicles are nowhere near the point of mass adoption, glimpses of a driverless future can be gleaned from current ADAS solutions with semi-autonomous features like automated steering. Categorised as Level 1 or Level 2 automation, these current ADAS solutions already require a complex array of sensor, video, and computing technology to partially aid the driver. Levels 3, 4, or 5 automation, where a vehicle can monitor and respond to the exterior environment without much or any human supervision, will require even more advanced technologies and will create an unprecedented influx of telematics data for fleet managers to use. In the future, enterprises will require ultra-reliable connectivity for the anticipated levels of data transmission.

V2X communication

V2X is a communication technology that enables a vehicle to transmit data to different devices in its environment, including infrastructure like road signs and other vehicles. The V2X communication vision is ambitious and predicated on an unprecedented level of connected things sharing the same communication protocols. If established, V2X communications would improve road safety and result in more efficient traffic coordination. Seen as a major use case for smart cities, V2X has the potential to transform the entire transportation market.

Connectivity is the cornerstone of future V2X endeavours. Vehicles will need the support of widespread, low-latency cellular networks to communicate with each other and ▶

[6] https://www.abiresearch.com/blogs/2023/06/07/commercial-fleet-electrification/



surrounding connected elements. V2X use cases will necessitate widespread 4G or 5G connections, with 5G's advanced speed and low latency likely providing better support to the large-scale use cases envisioned by V2X proponents.

Connectivity is king in the future of fleet management

All future fleet management use cases - including the near-term electrification of vehicles or the far-off V2X vision - will result in a massive increase in telematics data. Funnelling that data from vehicle gateways to cloud applications will require wireless communication companies that can provide uninterrupted connectivity.

Traditional approaches simply cannot fulfill the demands of next-generation telematics use cases. Mobile network operators (MNOs) deliver critical network services, but the scope of MNOs is severely geographically limited. IoT mobile virtual network operators (MVNOs) have been uniquely equipped for the tasks of more agile connectivity services by delivering more consistent coverage through a more globalised, agnostic approach, but can also be limited by dependency on MNOs, technology and logistical hurdles, and a lack of infrastructure ownership.

What emerges is a new kind of IoT software-as-a-service (SaaS)-based service provider that uses a unique, core network-owned infrastructure that is cloud-based that extends coverage from MNOs across the world through local points of presence (PoPs) for localised global connectivity. Advanced cloud-based connectivity management platforms give flexibility and cut the ties of legacy connectivity management platforms (CMPs) to empower organisations to have real-time insights and control over deployed devices.

ABI Research forecasts that data and analytics services revenue in the fleet management market will reach nearly US$75 billion in 2030, underscoring the need for strong connectivity partners that can support the industry's data-driven ambitions.

Network types and requirements

4G LTE networks are a dominant connectivity choice for fleet management use cases, especially as 2G and 3G networks are now being sunset around the world. The wide adoption of 4G, its consistent coverage and versatile throughput options can support a range of higher-throughput fleet management use cases like cargo tracking, fuel management and video-based use cases like driver behaviour monitoring. LPWA networks like LTE-M and narrowband-IoT (NB-IoT) are a cost-effective choice for low-data asset tracking and remote monitoring use cases.

However, LPWA and 4G networks can seem limiting for fleet applications when compared with 5G networks. 5G networks have exponentially faster data speeds than 4G networks and ultra-low-latencies, but its slow adoption and inconsistent geographical coverage has limited its impact on the fleet management market. However, it can be easier to adopt this developing connectivity technology through a network provider that owns the core network infrastructure as a more direct approach. The piecemeal rollout of 5G can create hurdles when trying to tie together an approach that utilises multiple network providers or MVNOs. A robust network provider can provide service using multiple MNOs within a region - in a sense, aggregating the 5G rollout of each one to maximise 5G coverage nationwide and globally.

5G adoption will slowly grow in the near term when more network rollouts occur and advanced fleet use cases like video monitoring and autonomous driving make headway in the market. Satellite connections will also steadily increase in the fleet management market, as being connected continues to be critical for fleets in remote areas with limited cellular coverage.

Importance of coverage and eSIM

Commercial trucking fleets often traverse geographical areas that offer varying levels of cellular coverage. Fleets can travel through rural and metropolitan areas and across borders, entering and exiting regions with different national operators and 4G, 5G, or LPWA coverage ▶

and availability. These vehicles must have connectivity throughout, as many fleet management use cases require uninterrupted, real-time insights into the vehicle's location, health and performance.

Given these requirements, it is natural that MVNOs would be fleet management partners. MVNOs specialise in aggregating operator profiles on a single subscriber identity module (SIM) and aggregating connectivity from different operators' networks on a single profile. This enables a device to seamlessly move between carrier networks, creating an uninterrupted chain of connectivity across various regions and countries.

Cross-carrier connectivity has become even more flexible as MVNOs have transitioned to eSIM. eSIM allows customers to remotely provision SIM cards after the point of manufacturing, meaning that customers can activate devices and provision them with new carrier profiles, over-the-air (OTA) and remotely. The technology eliminates physical SIM swapping and network profile lock-in, allowing users and their MVNO suppliers to dynamically change networks depending on their needs. Fleet managers can now easily change their devices' network profiles depending on a fleet's route or uniformly administer remote updates to a large group of devices.

This touchless, single-stock keeping unit (SKU) approach to global connectivity is not only capable of switching networks OTA, but can also support adherence to data sovereignty and localised access, while removing dependency on roaming.

What combines the strengths of an embedded universal integrated circuit card (eUICC) with remote, automatic switching on networks is a multiple international mobile subscriber identity (multi-IMSI) approach that uses eUICC. A multi-IMSI technology solution is all managed through a single connectivity provider, which holds the existing relationships with multiple network operators, each providing its international mobile subscriber identities, and then held in a single SIM. When devices need additional coverage or a network fault is detected, these profiles can be switched OTA, allowing for remote SIM provisioning of the new IMSI, in real-time.

This easy management and uninterrupted coverage will become even more impactful as fleet management use cases require more real-time data processing and decision-making. As a result, more fleet managers will seek out a partner with nationwide coverage and a global footprint that supports connectivity in as many countries as possible across all network types, including 2G, 3G, 4G, 5G, NB-IoT and LTE-M network coverage.

Connectivity and platform providers

Enterprises can take several approaches when crafting a connectivity strategy for their fleets. Companies can purchase connectivity and a CMP separately or they can buy a bundled connectivity and CMP offering from an operator or MVNO. Each approach has advantages, but purchasing both elements separately, or buying from an MNO, can be limiting for fleet managers when facing a new range of applications that require guaranteed connectivity and uniform management.

Purchasing connectivity and platform separately

Purchasing connectivity and a CMP from two separate suppliers is an approach that can be adopted in the industry. If an enterprise has specific demands for both its connectivity and management platform, and is aware of all the available suppliers, it can feel empowered to handpick the two offerings it believes are best for its company goals. Companies that purchase the two separately typically lean on SIs to guide and integrate their purchases.

Purchasing connectivity and a CMP from two separate suppliers leaves enterprises in a scenario where the dependency on SIs to guide and integrate their purchases can arise. Only a limited number of companies choose this option, as merging a connectivity offering with a separate connectivity platform requires an immense amount of time and money, and has a great risk of failing if the wrong supplier is chosen or the systems are not tightly integrated. An enterprise that chooses this option must integrate different operator connectivity profiles on a single, third-party platform to ensure device visibility and control across networks and coverage areas. These integrations would be extremely complex and time consuming.

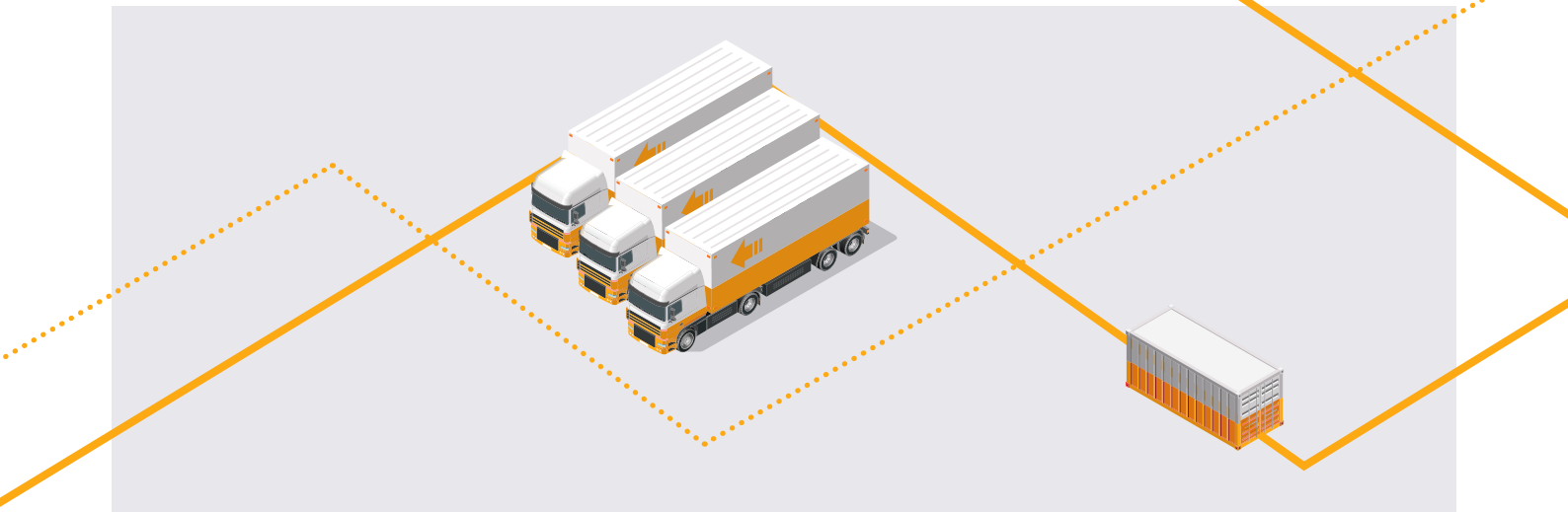
As a result, this option is mostly reserved for large companies with a strong incentive to control every part of their connectivity and platform system, and may simply have been an inconvenient necessity in the early days of fleet management when no end-to-end suppliers existed. Today, however, most companies choose an end-to-end supplier that typically provides a bundled connectivity and CMP offering.

Choosing a company that specialises in CMPs, especially one that can provide customers with SIMs (either multi-IMSI or eUICC), creates a streamlined, fast time to market approach. In addition, when selecting a provider, being able to bring your own connectivity enables customers to bring their own IMSIs to integrate into the provider's SIM profile and CMP. In doing so, there is no need for an external SI.

Purchasing connectivity and a platform from an MNO

MNOs are often large organisations with an extensive history of providing connectivity to a range of enterprises and consumers. Fleet managers might look to an MNO's experience and be enticed by their bundled connectivity and platform options, particularly if a fleet is expected to stay in the home country of a national MNO. MNOs have also traditionally promoted themselves on the grounds of longevity, as they have been in business for so long. They are, therefore, likely to be in the market to support a fleet manager for the duration of their vehicles' lifetimes.

However, there are several drawbacks to this approach, especially when considering fleet management use cases that require uninterrupted connectivity across ▶



various regions and networks. MNOs do not typically have roaming agreements with other operators domestically, meaning fleet managers who choose an MNO as their connectivity and CMP supplier would be locked into a single operator's network for all national deployments. In addition, an operator's global connectivity is typically dictated by its roaming agreements with international partners, potentially leaving coverage gaps in key international areas. It is also more difficult for customers to achieve the same quality of service (QoS) and platform functionality from an MNO when operating on its international partner's network. These disadvantages could have severe implications for fleet management use cases that require continuous coverage and uniform connectivity management across borders.

Purchasing connectivity and a platform from an MVNO

Enterprises can also purchase a bundled CMP and connectivity offering from an MVNO. As connectivity resellers, MVNOs can aggregate many operator networks on a single SIM and create a global coverage portfolio. MVNOs also combine these networks together into a single platform and can offer the same platform features, performance and user interface across regions and network connectivity types. Virtual operators can guarantee this international connectivity and connectivity management at a regulated price point that is not subjected to complicated roaming fees or shifting partnerships.

For MNOs, connectivity is frequently the end game, with their existing platforms allowing customers to manage connectivity for the sake of selling IoT tariff plans. For MVNOs, connectivity is just the starting point and is the building block on which they create value through the guaranteed continuity of service availability, at a predictable price point, and often with specific vertical- or application-specific experience. MVNOs are in the business of conducting all the back end plumbing, so that their customers do not have to and can purchase services that they know will 'just work'.

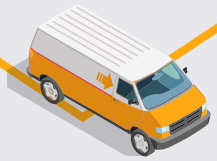
Many current fleet managers already benefit from MVNOs' carrier-agnostic platforms and connectivity services. But future fleet management use cases will require something even greater. As the fleet management market evolves to include more advanced use cases, fleet managers will require a next-generation connectivity provider - merging the best of both MNO and MVNO worlds - that can deliver ultra-low latencies and effective localised, yet global performance across different networks, countries and device types.

Next-generation connectivity and platforming

The right MVNO partner for fleet managers in the future must establish a unique global presence in the IoT industry by building a network of highly resilient connectivity with a maximal number of local PoPs around the world. This arrangement results in fast local connectivity, globally. This type of localised global footprint will enable MVNOs to lead the way in supply-side provisioning for fleet management by guaranteeing the effectiveness of applications, including video monitoring, that increasingly require low-latency data communications. This, in combination with eSIM for ultra-flexible connectivity around the world, will provide the back end support that fleet managers need as they prepare their vehicles to travel into and out of new areas around the world and in different networks.

However, fully redundant, highly available and high-performance connectivity is only really usable in combination with a cutting-edge CMP designed to oversee large-scale fleets of devices on the move. Granular visibility will be necessary across a range of device types, monitoring data usage, device behaviour and connectivity performance, while managing OTA configurations and administering continual security checks and tests. A full breadth of connectivity, monitoring and security services will be needed to allow fleet managers to receive real-time insights into their fleets around the world, and is necessary to optimise the performance of those devices that enable business-critical use cases; for example tyre, engine and fuel monitoring. Such an offering will be a necessary support system today in order for enterprises to prepare for the next wave of fleet management innovation.

A key consideration in fleet telematics is the need to balance capturing real-time information with battery optimisation. Latency is a crucial element in this balance, ▶



particularly when considering low-power telematics use cases, where the expectation is that the battery lasts the entire device lifecycle. Locally derived connectivity significantly decreases latency, compared to roaming, and can shorten data communication time by a third. While this might not seem like much at first glance, this can ultimately double the lifecycle of a device's battery - just through latency alone. Other technologies like extended discontinuous reception (eDRX) and power saving mode (PSM) when implemented alongside LPWA networks can deliver on the balance of pertinent data insights, while also optimising battery life.

Case study: A competitive edge in automotive IoT with floLIVE

AutoMobility is a leading distributor and manufacturer of automotive aftermarket electronics. Its extensive product portfolio includes dash cameras, app-based remote vehicle starters and security features. The company has innovated its products as customer demand for connected devices has grown. For example, the company has integrated its remote vehicle starter capabilities into a smartphone application that also measures vehicle metrics. This solution requires resilient mobile communications between sensors, the vehicle and the user's smartphone(s). With **floLIVE**, AutoMobility could offer its customers consistent global coverage for seamless user experience and simplified management. In addition, by using floLIVE's integrated platform, alongside its connectivity services, AutoMobility accelerated its time to market and now has comprehensive visibility into its devices and network behaviour. What AutoMobility gained from this partnership specifically is:

Robust connectivity: floLIVE offers a large IMSI library supported through UICC, eUICC and multi-IMSI, which offers both a single-SKU SIM approach for streamlined logistics and allows AutoMobility to achieve worldwide connectivity through a wide choice of network operators.

Single SKU: Instead of going from provider-to-provider to source connectivity, AutoMobility can utilise floLIVE and have access to a global connectivity library supported on floLIVE's own mobile core network infrastructure - and all profiles are available on a single SIM, removing the complexities associated with managing multiple SKUs.

Application programme interface (API) integration: For increased flexibility and interoperability, floLIVE exposes its API for back end integration across technologies and hardware.

Visibility and management: floLIVE's connectivity management platform makes it possible for AutoMobility to achieve granular visibility in device and network behaviour for comprehensive support and management.

Summary

The fleet management market has matured from simple track and trace use cases to advanced video-based monitoring and autonomous applications. Ushered in by improvements in IoT and wireless communication technologies, this new era of innovation will call for even greater advancements in sensors, cloud services and connectivity technology.

Each fleet management vertical will undergo some digital transformation as new FMSs and wireless communication networks like 5G and satellite become more available. As fleet managers assess connectivity and CMP suppliers for the future, they will choose a partner that can offer uniform management across a fleet of devices and facilitate the quick, global connectivity that will be foundational to fleet management's evolution.

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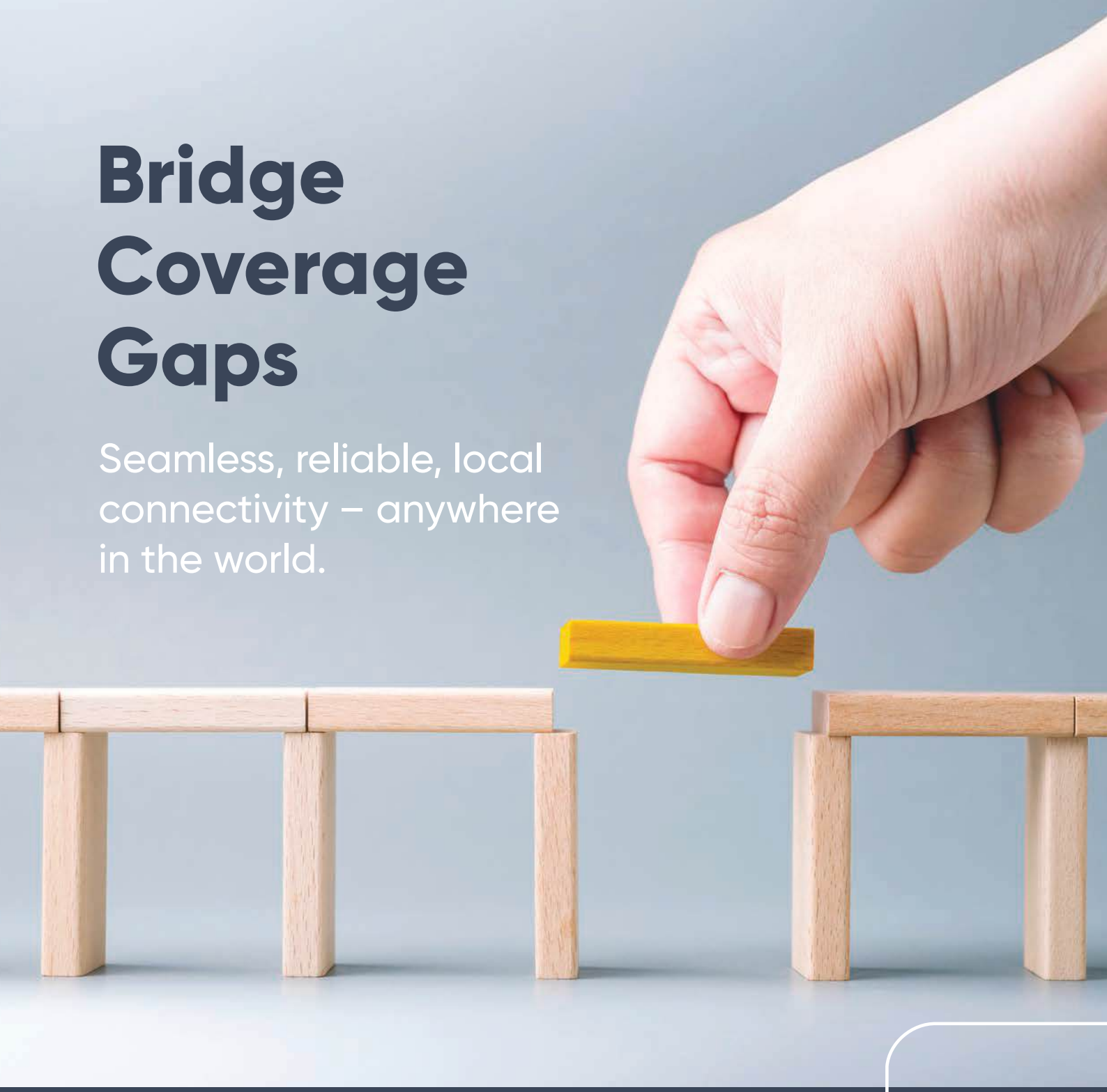

Coverage gaps are inevitable, especially in certain environments and geographies. But with floLIVE, you can ensure you have always-on connectivity.

It's time to close the gaps.
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