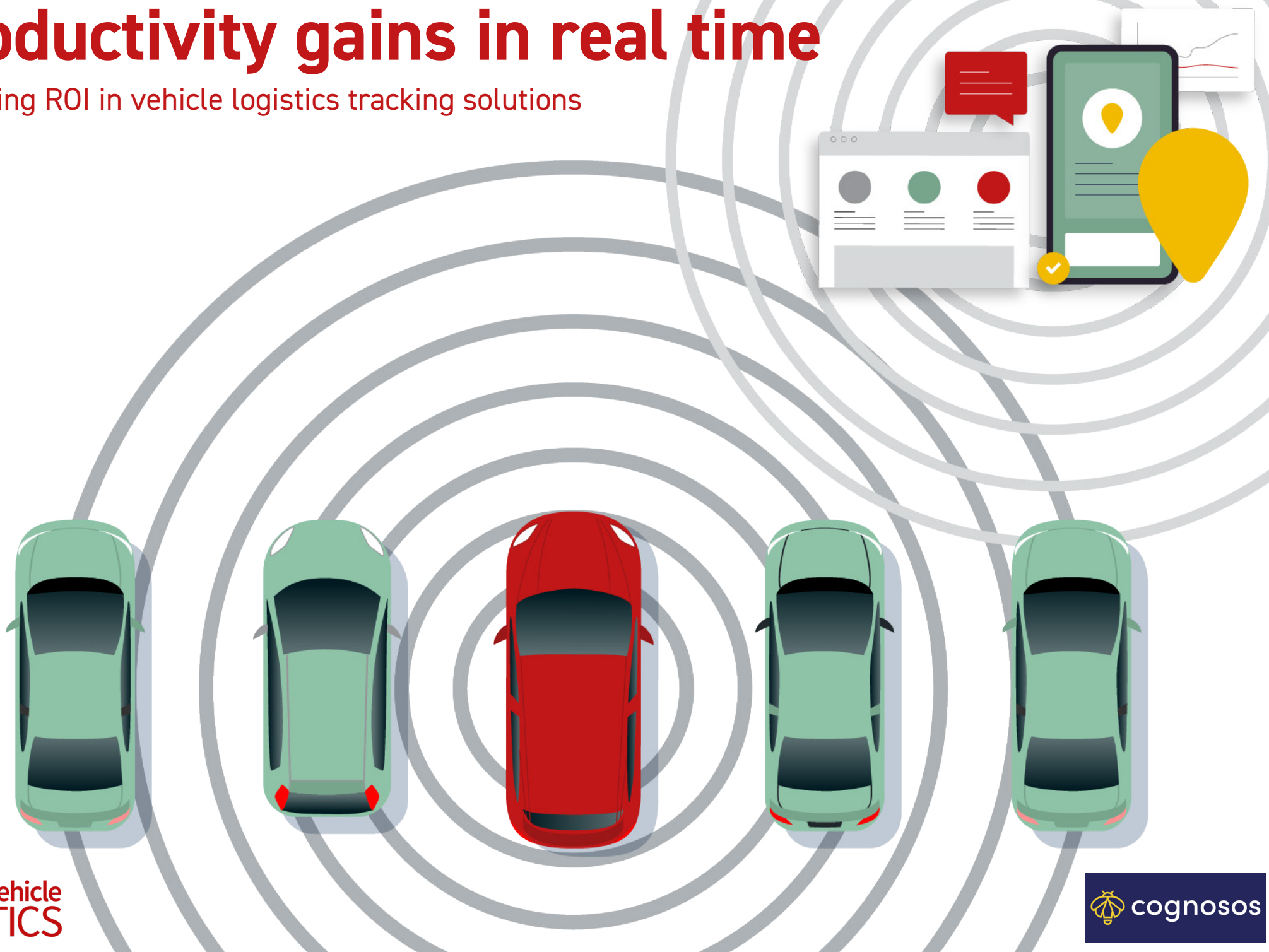
# Productivity gains in real time

## Unlocking ROI in vehicle logistics tracking solutions



Finished Vehicle LOGISTICS

cognosos

November 2021

This e-book describes solutions for the real-time tracking location services (RTLS) of finished vehicles in transit and at vehicle processing centres. In particular, it explores the return-on-investment logic for RTLS 2.0 technology, such as those provided by Cognosos, compared to other solutions including barcode, handheld scanners, RFID and telematics. The e-book features insight and interviews from automotive OEM logistics managers, from supply chain management experts and Cognosos chief product officer, Adrian Jennings.

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Automotive LOGISTICS Finished Vehicle LOGISTICS

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Cognosos equips enterprises with the real-time asset intelligence needed to unlock insights and accelerate supply chains. Its lightweight platform deploys quickly both indoors and outdoors, delivering an unparalleled combination of price and performance that is now tracking over 100,000 assets across multiple industries including healthcare, logistics and automotive.
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# Introduction: Next generation Visibility

Finished vehicle supply chains process vehicles at scale. Ro-ro car carrier vessels can carry over 8,000 vehicles; a typical transit storage or vehicle yard at a port can easily hold 10,000-60,000 vehicles.

Yet that scale brings challenges, and one in particular: while vehicles may arrive *en masse* off a ship or continuously off an assembly line, they are rarely processed or shipped onwards in the same volume. Instead, OEM logistics, yard or terminal managers must select specific vehicles – to meet shipping schedules, satisfy specific customers, or fulfill specific accessory requirements.

Those vehicles must first be located, which is no simple matter, especially in a large, busy yard. Keeping track of vehicles is labour intensive. Yard audits are the norm: a team of employees specifically tasked with continually recording the current location of specific vehicles by scanning barcodes, which requires walking miles a day in all weathers.

With high-value inventory such as vehicles, time really does equal money, especially as carmakers try to balance cash flow. Gaining real-time visibility at scale, at low cost, is not just a nice to have for OEMs. With today's unique supply chain constraints – including critically low finished vehicle inventory in many markets, along with driver, equipment and labour shortages – poor visibility increasingly means lost sales. Speed, accuracy and visibility in vehicle logistics matter more than ever to OEM revenue and balance sheets.

## From RTLS 1.0 to RTLS 2.0

Over the years, OEMs have applied different real-time location services (RTLS) technology to the task of improving this accuracy and visibility, with varying degrees of success and implementation. Vehicle logistics operators have explored solutions including RFID, cellular telephony, GPS tags and even onboard telematics. However, whether through issues in costs, implementation or accuracy, most OEMs and processors continue to rely mainly on manual processes.

The result is that the process of locating vehicles takes longer than it should, with a percentage of vehicles going missing, potentially for several days. While they seek these missing vehicles, terminal operators face further inefficiencies in scheduling internal yard processes such as accessory installation or vehicle loading.

Transport and trucking companies also suffer, as drivers wait idle to build truckloads, straining already tight labour forces even further.

For OEMs, it often means greater cost, inefficiencies, slower throughput times, lower inventory turns and difficulties in providing accurate delivery promises to customers.

Despite these chronic issues in vehicle logistics, many other industries use RTLS effectively across supply chains, as logistics managers across the automotive industry have noted.

"Buy a 49-cent pen on Amazon, and you can see where it is through the supply chain. Buy a $150,000 vehicle, and once it has left the factory, you don't know where it is," Charles Franklin, senior national manager of business development at Glovis America, told *Finished Vehicle Logistics*. Glovis is part of Hyundai-Glovis, the logistics arm of Hyundai Motor Group, serving Hyundai, Kia and other OEMs.

One problem is that most OEMs and providers still tend to consider approaches mostly developed around the turn of the millennium. Such solutions often require high investments upfront in data-reading infrastructure and take around six months or longer to install, both of which put the return-on-investment (ROI) for vehicle logistics projects well out of reach.

Meanwhile, tracking technology and business models have moved on. Where once fixed readers were needed throughout yards to capture RFID tags, satellite technology can track locations to high accuracy. Where once separate cellular contracts were needed for individual devices, today a single, low-cost radio infrastructure can cover tags in a large area.

And where once data was captured and processed locally, today that processing power is amplified in the cloud, and further enhanced through artificial intelligence.

This shift represents the difference between RTLS 1.0 and RTLS 2.0 technology – which is to say that tracking has moved into the post-cloud, post-AI era. Unfortunately, relatively few OEMs and yard operators have moved with it.

There are exceptions. At Kia's US vehicle assembly plant in West Point, Georgia, Hyundai-Glovis has deployed a true RTLS 2.0 solution that uses wireless-equipped, GPS-enabled hardware tags, coupled to cloud-based tracking and reporting software.

The technology, which was provided by US vehicle- and asset-tracking specialist Cognosos, has delivered a clear ROI for Hyundai-Glovis, according to vehicle processing centre general manager, Robert Carmichael (see p21).

This e-book will further explore how RTLS 2.0 technology can support advanced tracking for vehicle logistics, and why OEMs and logistics providers might find that the ROI assumptions that they had previously made belong firmly in the last decade, if not century.

# Time for vehicle visibility to get real

**Tracking inventory is money (and sales)**

In a low vehicle inventory paradigm, any extra time spent tracking and locating missing or inaccurate stock can impact sales and working capital

**Manual labour hits productivity**

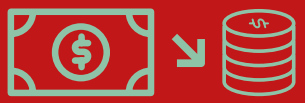
The need for manual scanning of vehicles in large yards requires more staff – which means higher costs, and could lead to delays from labour shortages

**Need for better scheduling**

Inaccurate vehicle locations or missing inventory harm the ability of terminal managers and carriers to schedule accessory installation and transport loading effectively

**Consumers expect accuracy**

Today's customers are used to tracking all items they order, and won't accept any less after they purchase expensive vehicle purchases



**Dramatic drops in total costs**

The latest real-time location services require minimal infrastructure and cellular costs, while connecting users to powerful data analytics and software as standard

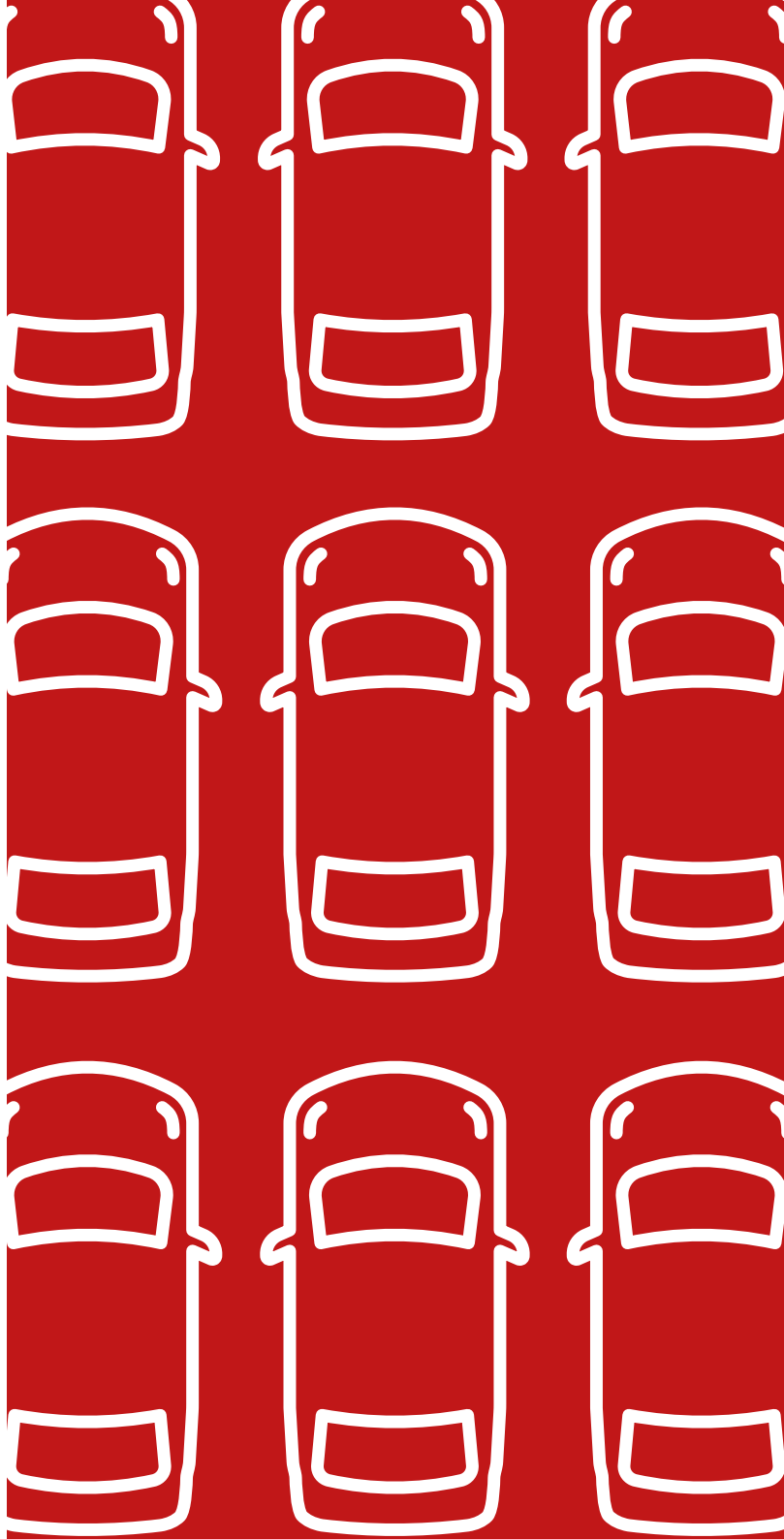
**The key for digital distribution models**

As consumers buy, lease and subscribe to vehicles online, OEMs and retailers will require up-to-the-second visibility across vehicle logistics and handovers

# Chapter 1

## When it comes to tracking tech, seeing is believing

First generation RTLS technology has higher upfront costs, more room for error and lacks the cloud-based analytics power that newer generation solutions offer




Most of the tracking and location technology solutions on the market today still fall into the RTLS 1.0 generation. While these solutions offer considerable value – and provide visibility greater than is still common in many vehicle logistics yard operations – they can rarely unlock the same ROI as the low-cost infrastructure, cloud-powered solutions now available.

Adrian Jennings, chief product officer at Cognosos, points to three main reasons why previous generation technologies struggle to meet today's demanding investment justification criteria.

First, heavy infrastructure costs immediately raise the bar when it comes to the necessary returns. RFID-based solutions require fixed gates to scan and read tags, such as when a vehicle has reached a specific point, like an accessory-installation station. There will likely be separate yard entry and exit readers, as well as intermediate location points.

Meanwhile, equipment that uses cellular connections can require expensive towers onsite to create a local network. Otherwise, users will need third-party contracts to enable cellular data for each device they want to track.

In both cases, the costs and installation times will often knock ROI times back by 12-18 months – far too long to justify the capital expenditure for most vehicle logistics projects.

A second factor holding back ROI is that many technologies are prone to natural disruption or human error. Workers can miss a barcode scan, while bad weather can obsure barcodes and interfere with RFID-based readers.

Furthermore, technology that depends on scans or gate reads will only provide information on where a vehicle was at a given time. Even using in-vehicle telematics has such drawbacks. Assuming a telematics system is present in each vehicle, and that it can be activated before it is handed over to customers (neither of which is


always the case), vehicles can only be tracked when they have been started, which means that for many points in the supply chain – in transit on rail, trucks or vessels – locations are not updated.

On the other hand, a solution that has low data latency can let operators know where all vehicles are at any given time, which is a much more powerful tool in making decisions that avoid disruption or improve optimisation.

## The power of the cloud

Put these factors together and it becomes obvious why RTLS 2.0 technology offers savings on costs as well as better performance. Firstly, it drastically reduces infrastructure and communication costs. Using cellular without local infrastructure would be cheaper compared to building towers, however that would require high third-party network costs. But using one or two simple local radio devices can connect all GPS tags within a large yard or terminal area without third-party cellular costs.

How is that possible at yards stretching hundreds of acres? In a word, the cloud.

By leveraging the processing power of a large cloud network, a simple radio can go from reaching a few feet to covering miles. Combining this coverage with the analytics capabilities of the cloud data lake also allows OEMs to optimise vehicle movements and loading operations.

Such approaches also ensure vehicle location accuracy to within a few feet, reducing the search time for the vehicle to effectively zero, while significantly removing the amount of labour required to search for and double check 'missing' vehicles in yard audits.

# Talking about the next generation

## RTLS 1.0

- Fixed gate readers limit ability to track locations
- High investment for onsite local cellular infrastructure
- Third-party costs for cellular connection of devices
- Complex software and IT integrations
- Limited data processing and analytics

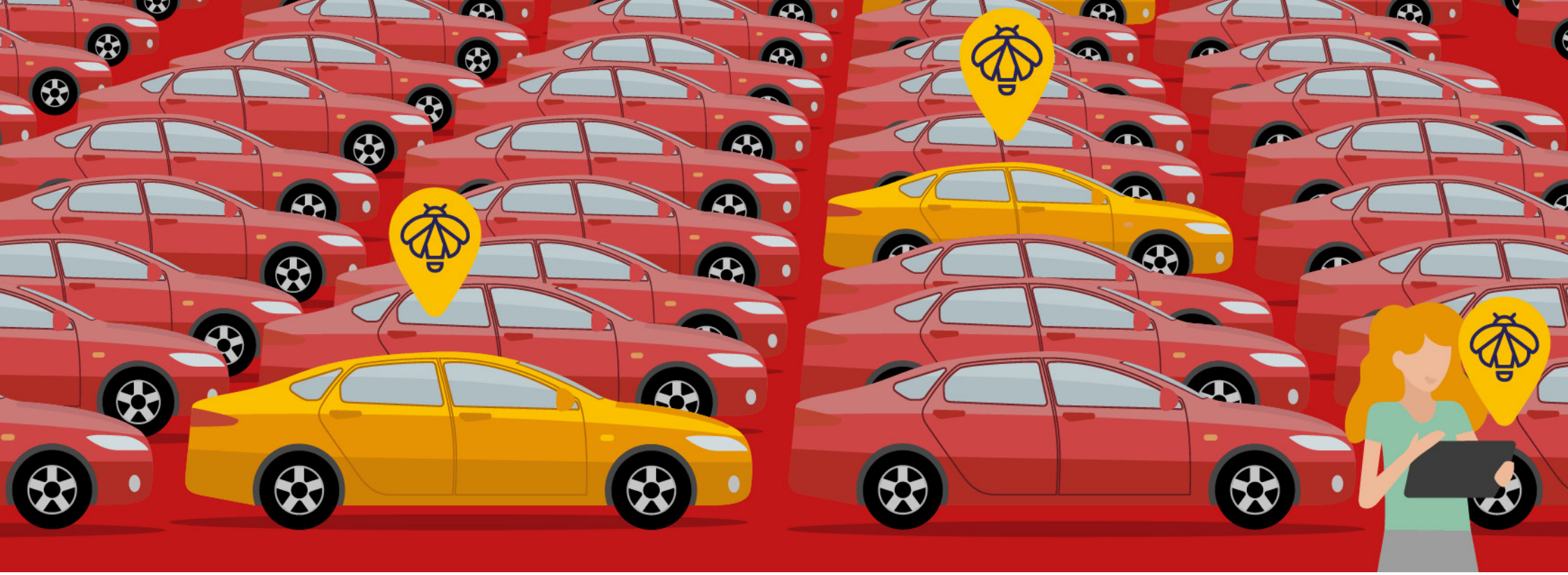
## RTLS 2.0

- Single radio gateway can serve entire facility
- Real-time, high accuracy tracking
- Browser-based software integration
- Cloud-connected, data analytics
- Entire solution offered as a service to minimise capex

# Chapter 2

## Real-time analytics, right out of the box

RTLS 2.0 vehicle-tracking technology offers a combination of hardware and software solutions that include real-time data and analytics reporting as standard, with easy integration to logistics IT systems



Cloud- and AI-powered software capabilities are key to RTLS 2.0 technologies. But to ensure a fast and effective ROI for vehicle logistics, the software needs to be combined with smart and affordable hardware.

Low-power, wireless radio protocols can enable surprisingly long-range communication. Cognosos, for example, uses radio equipment that covers entire automotive sites with one or two gateway devices.

Also important are the tracking tags themselves. For example, tags that feature the use of an accelerometer and GPS technology can take readings of the vehicle whenever it moves and transmit its position and parking place anywhere wirelessly to the cloud.

An effective software solution turns RTLS 2.0 technology from a fast ROI into real, recurring value. And, as a byproduct of the ability to track precise vehicle movement, users benefit from helpful data and analytics that can inform KPIs like dwell time or slow-moving inventory.

In solutions such as those offered by Cognosos, for example, users can also set geofencing alerts that are triggered when vehicles enter or leave zones or points across a terminal – an accessorisation or repair station, for instance. The system can also flag when unexpected vehicle movements take place or workflow processes are omitted.

“Finding a particular vehicle couldn’t be easier,” summed up Adrian Jennings. “Similar to the experience we have using maps on our mobile phones, the vehicle appears as a red dot on a map on employees’ screens, along with directions for how to optimally reach it: employees simply go straight to it, without wasting a second.”

In contrast to older generation vehicle location technologies, RTLS 2.0 solutions simply work. They don’t require a systems integrator, and instead come pre-integrated with software, ready to deploy, right out of the box.

**“Similar to the experience using our mobile phones, the vehicle appears as a red dot on a map on employees’ screens, along with directions for how to optimally reach it: employees simply go straight to it, without wasting a second.”**

**Adrian Jennings,** Cognosos

## Tracking vehicles as a service

Such a turnkey approach supports faster ROI for OEMs. Importantly, newer RTLS 2.0 providers also often offer technology solutions 'as a service'. For example, rather than an OEM or logistics provider investing hundreds of thousands of dollars upfront to purchase physical tags and wireless equipment, there are options to pay for the entire solution on a subscription basis. For monthly fees, users rent tags and equipment, along with software and integrations.

This approach further supports faster ROI by shifting a significant portion of the investment from upfront capital expenditure to running operational costs. While the rolling costs may be higher, they will be offset more quickly by the savings from improved visibility in accuracy and lower overheads.

That means a faster time to value for the investment. For a capital purchase, an operator would have to earn back the entire cost of the whole system before the benefits start yielding savings. In an as-a-service model, companies get positive value from day one. There are no more complex calculations of 'net present value' to justify a huge bill against savings that could be 18 months away.

# RTLS 2.0 features

Low power, long-range wireless communication that can cover entire facilities with one or two devices

Tags with accelerometers trigger GPS to record vehicle parking places

Cloud-based software providing analytics, dashboard reporting and geofencing

Easy integration with existing IT systems with minimal build-out time

# Chapter 3

## Accuracy and speed – unpacking the ROI

Assessing return on investment for tracking requires understanding impacts across the supply chain, but none as important as improving search time and location accuracy

Today, investment justification criteria in the automotive supply chain are tougher than ever. In an environment where potential investment cases must compete for a fixed budget, a payback of no more than a year is typically sought for logistics technology solutions, and often expected in as little as eight months.

Building that ROI involves looking beyond the obvious, easy-to-see, easy-to-measure benefits of an investment, said Richard Wilding, professor of supply chain strategy at Cranfield University's Cranfield School of Management.

"An iceberg comes to mind. Much of the time, a lot of the overall ROI of a strategically valuable investment is hidden below the waterline: to build the business case, it's necessary to include – and monetise – the benefits which aren't so obvious, and which aren't so visible."

While RTLS 2.0 uses advanced cloud and AI technology, most of the returns that it can deliver are obvious: the reduction in search time, along with the increase in locational accuracy and certainty. When a vehicle is where a system says it is, fewer employees are needed to correct mistakes, and fewer yard audits to rediscover missing vehicles.

But there are less obvious, but still significant benefits from that greater locational accuracy.

"The greater the value tied up in inventory, the greater the importance of visibility," said Steven Carnovale, assistant professor of supply chain management at Rochester Institute of Technology's

**"A lot of the overall ROI of a strategically valuable investment is hidden below the waterline: to build the business case, it's necessary to include – and monetise – the benefits which aren't so obvious and which aren't so visible."**

**Richard Wilding,** Cranfield School of Management

Saunders College of Business, and an associate editor of the Journal of Supply Chain Management.

"Visibility provides the ability to control, and with better control, it's possible to plan better," he added. "Better planning doesn't just improve productivity – its benefits ripple right through the downstream supply chain, in the form of increased availability, and leaner inventories."

Consider, for example, the process impact when a car cannot be quickly located. Repair or accessory specialists stand idle, or truck drivers wait with empty trucks. Carriers already build such inefficiencies in waiting times and truckloads into contract negotiations. With low vehicle inventory and mass driver shortages, who can afford to waste such time and resource further?

The combination of greater locational accuracy and improved visibility also reduces handling. That improves efficiency, while reducing the chance of damage to vehicles, which can be expensive to repair and lead to delivery delays.

Avoiding unnecessary vehicle and product movements also has sustainability impacts, said Mark Pagell, professor of sustainable supply chain management at University College, Dublin.

"Anything that can be done to reduce vehicle movement also reduces the impact on the environment, in the form of lower fuel consumption and fewer emissions. Over time, and over thousands of vehicles, the sustainability benefits can be significant."

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**Mark Pagell,** University College, Dublin

# Chapter 4

## Q&A: Investing in productivity

Adrian Jennings thinks OEMs are realising the reality that inefficient tracking just isn't worth it in an era of short supply and growing labour shortages, making the ROI case for real-time visibility that much clearer

# Adrian Jennings, Chief product officer, Cognosos

**Adrian Jennings joined Cognosos in March 2021 in this newly created position, leading on the company's product vision, roadmap, new feature development and commercialisation. He has more than 20 years' experience in real-time, asset-location technology and has also worked for the UK Ministry of Defence. He has an MA in physics from Oxford University.**

**The potential ROI of an investment in RTLS 2.0 technology such as that offered by Cognosos appears impressive for outbound. Why is the marketplace not seeing that same potential?**

From our perspective, a lot of automotive and logistics companies aren't seeing it because they're not looking for it. There's an element of 'boiled frog' syndrome at work: they're so accustomed to living with the poor productivity and process disruption of existing solutions that they're not actually aware that they're missing out on potential ROI. No one has been asking: 'Is there a better way?' But now that's changing, as finding that better way has become much more of an imperative.

**Can you elaborate on why improving this productivity now is so important?**

Right now, the automotive industry is in flux. Labour turnover is endemic: people are quitting jobs that they don't like and easily finding alternative employment that they do like. And ferrying vehicles around a yard all day, in all weathers, is one of those jobs that people don't like. Carrying out yard audits with a barcode scanner or RFID reader all day, in all weathers, is another job that people don't like. Continually hiring and inducting new employees is costly. And right now, potential new employees just aren't coming through. So being able to work with fewer employees makes a lot of sense.

There's another factor at work, too: a shortage of vehicles in the downstream supply chain. Component shortages – especially chips – are also endemic. Production volumes of vehicles are down, way down. Visit a yard and you'll see a lot of tarmac showing – although in some yards, you'd see that tarmac if it wasn't for the fact that the yards are being used for storing unfinished vehicles. So being able to make the best use of the vehicle inventory that is available makes a lot of sense.

**Some of these benefits are difficult to quantify, though. Productivity improvements resulting from lower manning levels can easily be measured, but other benefits are more challenging to quantify precisely. What's Cognosos's advice to the automotive industry?**

Our view is that the ROI of our solution is multi-layered. Improved productivity and lower manning levels are very obvious sources of ROI, but that doesn't mean that the other benefits of greater locational accuracy and certainty are zero. The benefits in terms of reduced process disruption are very much there – but they do take more work to calculate. Likewise, there are benefits to fewer in-yard vehicle movements, better planning, and being a carrier's preferred shipper. The resulting cost-avoidance is very real and it all contributes to the overall ROI. Do the calculations and the ROI of Cognosos's solution is very persuasive.

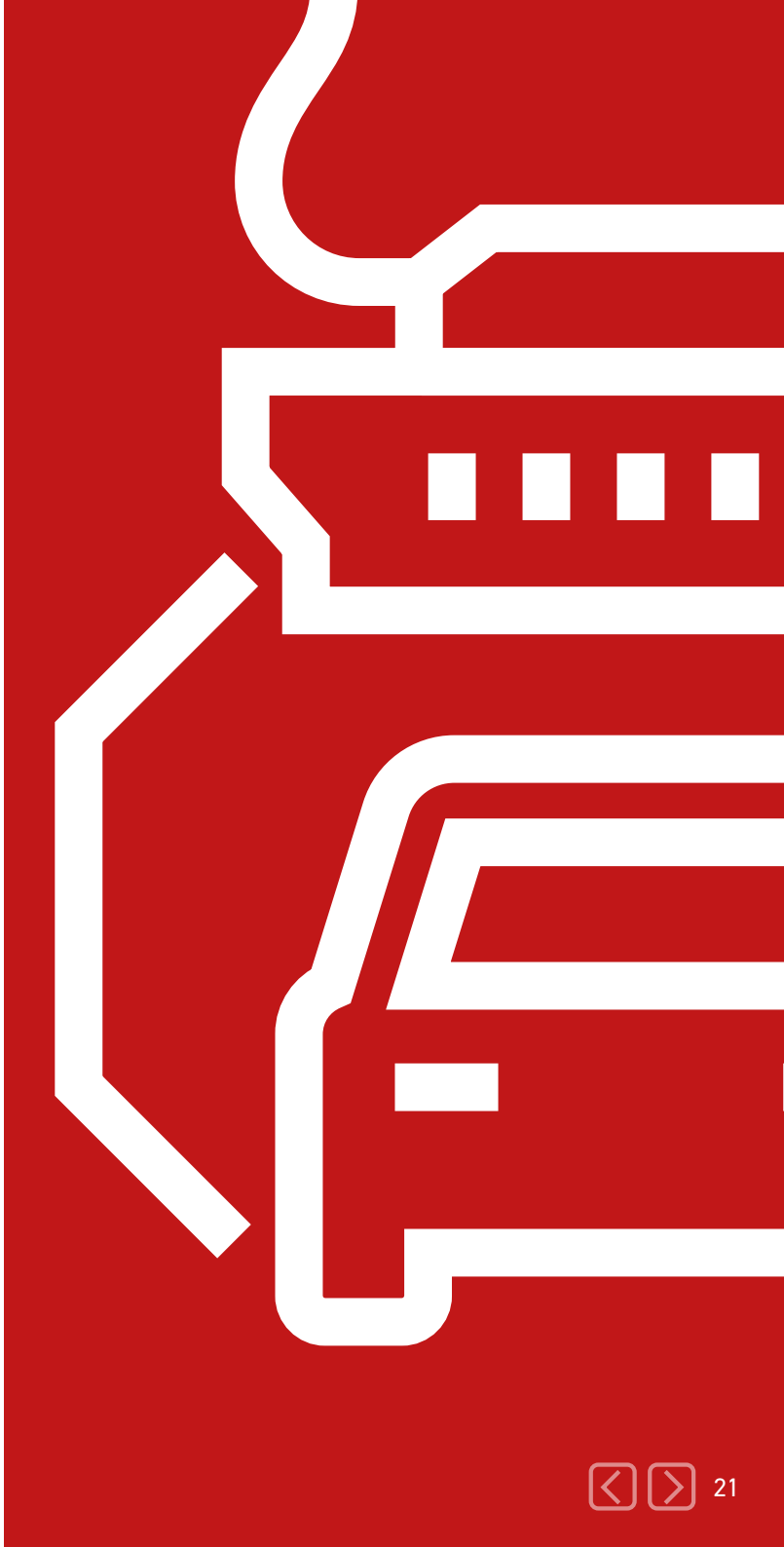
**“Likewise, there are benefits to fewer in-yard vehicle movements, better planning, and being a carrier’s preferred shipper. The resulting cost-avoidance is very real and it all contributes to the overall ROI.”**

**Adrian Jennings,** Cognosos

# Chapter 5

## Tagged for success – Hyundai Glovis case study

Since implementing an RTLS 2.0 solution at Kia's Georgia assembly plant, Hyundai Glovis reports significant productivity improvements at its vehicle processing centre



In mid-2018, Hyundai Glovis – which manages logistics on behalf of OEMs including Kia in the US – began using Cognosos technology at its 2,200-acre Kia assembly plant and adjacent vehicle processing centre yard facility in West Point, Georgia.

"We get 1,200 vehicles a day arriving from the assembly plant," said vehicle processing centre general manager Robert Carmichael. "Once it has arrived with us, each vehicle can be moved 8-10 times before it leaves, so keeping track of its location through all those moves can be a challenge."

In responding to that challenge, various approaches had been tried over the years. Originally, when the plant opened in 2009, RFID readers embedded in the parking lots had been seen as the best solution, which eventually evolved into an approach of using handheld scanners carrying out 'perpetual inventory' yard audits daily.

The manual work meant that each day as many as 20 vehicles could be designated as missing until located and scanned in. According to Carmichael, personnel using manual scanners would often walk 10-12 miles per day, sometimes in extreme weather conditions.

"Manually scanning vehicles to record their location in the yard had the highest turnover of any position," reveals Carmichael. "It was probably the most physically demanding job we had."

In 2017, a determined push began to evaluate alternative approaches. Plug-in solutions with cellular devices were examined, but eventually discarded.

"The costs were prohibitive: half a million dollars just for the basic infrastructure," he recalls.

In contrast, Cognosos's solution looked good from the start. "We quickly saw that it checked all the boxes: it didn't require a lot of power, it didn't require expensive infrastructure and its long range meant that two gateway devices could cover the entire site – the vehicle processing centre and the assembly plant. It did what we needed it to do."

Integrating the Cognosos solution into Hyundai-Glovis' existing systems proved straightforward, taking just a couple of days, and going live with the solution was uneventful. Immediately, it proved possible to dispense with the handheld scanner team, redeploying them elsewhere in the business.

Overall, says Carmichael, the Cognosos solution is credited with delivering a 15-20% increase in efficiency, a figure calculated by an internal process improvement group tasked with comparing the operation prior to the Cognosos deployment, and subsequently.

"The core metric that the group was looking at was the time taken from deciding that a particular vehicle was required, to getting that car to wherever it was required. With Cognosos, it speeded up considerably," he said.

"And over tens of thousands of vehicles that reduction in time mounts up, delivering a measurable increase in overall facility throughput time."

In short, Cognosos has delivered on Hyundai-Glovis's expectations.

"We knew that there had to be a better way and now we've got it."

The vehicle processing centre at Kia's West Point plant handles **1,200 vehicles per day**, each of which are moved **8-10 times** before leaving the yard. After switching to use Cognosos's tracking tags,

**vehicle cycle times improved 15-20%**

**“The core metric was the time taken from deciding that a particular vehicle was required, to getting that car to wherever it was required. With Cognosos, it speeded up considerably. And over tens of thousands of vehicles, that reduction in time mounts up, delivering a measurable increase in overall facility throughput time.”**

**Robert Carmichael,** Hyundai Glovis

# Conclusion: Clearer visibility of future vehicle logistics

The operational benefits of real-time, zero-delay locational tracking are obvious to all those working in today's vehicle logistics supply chains. The inability to locate vehicles moving through outbound distribution channels, and of those sitting in vehicle yards, is a pure productivity loss in high-volume, high-scale logistics, especially when faced with inventory and capacity constraints.

It makes less and less sense to rely on systems that require handheld devices to scan barcodes. Likewise, investing in technology that depends on fixed, sometimes unreliable, readers, or expensive cellular communication is to ignore the low cost, cloud-connected devices available today. And while in-vehicle telematics is a good step towards simplified tracking, this technology is constrained by when vehicles are turned on – something operators want to avoid as much as possible in outbound logistics processes. OEMs also still have inconsistent approaches as to whether such systems can even be used during vehicle distribution or not.

RTLS 2.0 technology, meanwhile, uses low-cost hardware, requires little infrastructure and connects to powerful analytics engines. By buying it as a service, users will also achieve a faster time to value, with immediate benefits through operational rather than capital expense.

As Robert Carmichael from Hyundai Glovis pointed out about the Cognosos solution that it uses, such technology is also independent of the vehicle's power source and gives real-time visibility every time a vehicle moves.

While the ROI is increasingly clear based on cost and productivity benefits today, OEMs and providers thinking ahead will see RTLS 2.0 as an important enabler of more digitised supply chains and distribution models.

The pandemic accelerated a pivot towards online sales and service, for example, services which continue to gain popularity. OEMs such as Volvo Cars, meanwhile, are selling electric vehicles online only, with major plans to ramp up digital models including vehicle subscription services.

Martin Corner, head of global supply chain management at Volvo Cars, told *Automotive Logistics* that real-time visibility of vehicles in the outbound pipeline would be essential for the carmaker to realise such ambitions. That would be the case not only for customers waiting for their vehicles, but for service and sales partners across the chain, who will need real-time visibility of vehicles at each touchpoint, including yard locations, loading times as well as where a vehicle might be on a car carrier.

"The finished vehicle logistics business can move toward a digital future but, if we don't adapt our stone age platform and execute it, the whole thing collapses," Corner said.

Ultimately, moving closer to this model won't depend on any single technology or solution, but a combination of tools. In-vehicle telematics to track satellite locations and monitor certain diagnostics will play a role. So, too, will leveraging connected devices to capture constant visibility of vehicles. And likewise, stakeholders will increasingly use data on location and inventory turns to optimise yard, terminals and routes.

RTLS solutions such as that offered by Cognosos can help OEMs to reduce downtime, labour and missing vehicles in operations today, and support this ongoing transformation in vehicle logistics. An ROI today can help future proof transport, yard and distribution operations tomorrow.

**"The finished vehicle logistics business can move toward a digital future but, if we don't adapt our stone age platform and execute it, the whole thing collapses."**

**Martin Corner,** Volvo Cars

# Credits




**Ultima Media**

401 King Street
Hammersmith
London, W6 9NJ
United Kingdom
www.automotivelogistics.media
+44 (0) 20 8987 0900

**Cognosos**

1100 Spring Street NW
Suite 300A
Atlanta, Georgia
30309 United States
www.cognosos.com
+1 (833) 736 7348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**Christopher Ludwig**
Editor-in-Chief, **Ultima Media**
christopher.ludwig@ultimamedia.com

**Marcus Williams**
Senior Content Producer, **Ultima Media**
marcus.williams@automotivelogistics.media

**Malcolm Wheatley**
Report author

**Gemma Wood**
Digital Designer, **Ultima Media**
gemma.wood@ultimamedia.com


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