

# CONNECTED CAR: OPPORTUNITIES FOR COMMUNICATIONS SERVICE PROVIDERS

## Cashing in on the Connected Car

The tremendous growth of the Internet of Things (IoT) presents enormous opportunities for network operators and communications service providers (CSPs) in all industries—but particularly in the automotive industry, where the connected car is the focus of intense innovation.

Today's connected car market is larger and growing even faster than many experts predicted, surging from 5.1 million units in 2015 to 37.7 million units by 2022, at a CAGR of 35.54 percent during that period, according to recent research.<sup>1</sup> The penetration rate of connected cars in North America, currently around 70 percent, will exceed 90 percent by 2020, according to Frost & Sullivan,<sup>2</sup> and the advent of the autonomous car will amplify the opportunities for service providers because IoT-based, content-driven services will become an increasing source of differentiation.

Automotive OEMs and tier-1 suppliers are jostling for first-mover position in delivering a new breed of network-based IoT services—from autonomous and assisted driving to emergency calling to on-demand TV and other infotainment capabilities—and this opens up new opportunities for CSPs to add value. With the automotive IoT sector focused on safety and advanced communications, next-gen networks and platforms can play a critical role in the vehicle-to-everything (V2X) ecosystem.

Capitalizing on the new opportunities will require three core capabilities: network modernization to accommodate fast-evolving cellular and mobile technologies; agile service innovation; and intelligent operations management to streamline operational efficiencies.

VMware has brought to market a proven, carrier-grade, network functions virtualization (NFV) infrastructure platform that has been tuned for CSP requirements. With optimized resource management and prioritization of resources based on CSP workloads, VMware vCloud® NFV™ ensures top performance, scalability, and high resiliency for critical network services, enabling CSPs to fully exploit the opportunities of the connected car.

### VCLLOUD NFV: UNLOCKING NEW OPPORTUNITIES

- New IoT business models with turnkey solutions
- Agile service innovation, onboarding, and automation
- Explosive growth through support for multiple connected devices
- Support for differentiated traffic profiles with massive bandwidth, highly available, and low-latency real-time applications
- Operations management with 360 degree visibility and analytics
- Lower cost per connection and overall operations

**“The hype may actually understate the full value of the Internet of Things.”**

—McKinsey Global Institute <sup>3</sup>

<sup>1</sup> SOURCE: MARKETSTOMARKETS PRESS RELEASE, MARCH 2017.

<sup>2</sup> SOURCE: FROST & SULLIVAN, APRIL 2015.

<sup>3</sup> MCKINSEY GLOBAL INSTITUTE, “THE INTERNET OF THINGS: MAPPING THE VALUE BEYOND THE HYPE,” JUNE 2015.

## Opportunities and Requirements: a Closer Look

The sophistication of services and capabilities in connected cars is not only driving increased connectivity densities and data rates but also differentiated class-of-service profiles. CSPs can capitalize on the revenue opportunities using their existing LTE/4G investments and continue to evolve on their road to 5G. Specific revenue opportunities for service providers include:

- **Converged communications** – CSPs can extend their core business services into the connected car ecosystem. Applications from converged telephony to advanced conferencing and collaboration, voice, video, and broadband can seamlessly enhance the car's private network services. But in order to be successful in the automotive IoT landscape, CSPs will need to forge tight partnerships with device makers, automobile manufacturers, content providers, and aftermarket automotive IoT devices and solutions.
- **Differentiated service levels and business models** – Capitalizing on the pervasive wide-area LTE coverage operators own today, the networks are geared to stand up to the quality and reliability requirements of V2X use cases. Next-gen networks (and evolution to 5G) can allow CSPs to offer differentiated service levels for massive broadband, low-latency, and low-power application needs with flexible per-connection, pay-as-you-go and subscription models.
- **Data intelligence services** – Data mining and analytics are at the core of connected car communications. With billions of events generated from the IoT devices, CSPs can leverage the collected data, location, and other contexts to create analytical models. Though end-user privacy and protection will continue to pose restrictions, aggregate models will enrich select use cases in communications, safety, infotainment, and remote operations.
- **Cloud services** – CSPs can offer turnkey high-value services in a secure multitenancy cloud-hosted model: remote operations, safety and emergency, fleet management and compliance, location aware services, over-the-air (OTA) device management, self-service portal, and service chaining, to name a few examples.
- **Managed services** – CSPs can expose their IoT platform investments to third-party service delivery and operations providers seeking to benefit from the service automation, secure multitenancy, and integrated operations intelligence. Additionally, core services in voice, video, and broadband can be wholesaled to other mobile virtual network operators (MVNOs) seeking to expand their service offers for IoT.

### Driving New Opportunities in the Connected Car

As LTE advances to 5G, mobile operators are accelerating their network modernization investments. They are leveraging network functions virtualization (NFV) and software-defined networks (SDN) to construct and deliver exciting new IoT-based services—encompassing a broad range of connected car use cases including:

- **Communications** – Operators can extend the footprint of traditional LTE/4G connectivity and communications into the connected car converged network: high-speed broadband and voice/video telephony and conferencing. As they evolve their infrastructures with LTE-V, LTE-direct, LTE-broadcast, NB-IoT, and 5G technologies, they also open up a whole new world of V2X use cases.
- **Safety** – The automotive industry has made significant strides in the driver and pedestrian safety arena. Continuing to accelerate the roadmap requires adding high-value, location-aware autonomous Advanced Driver Assisted System (ADAS) capabilities, lane-level accuracy with Global Navigation Satellite Systems (GNSS), emergency calling and roadside assistance, telematics-driven insurance incentives, fleet management, and compliance, to name a few.
- **Infotainment** – Consumer applications extending into the car’s private network include range-in-traffic management/routing, payments, multimedia, advanced navigation, location-aware contextual services (charging stations, next gas pump, parking availability, service stations), etc.
- **Remote operations** – This growth area initially started with basic capabilities such as find-my-car and schedule-routine-services, and now includes advanced capabilities such as remote diagnostics, preventative maintenance, ready-my car, emissions control, fuel efficiency, configuration management, service chaining, and more.

To meet the diverse requirements of providing services for the connected car—spanning growth in the number of devices, compliance, and stringent latency needs—mobile operator networks need to be transformed and modernized, with lower cost structures and faster service innovation and delivery. Fully exploiting the opportunities presented by these and other use cases will require three core capabilities, as described below.

#### Network Modernization for Differentiated Automotive IoT Services

CSPs and network operators will need to support 5G and enable both broadband and narrowband classes of service within the connected car. For example, autonomous, assisted driving, and emergency calling services will require low-latency and high availability, while infotainment services such as multimedia streaming will be more forgiving.

Operators will need to find ways to capitalize on their existing LTE investments and augment improvements over Dedicated Short Range Services (DSCR/802.11p) V2V communications with superior radio, ubiquitous coverage, mobility management, long-range coverage, latency, etc. They will need to explore advanced carrier aggregation to solve capacity issues, support low-powered endpoints, and deliver low latency for real-time applications leveraging distributed mobile edges and evolved LTE technologies (direct, broadcast, vehicle), and they will need to expand coverage density, security, and other capabilities.

The need for V2X support will be paramount in the connected car, including:

- Vehicle-to-vehicle (V2V) communication for traffic control and ADAS
- Vehicle-to-network (V2N) for network and cloud value-added services
- Vehicle-to-pedestrian (V2P) for safety-related services
- Vehicle-to-infrastructure (V2I) for integration with road infrastructure for traffic control and notification

The role of the operator to enable such an agile and multitenant environment will be a key to success. And while VMware vCloud NFV security provides transport, edge, and application-level network security, physical access to the car, including hardware, embedded services, ports, etc. will continue to pose exploitation risks.

### Service Automation—Agile Creation and Deployment

Network operators and CSPs need the ability to accelerate ideation, exploration, refinement, and deployment of innovative new services, along with the ability to automatically and programmatically deploy service components rapidly. That means they need to automatically and intelligently allocate the appropriate resources to each virtual workload, where and when needed. And they need an infrastructure that can seamlessly automate the on-boarding of virtualized network functions (VNFs) from multiple vendors in a truly open ecosystem.

### Simplified and Integrated Operational Intelligence

The portfolio of connected endpoints, services, networks, topologies, and customers compounds the operations landscape significantly for the CSP. The network operator needs the ability to automate service monitoring, lifecycle management, and resiliency in a simplified manner across the multitenant services deployed over shared infrastructure. Continuous and integrated operational intelligence is critical across such slices of networks and services to ensure elevated service levels, capacity and performance, dynamic scale and optimization, faster issue isolation and remediation, security, and compliance. The solution needs to sustain traditional analytical workflows as well as near real-time applications with closed-loop decision making.

### vCloud NFV: Accelerate Delivery of Automotive IoT Services

The vCloud NFV platform delivers on all of the demands described above, enabling CSPs to capitalize on the burgeoning revenue opportunities presented by automotive IoT services. vCloud NFV provides the necessary horizontal platform with carrier-class capabilities in automation, secure multitenancy, and simplified operations, and protects investments as CSPs evolve to 5G networks.

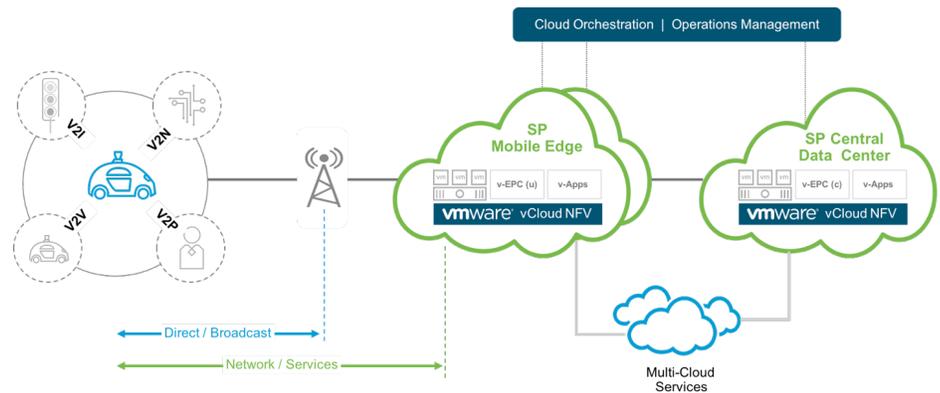


FIGURE 1. Automotive IoT Opportunities for CSPs

- Transformative new business onboarding.** The vCloud NFV platform supports private data center and public cloud platform services, and allows for centralized rapid service and network on-boarding and end-user-friendly service catalogs. Service delivery and operations can be fully automated in a multitenancy environment, enabling self-service workflows and dynamic service chaining, provisioning and integrated OSS/BSS workflows using northbound APIs. Tenants and applications can be tailored with differing SLAs to meet customer needs.
- Low-latency, modernized networks.** The benefits of software-defined networking and services enable CSPs to deliver low-latency networks, aligned to 5G principles. vCloud NFV provides flexible deployments spanning multiple data centers with mobile edge computing; disaggregation of user/control planes across edge and central topologies; and dynamic optimization of workload scale and placement to meet the low latency needs for real-time applications. V2V, V2P, and V2I, for example, can benefit from mobile edge computing with forwarding planes placed in proximity to serve a target locality/geography and assisted cellular communications using LTE-Direct and LTE-Broadcast, for example.
- Optimized delivery with service and network isolation.** The platform supports multitenancy with network and service slicing to meet V2X requirements. Striping across radio access technologies, access networks, edge and centralized resource platforms, networking, and applications are flexible configurations to ensure optimized delivery and service levels tuned to each customer. V2N cloud services such as traffic congestion control and real-time routing, for example, can be placed in a highly prioritized container with prioritized resource and availability SLAs.
- Secure communications.** vCloud NFV enables strong security between cars, networks, and infrastructure. Specifically, it delivers complete service separation in a secure multitenant environment across NFVI functions (virtual compute to networking) via a range of capabilities and features including micro-segmentation with fine-grained access controls for provider and tenant administrators; transparent integration at the virtual infrastructure management layer; delegated role-based access control (RBAC) for fine-grained resource access; cross-vCenter security policies, allowing operators to apply security policies consistently on objects across multiple VMware vCenter® services (network edges and inter-VM); and more.
- Simplified operational intelligent and management.** The platform provides centralized tenant-level operations management and visibility, allowing service providers to continuously monitor the entire infrastructure for faults, performance, capacity, configuration, and compliance issues and dynamically optimize to ensure SLAs.

### 5G READY—DELIVERING ON AUTOMOTIVE IOT NEEDS

- Highly flexible network topologies with low latency mobile-edge computing
- Network sliced multiple bearers, segmented by bandwidth, radio access technology, locality
- Optimized forwarding plane with proximity mobile edges
- Centralized control and common functions
- Localized eNodeB domains for LTE direct and broadcast
- Higher SLAs sustaining ubiquitous superior networks, coverage, and mobility management
- Centralized service automation and operational intelligence

### VMWARE vCLOUD NFV DELIVERS:

- **Reliability.** Tested, optimized, and proven NFVI in over 70 NFV implementations worldwide
  - **Interoperability:** 100+ Telecom Technology Alliance Partners, 15+ Certified NFV Partners through VMware Ready for NFV program
  - **Extensibility.** Ability to extend and unify automation and control in a cross-cloud environment: IT, NFV, public and managed clouds
  - **Operations.** End-to-end operational intelligence and management from physical layer to applications and VNFs
  - **Support.** VMware first carrier-grade support for NFV
- **Cloud ready.** Automotive IoT use cases benefit from chaining and orchestration of hybrid-cloud services, allowing CSPs to offer organically built and controlled private cloud services along with public cloud offers. Service providers can enrich their bundled offers leveraging the maturing ecosystem of SaaS vendors, automakers, and aftermarket connected car IoT players. IoT solutions in fleet management, emergency call centers, roadside assistance, multimedia content distribution, micro payments, remote diagnostics, and data analytics are potential examples.
  - **Lower operating costs and service risks.** Software-defined network functions not only help ensure lower service operating risks but also simplified service delivery through centralized cloud management and automation. Service providers can reduce costs with integrated operations and management into a VMware NFV virtualized cloud and use infrastructure hardware in the most efficient way possible to roll out secure multitenant service offers across new industries and business models.

### VMware: Unique Advantages for Service Providers

A technological and market leader in virtualization technologies, VMware delivers significant performance, scalability, and high resiliency advantages for critical network services. By teaming up with VMware, CSPs benefit from:

- **Faster deployment and agility with advanced networking and security.** vCloud NFV embeds networking and security functionality and provides a complete set of logical networking elements and services including switching, routing, QoS, and monitoring that can be programmatically provisioned and managed. Networks and VNFs are secure from any outside threats with automated, fine grained policies tied to the virtual machines.
- **Carrier-grade platform.** The high-performance capabilities offered in vCloud NFV deliver a highly scalable NFVI platform that meets carrier-grade network requirements.
- **Automated and orchestrated network infrastructure.** vCloud NFV provides a VIM that controls and manages the NFVI compute, storage, and network resources. CSPs can automate and orchestrate network infrastructure without worrying about the underlying physical configuration of resources. As a result, service providers can accelerate and simplify network provisioning and launch new services faster to market.
- **Simplified operations and improved network performance.** vCloud NFV delivers 360-degree visibility and single-pane-of-glass management and monitoring, along with predictive analytics and logging insights to give service providers greater control of their network. With policy-based automation, service providers can streamline key network processes and allocate and provision VM resources to rapidly provision and deploy VNFs. In addition, service providers can optimize and manage capacity by dynamically allocating and balancing VMs to guarantee optimal access to VNF resources.
- **Growing partner ecosystem.** VMware has also brought together the largest partner ecosystem of VNFs for vEPC and vIMS deployments. Working with those partners, VMware offers pre-certified VMware Ready™ for NFV turnkey solutions that can deliver an evolved network in hours or days as opposed to months.

## vCloud NFV: Removing Key Barriers for Business Transformation

VMware vCloud NFV is a fully integrated, modular, and extensible NFV infrastructure platform. It allows multivendor VNFs to share a pooled capacity of resources that can be intelligently orchestrated and automated for the provisioning and delivery of services in a cross-cloud environment. This enables service providers to support an elastic business model of multicloud services and personalized offerings while simplifying and automating networks, accelerating time to market, and reducing TCO.

GET STARTED TODAY

New opportunities  
with vCloud NFV

[LEARN MORE >](#)

Join Us Online:

