



State of the Market: Internet of Things 2017

Making way for the enterprise

verizon✓

Executive summary

IoT is at the core of digital transformation

From farm to fork, food producers are collecting and leveraging data from tens of thousands of internet-connected sensors to better manage the quality, safety and distribution of their products worldwide.

Sprawling healthcare complexes are leveraging IoT-enabled track and trace capabilities so medical personnel can quickly locate critical emergency equipment needed for urgent patient care.

Cities and communities are looking at ways to improve citizen engagement, quality of life and safety while bridging the digital divide through IoT and infrastructure upgrades.

Across the energy and construction industries, companies are deploying IoT-connected unmanned aerial vehicles – “drones” – instead of dispatching workers to perform inspections, maintenance and other high-cost tasks.

Even the insurance industry has taken to the skies in a big way, with 70% of Fortune 500 property & casualty companies tapping network-connected drones to perform inspections and other claims-related work¹. It's no longer a question of if or when, but rather of just how deeply IoT will transform the industry going forward.



No turning back

In our view, 2016 was the year IoT gained significant momentum in the enterprise. In 2017, it is clear there is no turning back. Businesses are laser-focused on IoT as an enabler of sustainability, safety and economic growth – with 73% of executives either researching or currently deploying IoT, according to a survey of industry executives commissioned by Verizon². By digitizing their most important assets and processes through IoT – everything from fleet and pharmaceutical tracking to data analytics that support public safety and sustainability efforts, enterprises are banking on:

- Dramatically growing their businesses.
- Increasing operational efficiency.
- Delivering an unparalleled experience to partners and customers.

Yet this is happening at a slower than expected pace. Here's why.

An absence of industry-wide IoT standards, coupled with security, interoperability and cost considerations make up over 50% of executive concerns around IoT, according to Verizon's survey².

Most enterprise IoT projects are in the proof of concept or pilot phase, not in production³.

In the industrial sector, in particular, “companies are often constrained by long capital cycles, organizational inertia and a shortage of talented staff that can develop and deploy IoT solutions,” McKinsey & Company notes³.

For now, businesses seem most focused on simpler use cases to track data and send status alerts. These are easier to deploy but lack data analytics capabilities. Yet, because these simpler projects generate value more quickly, customers will remain focused on them, at least for the immediate future, according to the McKinsey & Company report. And this means they will not obtain full value from IoT.

What's new and what remains the same.

Pace aside, great strides have been made in the last year, especially on the cost, security and technology fronts.

Gartner, Inc. forecasts that 8.4 billion connected things will be in use worldwide in 2017, up 31% from 2016, and will reach 20.4 billion by 2020. Total spending on endpoints and services will reach almost \$2 trillion in 2017⁴.

Last year, we reported on advancements in technology, data and integration – all of which were brought together through platforms and services that often seemed disparate and complex.

This year, simplified end-to-end solutions, low cost IoT technologies and connectivity solutions, and new regulatory requirements around food safety, pharmaceuticals, energy and the operation of commercial drones, are driving IoT deployments. For example, to comply with the US Drug Supply Chain Security Act (DSCSA), pharmaceutical manufacturers, distributors, and the various logistics and transportation providers in between, are leveraging IoT solutions to track and trace medicines from production to patient.

Innovation in IoT and network technologies is advancing rapidly, while costs are declining. Pricing of new Category M (Cat-M) connection modules used in IoT sensors has dropped to a fraction of the cost they once were. And with the low cost of connectivity, the addressable market expands. As a result, companies are deploying more sensors, collecting more data and tracking more goods and assets. In March, Verizon launched the first nationwide 4G LTE Cat-M1 network. Designed specifically for IoT use, the Cat-M1 network offers flexible data plans at competitive rates.

Competitive pricing will rapidly drive new use cases. And new connectivity options, including NarrowBand-IoT (NB-IoT), combined with more secure platforms are opening the doors of innovation in enterprises. Lower latency and higher throughput options are also coming to market. This is the year we will see more developments around the first 5G networks. 5G is expected to be up to 100 times faster than existing networks, it also promises to be more efficient and have lower latency rates. As such, experts expect 5G to massively expand IoT applications and drive innovation across all industries.

Getting up to speed: The evolution of IoT connectivity

- **2G** – A network protocol that allowed the most basic smartphone functionality: simple text messaging and very small amounts of data.
- **3G** – A network protocol supporting services that provide an information transfer rate of at least 2 Mbps, allowing larger data formats, including music and video.
- **4G LTE** – The fourth generation of mobile communications technology (established in March 2008). LTE is a mobile communications protocol established by the International Telecommunications Union. The acronym stands for “Long Term Evolution,” and was more or less established as the “path” along which wireless broadband capabilities would continue to expand as demand increases. 4G LTE currently delivers the fastest wireless connection for a mobile internet experience – up to 10 times faster than 3G.
- **Low-Power Wide-Area Network (LPWAN) or Low-Power Network (LPN)** – A type of wireless telecommunication wide area network designed to allow long-range communications at a low bit rate among things (connected objects), such as sensors operated on a battery. Examples of LPWAN networks include LoRa and SigFox.
- **Cat-M** – A new class of LTE chipset specifically designed for sensors. Earlier this year, the first 4G LTE Cat-M1 network launched, affording low-cost connections for commercial IoT endpoints.
- **NB-IoT** – An LPWAN radio technology standard that has been developed to enable a wide range of new IoT devices and services to be connected using cellular telecommunications bands.
- **5G** – A new protocol which is expected to be up to 100 times faster than existing networks and will have an additional advantage of low latency. In February 2017, Verizon announced 5G trials in 11 markets throughout the US. Verizon is collaborating to accelerate global commercialization of 5G through the Verizon 5G Technology Forum.

5G's low latency, throughput and efficiencies are critically important in the development of technologies like autonomous mobility, supporting innovation in drones, fleets, consumer vehicles and more.

What has not changed is perception of the number one barrier to large-scale IoT deployments in the enterprise – security concerns. The concerns are justified. Verizon's 2017 Data Breach Investigations Report analyzed 1,935 confirmed data breaches and 42,068 incidents. It found that no locale, industry or organization is bulletproof when it comes to the compromise of data. Perpetrators' main motives: financial gain and/or espionage⁵.

But is the risk too great to go forward? Not according to Gil Press, a consultant focused on IoT and other technology topics.

"The lack of standards and security risks will continue to slow down the adoption of IoT for years to come," Press says. "But the sudden emergence of a 'killer app,' possibly in the enterprise rather than in the consumer market, could accelerate IoT adoption regardless of any security and interoperability concerns⁶."

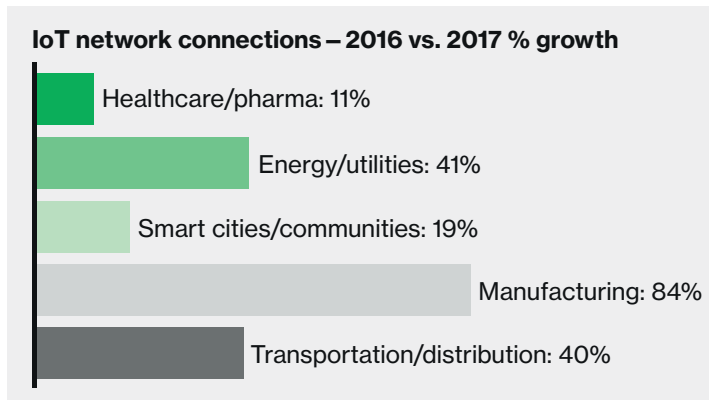


Figure 1: Year-on-year growth in Verizon IoT network connections

The big three: Simplicity, scalability and security

Security is the biggest concern, but not the only demand enterprises have. Businesses also want scalability and simplicity from IoT, and industry-wide, technology providers are partnering to provide end-to-end services to meet their demands. The evolution of IoT platforms that offer industry-specific applications and extensive data analytics are streamlining the enterprise IoT experience. Municipalities, in particular, are leveraging these IoT developments to create and extend smart city services, such as smart parking, smart lighting, citizen engagement and public safety services.

Overall, IDC predicts that the worldwide installed base of IoT endpoints will grow from 14.9 billion at the end of 2016 to more than 82 billion in 2025⁷.

Yet companies are just at the very beginning of uncovering new data-driven revenue sources and delivering enriched customer experiences.

For now, the bulk of new IoT analytics applications and services are concentrated in the B2B market. In addition to predictive maintenance, popular use cases are inventory management, fleet and asset management, and remote patient monitoring.

This growth will propel major efficiency and productivity gains as enterprises discover innovative new use cases for the devices and simple, low-cost connectivity options continue to become available.

The bottom line: IoT is open for business.

The Internet of Things becomes enterprise-grade

Reaping benefits beyond regulatory compliance

Regulatory compliance remains a driving factor behind enterprise IoT adoption.

In the pharmaceutical industry, for example, drug manufacturers have until November 2017 to mark packages with a product identifier, serial number, lot number and expiration date – plus have the capability to electronically store and transfer all transaction histories, including shipment information, across their distribution supply chain. The US Drug Supply Chain Security Act is designed to thwart counterfeit drugs, which cost the industry anywhere from \$75 billion to \$200 billion annually and can make up half of all drugs sold in some low-income countries⁸.

Yet increasingly, enterprises are reaping IoT benefits beyond compliance capabilities. More connectivity options, efficiency increases, better customer relationships and business growth are just a few.

According to Verizon's survey, customer service (33%), management of assets (26%), and production and delivery capabilities (25%) are among the top IoT deployment objectives in their businesses².

Consider the case of the global pharmaceutical company that manufactures pain medication and is shipping a \$100 million order to a regional distribution center. Sensors in the containers monitor location, temperature and geo-fencing parameters on the shipment. When a major accident occurs, the driver is forced to take an alternate route. This triggers an alert, notifying the manufacturer that the geo-fencing parameter has been violated. In turn, the dispatch contacts the driver, confirms the situation and pinpoints the shipment using GPS.

This near-real-time data will allow the company to reset expectations for delivery, thus preserving the customer relationship and protecting the brand by accurately tracking shipments, and providing updates regarding location and temperature during transit.

In the energy sector, what began in 2007 as a nationwide effort to monitor energy consumption under the Energy Independence and Security Act has evolved to an installed base of hundreds of millions of digital meters supported by remote reading and other smart grid apps.

But enterprises are already leveraging IoT data about grid capacity, demand and usage to more efficiently manage the energy grid and provide more value-added services to consumers.

The emergence of intelligent energy platforms, such as Verizon's Grid Wide Utility Solutions, provide utility companies with an easy on-ramp to smart grid modernization. Dakota Valley Electric Cooperative and Peninsula Light Company are two of a growing number of utility companies leveraging this secure platform-as-a-service to achieve better operational visibility. Grid Wide enables them to better monitor consumption, manage remote disconnections and detect outages more quickly. The result: lower service restoration times and increased customer satisfaction.



Clear skies for commercial drones

Enterprises are taking flight

By far, the biggest regulatory news in the last year is the Federal Aviation Administration's (FAA) easing of rules surrounding the operation of unmanned aerial vehicles (UAVs) or drones. To fly a commercial drone, operators now need to pass an aeronautical knowledge test rather than earn a more expensive pilot's license. After making this regulatory change in August 2016, the FAA predicted a dramatic increase in drone usage, with 600,000 commercial drones in the air by the end of 2017, up from the 2016 figure of 20,000⁹.

In short, the new regulations greatly simplify access to air space. However, the on-ramp can be complex – everything from securing airspace to insurance requirements, equipment maintenance and crew management. To date, drones have been deployed primarily in military and public safety scenarios. Going forward, analysts expect enterprise and commercial use cases to expand exponentially. Companies like Skyward, a Verizon company, have worked to simplify drone operations.

Revenues from drone sales will reach \$12 billion in 2021, up from \$8.5 billion in 2016¹⁰.

With the evolution of regulations, analysts at Goldman Sachs also see drones “headed for new heights in the business world,” adding up to a \$100 billion market opportunity over the next five years. Even that figure is “just the tip of the iceberg,” according to Goldman Sachs Research¹¹.

Drones equipped with cameras and sensors can stream real-time data about the health of crops in the field, or maintenance conditions of hard-to-reach pipelines, communication towers and raw material stockpiles. This will be enabled by advancements in network connectivity through Verizon's Airborne LTE Operations (ALO) initiative, allowing drones to stream video and transmit data to a computer or smartphone on the ground.

Pacific Gas & Electric (PG&E) is testing drones to enhance the safety and reliability of its electric and gas service. It's also exploring the use of drones to monitor hard-to-reach infrastructure and to detect methane leaks. Rather than dispatch a \$2,500-an-hour helicopter crew for the job, it can use a drone.

Industry experts expect drone technology to be adopted as ubiquitously as the internet, and Verizon is now well positioned to be among the earliest providers of a full-service platform. Platform services will range from flight planning and fleet management to data collection, storage and analysis – all of which will be incorporated into Verizon's ThingSpace platform.



Case study

Based in Greeley, Colorado, Hensel Phelps Construction Co. is one of the largest general contractors and construction companies in the United States, with a diverse range of domestic and international construction projects and a drone operations program that is one of the most sophisticated in the industry. Hensel Phelps saw the potential for unmanned aviation to make its design and construction processes more efficient. It does so by working with Skyward to streamline drone operations and seamlessly incorporate it into their business, cutting costs and keeping safety top of mind.

It's now able to easily track pilot hours, flight records and maintenance for its fleet of drones and has deployed them for a variety of use cases, including building inspections, data gathering for architects, surveying, and HVAC efficiency inspections.

Top five markets for commercial drones

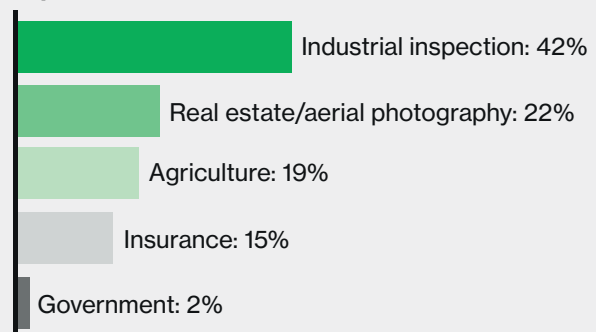


Figure 2: Use of drones, by industry⁹

Ascending the data value chain

Converting IoT data streams to cost savings and business value

The better enterprises get at collecting, integrating and analyzing IoT data (also known as machine-to-machine or M2M data), the greater the business value. Executives can make informed decisions based on real-time conditions, as well as increasingly accurate predictive scenarios.

Today, companies have much more data, and many more data sources than ever before. But the data is of absolutely no help if it can't be cost-effectively stored, analyzed and used to make intelligent business decisions.

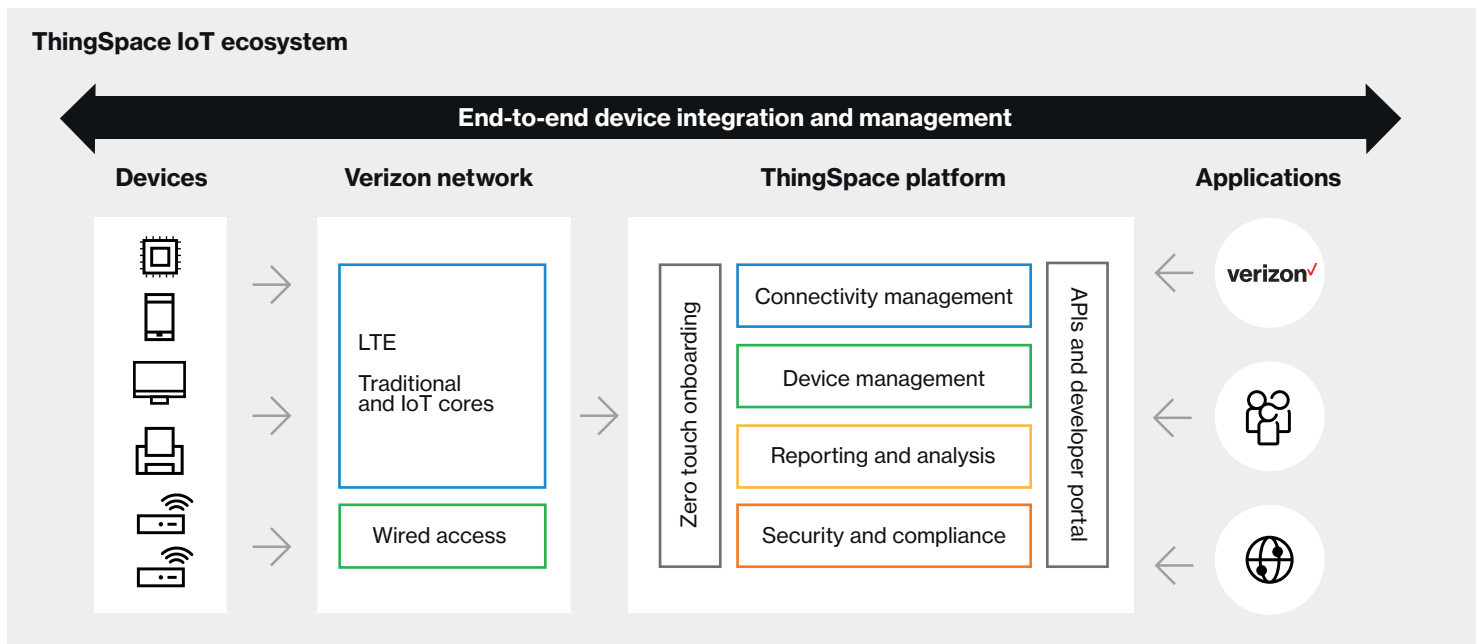
Up until now, the challenge has been managing, integrating and securing all of the required data, plus having access to tools that enable developers to build IoT applications.

That's where platforms come in and are changing the game – fast. Today's IoT platforms address head on the complexity and fragmentation enterprises have faced in creating and leveraging IoT applications to realize measurable business value.

Overall, the IoT platform market is expected to grow 35% per year to \$1.16 billion by 2020¹².

Simply put, platforms provide enterprises with a quick on-ramp to IoT by bringing together all of the components needed for an IoT solution. Verizon's ThingSpace platform, for example, provides a web-based, open development environment that becomes the “one pane of glass” for customers and developers to manage, develop and deploy IoT solutions. The availability of mature platforms simplifies the development process, and enables enterprise users to create new product and service categories – broadening the revenue stream and boosting customer service in the process.

The ThingSpace IoT ecosystem furnishes full, end-to-end device integration and management, giving developers secure and simple access to a range of development tools and services, including reporting and analytics. Enterprises are in full control of their applications, easily and quickly activating and/or suspending devices as business requirements change.



Asset management and the new sharing economy

There's a platform for that

Converting data to new products and services and, ultimately, to business value is the name of the game. To help enterprises get there, providers are rapidly creating and expanding platforms that offer out-of-the box applications as a service, such as equipment sharing, and track and trace capabilities. In turn, companies across all sectors are quickly developing use cases and can even brand the experience as their own offering.

Verizon Share solutions, for example, offer a platform that integrates all of the data and functionality needed to track and manage shared assets, from large construction equipment to campus-based bicycles. Use cases are proliferating as both business and consumer preferences shift from ownership to "usership."

Universities and corporate office parks can offer students and staff new alternative transportation options that improve accessibility, address parking issues and help achieve sustainability targets.

Using Share, resorts, adult-living communities and golf courses can offer customers a way to search, locate and reserve electric scooters, paddleboards and other recreational equipment from their smartphones – offering their clientele convenient and unique services, while driving new revenue.

Another example of asset tracking is the Verizon Intelligent Track and Trace platform, which has a Cold Chain solution that provides enterprises with GPS location tracking and temperature monitoring of shipments throughout the supply chain – especially important for healthcare manufacturers shipping vaccines and other high-value, temperature-sensitive goods. Businesses can set sensor thresholds to monitor temperature-sensitive cargo, giving them more proactive quality control over shipments of perishable goods. Cold Chain can also integrate with Serialization, another part of the Intelligent Track and Trace platform, for seamless quality control to assist customers with regulatory guidelines.



Case study

Columbus Yellow Cab is using Verizon Share solutions to automate and streamline the cab reservation and payment process for its full fleet of cabs and drivers across Ohio.

Yellow Cab's drivers, known as Driver Partners, will leverage Verizon Share solutions to more easily locate and rent available cabs, creating an on-demand, self-service approach to gaining access to vehicles. Normally, Driver Partners lease vehicles from Yellow Cab on a daily, weekly or longer basis, forcing them to repeat basic administrative duties and adding wait times to passenger pickups. Verizon Share solutions save Yellow Cab's drivers time and money by enabling fleet sharing city-wide.

Delivering smart, sustainable energy solutions

IoT is working to reinvent the energy and utilities industry by automating and enhancing distribution grids with technology like Verizon's Grid Wide Solutions platform. Electric, gas, water and other energy providers are tapping sensors and integrated IoT energy platforms to improve water management, boost security, address compliance, and deliver new and enhanced customer services.

Smart meters and other connected equipment are streaming up-to-date information about energy consumption and operations, enabling utility enterprises to identify patterns and trends, and better manage infrastructure and operations.

Utilities can provide new and enhanced services, such as outage management and energy budgeting with smart meters. Smart meters also deliver operational savings through automated meter reading.

Perhaps more so than in any other industry, IoT is playing a central role in the overall modernization of the energy sector. Financial benefits for companies that do install smart energy grids could reach up to \$157 billion, according to Business Intelligence¹³.

Security is, of course, critical to both energy providers and customers. Verizon's Grid Wide Solutions platform addresses this key requirement by providing an integrated and secure communications network for remotely reading smart meters.

By delivering smart energy grid as a service, Grid Wide also turns each of the utility-owned meters into a power-quality sensor that provides enriched data.

The pre-configured data and analytics dashboards provide timely information regarding outages and abnormal usage patterns, while also helping utilities drive revenue.

This lets utilities understand not just the quantity, but the quality of the electricity they are delivering to customers. The utility's smart meter communicates its meter data over Verizon's wireless network, through Verizon's private network and then to Verizon's cloud environment.



Case study

An electricity distribution utility is using a smart meter and smart-grid cloud platform to detect outages, and control operational costs associated with manual readings and reactive repairs.

Smart Metering platform-as-a-service combines 4G LTE connected smart meters with Verizon's wireless and Private IP network and smart metering technologies to give the utility:

- Meter reading and control.
- Outage and restoration notifications.
- Actionable insights.
- Data for future growth planning.

With this platform, the utility better manages service and monitors consumption, and detects outages more quickly – helping to lower service restoration times and increase customer satisfaction.

Smart communities

Safer, more informed citizenry

Generally speaking, cities and municipalities are not traditionally seen as being at the forefront of innovation, but they're making significant strides.

This is due in part to the fact that city officials are leveraging IoT and tapping into all kinds of data to make their cities safer, healthier and more efficient. In doing so, they are catering to the longtime urban citizenry plus the legions of young professionals flocking to urban areas where they demand 21st-century municipal services. The ever-increasing implementation of low-cost sensors coupled with IoT platform technology is enabling cities to track and act on – often proactively – a vast array of information, ranging from street disturbances to traffic conditions and air pollution.

This is one of the primary reasons why mayors and other city officials are among the most vocal proponents of IoT-enabled municipal services. In the last year, Chief Information Officers (CIOs) across several large cities have formed a Council of Global City CIOs to share best practices and to encourage a variety of projects, such as municipal Wi-Fi, movement analytics, waste management and water utility management.

The mayors of the world's largest cities cannot do it alone, and, in many cases, it's becoming clear that strategic partnerships are the vehicle to help move them forward.

Verizon's Smart Communities and Venues platform and services enable municipal enterprises to securely collect, store, manage, track and analyze data about parking, lighting and traffic conditions – even potholes. In doing so, city officials can anticipate and reduce traffic congestion, and predict and fix infrastructure issues before they occur – creating safer, more efficient and more economical services for citizens overall.

Free Wi-Fi has already caught on in a big way, with San Francisco, Baltimore, Albany, NY, and Washington, DC among the growing number of municipalities offering a free service. Verizon is working with the city of Sacramento to provide free Wi-Fi in public parks, among other initiatives, as part of a Public-Private Partnership between the city and Verizon, whereby Verizon will make significant investment to help bring technological innovation to the city.



Earlier this year, officials in Kansas City, Mo. worked with Verizon and Xaqt, a local startup company, to launch an online data portal that shows where open parking spaces can be found in downtown. The city has also installed 178 smart streetlights and 26 digital information kiosks in its 51-block “smart city” section as part of an ambitious smart city initiative that Kansas City's CIO says will make it “the smartest city on Earth within five years.” Today, IoT technology covers about 2.2 miles of its city blocks, but plans call for expansion to 10 miles within the next three years.

Smart city IoT platforms are continually adding new services designed to improve urban living. Intelligent traffic capabilities can manage the flow of traffic to cut congestion, support public safety initiatives and reduce emissions. Digital kiosks are working to connect and engage citizens, providing wayfinding and real-time transit schedules, neighborhood news, local deals and targeted advertising.

During the big 2017 football game, for example, officials in Houston worked with Verizon to deploy advanced IoT technologies, including a Light Sensory Network (LSN), digital interactive information kiosks, and an Intelligent Video and Security Analytics solution to provide security monitoring around the stadium. The technologies supplemented human security presence with unobtrusive yet effective video-based technologies with advanced analytics. They also provided fan engagement opportunities, making it easier to find information, get directions, and connect with friends while enjoying the big game festivities.

In March of 2017, as part of a public safety effort underway in Boston (part of the Vision Zero initiative), Verizon began collecting car, bike and pedestrian traffic data at one of the city's most dangerous intersections with the goal of creating a safer community.

Jascha Franklin-Hodge, CIO for the City of Boston, said that what is compelling about the partnership with Verizon is that it is centered on providing solutions for its residents and businesses.

On one hand, the partnership will give residents – particularly those who could not previously get access – more high-speed broadband service choices. The smart-city applications are less about technology and more focused on solving issues like residential traffic management¹⁴.

Smart communities, from coast to coast

- **Boston, MA:** In 2017, Verizon began collecting car, bike and pedestrian traffic data at one of the most hectic intersections. The data will measure if interventions, such as changing traffic signal timings or installing a bike lane, have been effective. Boston will use the information to inform and implement changes.
- **Sacramento, CA:** In June 2017, Verizon announced a Public Private Partnership with the city to invest millions in smart city solutions designed to increase public safety, support economic development and bridge the digital divide. Specific areas of focus include the city's Vision Zero initiative, free Wi-Fi access in public parks, digital kiosks around the city, education initiatives and infrastructure investment in next-gen technologies.
- **New Rochelle, NY:** Over the next couple of years, 24 digital kiosks will be installed in New Rochelle, starting in the downtown with plans of more to come. The kiosks will provide user-friendly access to local community information, like city services, maps, events, emergency response and more, and each kiosk will be its own, high-speed Wi-Fi hotspot. This next-gen technology will help make New Rochelle one of the most connected cities in the region, leapfrogging the last-gen portals in other cities.
- **Kansas City, MO:** The city has launched an online data portal that shows where you can find an open parking space downtown. It has also installed 22 smart streetlights and 25 digital information kiosks on its 51-block smart city section as part of an ambitious smart city initiative.



Platforms expanding to offer full-stack IoT services

Apple has HomeKit, Verizon has ThingSpace, Google has Cloud IoT Core, IBM has Watson and Cisco has Jasper. These and numerous other platforms populating the IoT marketplace promise a secure infrastructure and a set of tools that enable developers to build IoT applications, then to manage the vast array of connected devices and the huge volumes of data those endpoints generate.

Players in the IoT platform market are quickly building comprehensive solutions with most or all of the components that enterprises need to get an IoT service up and running.

Many players in the IoT space are trying to build a “full-stack” offering, either through investing in their own IoT solutions or through acquisition. In the last year, SAP acquired IoT platform provider PLAT.ONE as well as Fedem Technologies for technology enabling predictive maintenance. Cisco acquired Jasper.

And plenty of new start-up players in the IoT platform market are forging ahead quickly to build comprehensive solutions that aim to offer all of the components enterprises need to get an IoT service up and running quickly.

Over the past couple of years, Verizon made several acquisitions in the IoT space, including:

- Skyward, the drone operations company.
- Telogis and Fleetmatics, fleet and mobile resource management firms.
- Sensity Systems, a smart city and LED lighting company.
- LQD WiFi, a developer of outdoor digital kiosks that figure prominently in several smart city plans.

The expanded portfolio enables more seamless integration at the platform, network and device levels.



IoT security and privacy

Rarely does a week go by without headlines of a corporate security breach, so it's hardly surprising that security tops the list of enterprise concerns around IoT. The deployment of sensors and the enormous volume of data they generate increases the level of risk and can also impact insurance costs, brand reputation and relationships with business and supply chain partners. Moreover, a breach can be financially devastating.

IoT security is complicated

IoT devices are built around different computing hardware than traditional computers, and thus use less processing power and offer limited background processes. Traditional computers can run anti-virus programs for security and require explicit user permission to greenlight processes. But IoT devices can't run these types of applications.

In April 2017, Verizon launched its IoT Security Credentialing service, which adds an extra layer of protection through the remote provisioning and management of embedded Universal Integrated Circuit Cards in IoT devices. GSMA, the trade body representing mobile operators worldwide, has certified the service to provide application protection, authentication and data privacy for connected IoT solutions.

The security credentialing service is designed to help reduce many of the security threats linked with today's IoT deployments, enabling developers to secure single points of vulnerability, and better protect IoT devices and applications regardless of the enterprise's service provider, or the type of transport being deployed – cellular, Wi-Fi or wireline. Just as user names and passwords allow employees to access various networks and devices, security credentials issued to connected devices enable only trusted devices to communicate with the enterprise infrastructure.

For enterprises, this means an added layer of security for both devices and apps. Also, with trusted authentication, the service lets enterprises give select employees and devices access to apps or IoT devices through encryption. Data privacy and security are maintained through encryption.

Make no mistake: Network, device, data and application security will always be a top enterprise issue. IoT security is always going to be a work in progress, yet it's important to note that, more so than ever before, security is becoming more and more "baked in" to the IoT value chain on the platform, network and device level. It is a trend that will surely continue given the reality of increasingly sophisticated breach attempts and the ever escalating financial risks they present.



The increasingly compelling economics of IoT

Enterprises want to know what IoT means to the bottom line. How will it cut costs and by how much? Where will it help to create new revenue? How much business value can enterprises expect to derive from IoT-related initiatives?

IDC found that the true value of IoT is being realized when the software and services come together to enable the capture, interpretation, and action on data produced by IoT endpoints. On the revenue side, the research firm expects IoT to grow 16.7% year over year in 2017, reaching just over \$800 billion¹⁵.

While revenue projections of course vary, analysts are agreed on one point: by far, the lion's share of these gains will happen in the B2B space.

Sure, consumer applications such as fitness monitors and self-driving cars may be attracting all of the attention and can indeed create significant value. But B2B uses can generate nearly 70% of potential value enabled by IoT¹⁶.

To realize the full potential of IoT applications, McKinsey Global Institute also notes that technology will need to continue to evolve, providing lower costs and more robust analytics¹⁶.

On the whole, the industry is making swift progress.

The first nationwide commercial 4G LTE Cat-M1 network, which Verizon launched this spring, spans 2.4 million miles and enables enterprises to rapidly develop and deploy agile IoT solutions and then scale those applications on the low-cost, secure network.

A game-changer for the industry, Cat-M1 is a new class of LTE chipset specifically designed for sensors. These chipsets are more affordable, require less power, offer more efficient power management for extended battery life and support use cases not connected to external power sources – everything ranging from water meters to asset trackers to consumer valuables.

On the business value side, enterprises across all industries continue to develop IoT use cases. Construction companies and healthcare manufacturers are changing the way they manage vehicle fleets, and track and locate high-cost drugs and specialized equipment. Sensors and IoT connectivity are working to increase equipment visibility, accountability, security and convenience, plus saving enterprises time and helping them control operational costs.

Real-time visibility of such data can potentially make or break a business. Consider the food company to which a salmonella outbreak is traced, due to inadequate refrigeration temperatures during transit. The shipment is lost, consumers are harmed and damage to brand reputation can be unrecoverable.

In manufacturing, sensor data is keeping equipment up and running, streaming data that enables an enterprise to predict when maintenance will be needed. Placing equipment on predictive maintenance schedules helps reduce downtime, cut costs and keep production humming.

In the energy sector, the smart grid is all about providing consumers with a better customer experience and more reliability by improving power management and adopting greener technology. Successful adoption of this technology will enable the average household to save nearly \$600 in direct bill savings, according to research from University of California, Riverside. After one year, the total energy savings attributed to smart grid technology is estimated to be \$42 billion. In five years, the annual savings are estimated to increase to \$48 billion. In 15 years, the savings are estimated to increase to \$65 billion and \$102 billion in 30 years. The energy saved can power the city of Las Vegas 207 times over, a refrigerator for 199 million years, or cool 378 million homes¹⁷.

Looking ahead

Manufacturing, transportation and utilities are leading the way with IoT investments in 2017. Yet insurance, consumer and cross-industry IoT investments, such as connected vehicles and smart buildings, will see the fastest spending growth²².

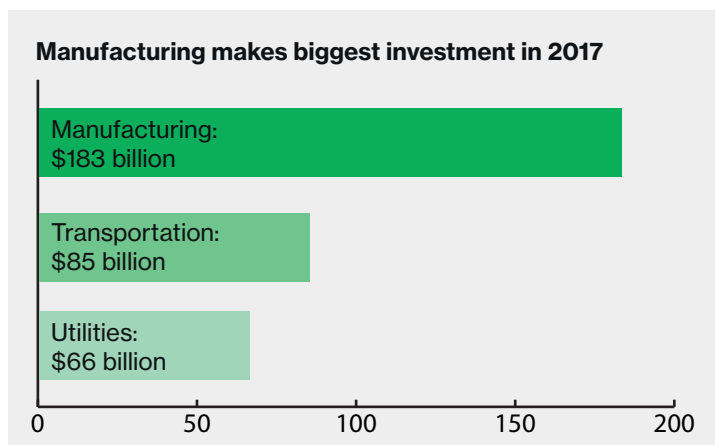


Figure 3: IoT investments in 2017, by industry¹⁸

In the year ahead, IoT platforms will become more and more seamless and streamline the deployment of IoT applications, which will continue to make in-roads into the enterprise. Securely collecting, analyzing and integrating data will continue to be enterprises' most critical concern.

Industry watchers also predict ongoing consolidation in the IoT market space, as larger providers continue to acquire start-up and specialty IoT firms. The goal for providers and enterprises alike is a seamlessly aligned ecosystem. According to Gartner, "total spending on endpoints and services will reach almost \$2 trillion in 2017" – which we believe can work efficiently and effectively to transform data into business value¹⁹.

In the last 24 months, companies implemented IoT solutions to lower operational costs, enhance customer service, provide competitive differentiation and improve supply chain management.

The potential benefits for the enterprise are huge. That's why we expect to see IoT continue to gain traction – and fast.



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