Taxonomy

IDC's Worldwide Semiannual Internet of Things Spending Guide Taxonomy, 2017: Update

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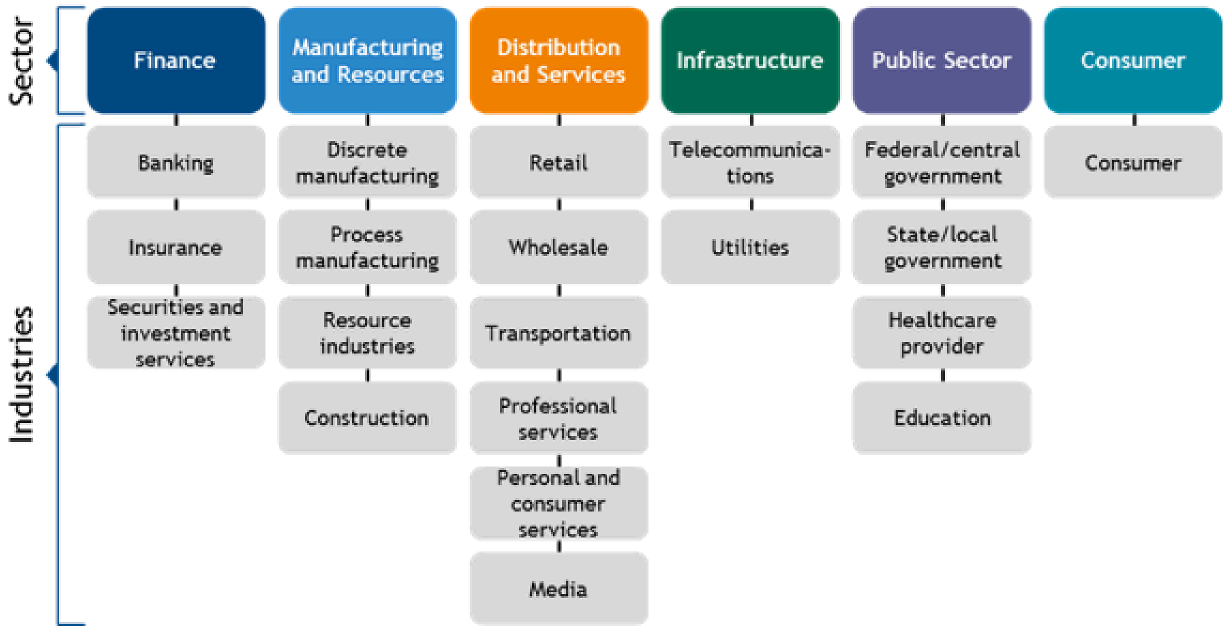
IDC'S WORLDWIDE SEMIANNUAL INTERNET OF THINGS SPENDING GUIDE TAXONOMY

FIGURE 1

IDC's Standard Industries



Source: IDC, 2017

IDC's 2017 taxonomy for the Worldwide Semiannual Internet of Things Spending Guide is intended to provide a framework to categorize and relate technology elements within this fast-growing market. This document contains definitions for the industries, technologies, and use cases contained within IDC's

Worldwide Semiannual Internet of Things Spending Guide. It also provides an overview of IDC's standard vertical and company classification systems and methodology. This IDC taxonomy:

- Defines Internet of Things (IoT) as a network of networks aggregating and interacting uniquely identifiable endpoints (or "things") that communicate autonomously using IP connectivity, whether locally or globally (The IoT is made up of technology-based connected solutions that allow businesses, organizations, and consumers to gain insights that help transform how they engage with the physical world of objects found in life and business.)
- Provides a definitional guide to IDC's Worldwide Semiannual Internet of Things Spending Guide
- Serves as a framework for how IDC organizes its IoT forecast methodology

SEMIANNUAL INTERNET OF THINGS SPENDING GUIDE TAXONOMY CHANGES FOR 2017

Changes to IDC's Worldwide Semiannual Internet of Things Spending Guide taxonomy are provided in Tables 1-2.

TABLE 1

IDC's Worldwide Semiannual Internet of Things Spending Guide by New Use Cases Segmented from Existing Use Cases, 2017

Industry	Use Case	Use Case Detail	Segmented From
Government	Public safety and emergency response	Body-worn camera	Public safety and emergency response use case (May 2017 version, release 2H16)
Government	Public safety and emergency response	In-car camera systems	Public safety and emergency response use case (May 2017 version, release 2H16)

Source: IDC's Customer Insights and Analysis Group, 2017

TABLE 2

IDC's Worldwide Semiannual Internet of Things Spending Guide by Renamed Use Cases, 2017

	Former Name		Revised Name	
Industry	Use Case	Use Case Detail	Use Case	Use Case Detail
Government	Public safety and emergency response	NA	Public safety and emergency response	General infrastructure

Source: IDC's Customer Insights and Analysis Group, 2017

DEFINITIONS

What Is a Vertical Industry?

A vertical industry is the set of all economic entities that offer goods and/or services designed to meet the specific needs of a group of customers or constituents. It is a well-defined segment as opposed to a broad, generic, and less specialized market. Because IDC's vertical research is rooted in deep economic and firmographic data, our taxonomy classification process parallels that of economic classification systems whereby we arrange organizations into groupings based on similar processes, products, services, and other behaviors and characteristics.

When selecting the vertical industries for the taxonomy, we incorporate data from key reference code systems such as:

- **The SIC** for the Americas and Asia/Pacific regions
- **The NACE Rev. 2** for Western Europe, Central Europe, and the Middle East and Africa
- **The ISIC** for reference in building up internationally comparable statistics on a worldwide basis
- **The JSIC** for Japan

Economic Entities, Enterprises, and Establishments

An economic entity is a producing unit, organization, or business. In our standard taxonomy and forecasting methodology, economic entities are recognized at the enterprise level (as opposed to the establishment level). For classification purposes, the definition of an enterprise goes beyond the broad colloquial concept of a business or an organization. Rather, an enterprise implies ownership of or control over legal, administrative, and fiduciary arrangements and organizational structures and resources to achieve objectives. Whenever possible, in IDC research, an enterprise has a common IS strategy and associated budget and decision making. The business strategy of the enterprise is reliant upon the various parts of the organization working together. An establishment, on the other hand, can be thought of as a single physical location or local unit where business is conducted. An enterprise may be made up of many establishments, or in the case in which an enterprise is a single-location organization, the concept of enterprise and local unit/establishment coincides.

As noted previously, a vertical industry is made up of a group of enterprises that share common production and distribution of goods and services. Although an enterprise may operate in several product or service areas, IDC aggregates vertical industries based on the enterprise's principal activity as determined by the value contributed to the organization relative to other activities. For example, in the United States, this is referred to as the organization's primary SIC code. The NACE system is used in Europe to determine the enterprise's principal activity.

IDC's Sector and Associated Primary Vertical Markets

The objective of IDC's vertical industry taxonomy is to study and analyze IT adoption, spending, and trends in a worldwide consistent fashion. It is intended to assist organizations with their strategy, marketing, planning, sales, and operations. With this objective in mind, IDC has defined 20 primary vertical markets, which are collectively exhaustive and mutually exclusive. Of these, all 20 industries apply to IoT. However, industry spending aligns with operationally intensive industries compared with pure service industries like financial or professional services.

What Is a Sector?

A sector is defined as a fairly large grouping of organizations with similar general economic activity. It is broader in scope than an industry or a vertical. IDC's taxonomy divides economic activities into five sectors, excluding the consumer vertical: financial, distribution and services, infrastructure, manufacturing and resources, and public sector.

These macromarket views are best used when:

- Developing a vertical strategy and determining where your customer base is most developed
- Summarizing data points for an executive presentation
- Comparing synergistic sectors

Table 3 defines and provides company examples for each of IDC's primary vertical markets and sectors. IDC's Worldwide Internet of Things Spending Guide provides both a sector and a vertical view.

TABLE 3

IDC's Worldwide Sector and Vertical Taxonomy: Company Examples of Primary Markets by SIC, NACE, and JSIC Codes

Sector	Primary Vertical Market	Example Organizations	SIC Codes	NACE Codes	JSIC
Finance	Banking	Citigroup, Bank of America, Wells Fargo, AmeriCorp, American Express, and Bank of New York	6011, 6019, 6021, 6022, 6029, 6035, 6036, 6061, 6062, 6081, 6082, 6091, 6099, 6111, 6141, 6153, 6159, 6162, 6163	64.00	62, 63, 64
	Insurance	American International Group, UnitedHealth Group, WellPoint, Allstate Corp., Alfac, and Marsh & McLennan Companies Inc.	6311, 6321, 6324, 6331, 6351, 6361, 6371, 6399, 6411	65.00	67.00
	Securities and investment services	Morgan Stanley, Goldman Sachs Group Inc., Simon Property Group Inc., and Equity Office Properties Trust	6211, 6221, 6231, 6282, 6289, 6712, 6719, 6722, 6726, 6732, 6733, 6792, 6794, 6798, 6799	66.00	65, 66
Manufacturing and resources	Discrete manufacturing	Bombardier, Boeing, United Technologies, Ford, General Motors, Polo Ralph Lauren, Intel, AMD, and Caterpillar	23–25, 31, 34–38, all of 39 excluding 3911, 3914, 3915, 3996 and 3999	14, 15, 16, 25, 26, 27, 28, 29, 30, 31, 32	11 (116–119), 13, 20, 25, 26, 27, 28, 29, 30, 31, 32,

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IDC's Worldwide Sector and Vertical Taxonomy: Company Examples of Primary Markets by SIC, NACE, and JSIC Codes

Sector	Primary Vertical Market	Example Organizations	SIC Codes	NACE Codes	JSIC
	Process manufacturing	Dow Chemical, DuPont, Alcan, Alcoa, Phelps Dodge, International Paper, Reynolds Group, Nestlé, Tyson Foods, Unilever, PepsiCo, Coca-Cola, Bare Escentuals, BP, Tupperware, and ExxonMobil	20–22, 26, 28–30, 32–33, 3911, 3914, 3915, 3996	10, 11, 12, 13, 17, 19, 20, 21, 22, 23, 24	9, 10, 11 (110–115), 12, 14, 16, 17, 18, 19, 21, 23, 24)
	Construction	Pulte Group, Lennar Corp., and Suffolk Construction	1521, 1522, 1531, 1541, 1542, 1611, 1622, 1623, 1629, 1711, 1721, 1731, 1741, 1742, 1743, 1751, 1752, 1761, 1771, 1781, 1791, 1793, 1794, 1795, 1796, 1799	41, 42, 43	6, 7, 8
	Resource industries	Monsanto Company, Chiquita Brands, Blue Diamond Growers, Newmont Mining Corp., Arch Coal, ConocoPhillips, Marathon Oil Corp., and Apache Corp.	111, 112, 115, 116, 119, 131, 132, 133, 134, 139, 161, 171, 172, 173, 174, 175, 179, 181, 182, 191, 211, 212, 213, 214, 219, 241, 251, 252, 253, 254, 259, 271, 272, 273, 279, 291, 711, 721, 722, 723, 724, 741, 742, 751, 752, 761, 762, 781, 782, 783, 811, 831, 851, 912, 913, 919, 921, 971, 1011, 1021, 1031, 1041, 1044, 1061, 1081, 1094, 1099, 1221, 1222, 1231, 1241, 1311, 1321, 1381, 1382, 1389, 1411, 1422, 1423, 1429, 1442, 1446, 1455, 1459, 1474, 1475, 1479, 1481, 1499	1, 2, 3, 5, 6, 7, 8, 9	1, 2, 3, 4, 5

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IDC's Worldwide Sector and Vertical Taxonomy: Company Examples of Primary Markets by SIC, NACE, and JSIC Codes

Sector	Primary Vertical Market	Example Organizations	SIC Codes	NACE Codes	JSIC
Distribution and services	Retail	Staples Inc., Best Buy, Pathmark, and Home Depot	5211, 5231, 5251, 5261, 5271, 5311, 5331, 5399, 5411, 5421, 5431, 5441, 5451, 5461, 5499, 5511, 5521, 5531, 5541, 5551, 5561, 5571, 5599, 5611, 5621, 5632, 5641, 5651, 5661, 5699, 5712, 5713, 5714, 5719, 5722, 5731, 5734, 5735, 5736, 5812, 5813, 5912, 5921, 5932, 5941, 5942, 5943, 5944, 5945, 5946, 5947, 5948, 5949, 5961, 5962, 5963, 5983, 5984, 5989, 5992, 5993, 5994, 5995, 5999	45, 47, 56	56, 57, 58, 59, 60, 61, 76, 77
	Wholesale	Ingram Micro, Tech Data, Anixter International Inc., McKesson Corp., Cardinal Health Inc., and SYSCO Corp.	5012, 5013, 5014, 5015, 5021, 5023, 5031, 5032, 5033, 5039, 5043, 5044, 5045, 5046, 5047, 5048, 5049, 5051, 5052, 5063, 5064, 5065, 5072, 5074, 5075, 5078, 5082, 5083, 5084, 5085, 5087, 5088, 5091, 5092, 5093, 5094, 5099, 5111, 5112, 5113, 5122, 5131, 5136, 5137, 5139, 5141, 5142, 5143, 5144, 5145, 5146, 5147, 5148, 5149, 5153, 5154, 5159, 5162, 5169, 5171, 5172, 5181, 5182, 5191, 5192, 5193, 5194, 5198, 5199	46.00	50, 51, 52, 53, 54, 55

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IDC's Worldwide Sector and Vertical Taxonomy: Company Examples of Primary Markets by SIC, NACE, and JSIC Codes

Sector	Primary Vertical Market	Example Organizations	SIC Codes	NACE Codes	JSIC
	Professional services	Microsoft, Accenture, Deloitte, and Google	6512, 6513, 6514, 6515, 6517, 6519, 6531, 6541, 6552, 6553, 7311, 7312, 7313, 7319, 7322, 7323, 7331, 7334, 7335, 7336, 7338, 7342, 7349, 7352, 7353, 7359, 7361, 7363, 7371, 7372, 7373, 7374, 7375, 7376, 7377, 7378, 7379, 7381, 7382, 7383, 7384, 7389, 7513, 7514, 7515, 7519, 7521, 7532, 7533, 7534, 7536, 7537, 7538, 7539, 7542, 7549, 7622, 7623, 7629, 7631, 7641, 7692, 7694, 7699, 8111, 8711, 8712, 8713, 8721, 8731, 8732, 8733, 8734, 8741, 8742, 8743, 8744, 8748, 8999	33, 58.2, 62, 63, 68, 69, 70, 71, 72, 73, 74, 75, 77, 78, 80, 81, 82	39, 40, 68, 69, 70, 71, 72, 73, 74, 85, 87, 89, 90, 91, 92, 93, 94, 95, 96, 99
	Personal and consumer services	Marriot International, Six Flags Theme Parks, DreamWorks, The American Red Cross, Parking Solutions Inc., and Goodwill Industries	7011, 7021, 7032, 7033, 7041, 7211, 7212, 7213, 7215, 7216, 7217, 7218, 7219, 7221, 7231, 7241, 7251, 7261, 7291, 7299, 7822, 7829, 7832, 7833, 7841, 7911, 7922, 7929, 7933, 7941, 7948, 7991, 7992, 7993, 7996, 7997, 7999, 8322, 8331, 8412, 8422, 8611, 8621, 8631, 8641, 8651, 8661, 8699	55, 59.13, 59.14, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99	75, 78, 79, 80, 94
	Transportation	Union Pacific Railroad Company, Greyhound, United Parcel Service, Werner Enterprises, United States Postal Service, Royal Caribbean Cruises, AMR Corp., Delta Airlines, and Plains All American Pipeline	4011, 4013, 4111, 4119, 4121, 4131, 4141, 4142, 4151, 4173, 4212, 4213, 4214, 4215, 4221, 4222, 4225, 4226, 4231, 4311, 4412, 4424, 4432, 4449, 4481, 4482, 4489, 4491, 4492, 4493, 4499, 4512, 4513, 4522, 4581, 4612, 4613, 4619, 4724, 4725, 4729, 4731, 4741, 4783, 4785, 4789, 4822	49, 50, 51, 52, 53, 79	42, 43, 44, 45, 46, 47, 48, 49, 86

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IDC's Worldwide Sector and Vertical Taxonomy: Company Examples of Primary Markets by SIC, NACE, and JSIC Codes

Sector	Primary Vertical Market	Example Organizations	SIC Codes	NACE Codes	JSIC
	Media	Time Warner, The Walt Disney Company, CBS Corp., and Comcast	2711, 2721, 2731, 2732, 2741, 2752, 2754, 2759, 2761, 2771, 2782, 2789, 2791, 2796, 4832, 4833, 4841, 7812, 7819	18, 58.1, 59.11, 59.12, 59.2, 60	15, 38, 41
Infrastructure	Telecommunications	AT&T and Verizon Communications Inc.	4812, 4813, 4899	61.00	37.00
	Utilities	Commonwealth Edison, Waste Management Inc., National Grid, and Duke Energy	3999, 4911, 4923, 4924, 4925, 4931, 4932, 4939, 4941, 4952, 4953, 4959, 4961, 4971, 4922	35, 36, 37, 38, 39	33, 34, 35, 36, 88
Public sector	Healthcare provider	Magellan Health Services, Brigham and Women's Hospital, Mayo Clinic, Kindred Healthcare Inc., and Quest Diagnostics	8011, 8021, 8031, 8041, 8042, 8043, 8049, 8051, 8052, 8059, 8062, 8063, 8069, 8071, 8072, 8082, 8092, 8093, 8099, 8351, 8361, 8399	86, 87, 88	83, 84
	Federal/central government	Department of Defense, Department of Health and Human Services, and Department of Justice	9111, 9121, 9131, 9199, 9211, 9221, 9222, 9223, 9224, 9229, 9311, 9411, 9431, 9441, 9451, 9511, 9512, 9531, 9532, 9611, 9621, 9631, 9641, 9651, 9661, 9711, 9721	Part of 84	97.00
	State/local government	City of New York Police Department, California Department of Transportation, and Massachusetts Department of Health and Human Services (including Mass Health insurer)	9111, 9121, 9131, 9199, 9211, 9221, 9222, 9223, 9224, 9229, 9311, 9411, 9431, 9441, 9451, 9511, 9512, 9531, 9532, 9611, 9621, 9631, 9641, 9651, 9661, 9711, 9721	Part of 84	98.00
	Education	University of Notre Dame and Town of Framingham School District	8211, 8221, 8222, 8231, 8243, 8244, 8249, 8299	85.00	81, 82
NA	Consumer	NA	NA	NA	NA

Source: IDC's Customer Insights and Analysis Group, 2017

Defining the Internet of Things

IDC defines IoT as a network of networks aggregating and interacting uniquely identifiable endpoints (or "things") that communicate autonomously using IP connectivity, whether locally or globally. The IoT is made up of technology-based connected solutions that allow businesses, organizations, and consumers to gain insights that help transform how they engage with the physical world of objects found in life and business.

IDC makes important distinctions about the addressable IoT market. Fully private, closed-loop networking-based use cases are generally excluded from this forecast. Traditional personal computers, laptops, mobile phones, and tablets are excluded from this forecast. In addition, pervasive connectivity is not required to give support to intermittent IP connectivity especially found in emerging use cases (e.g., consumer wearables).

Concerning IDC's four pillars, IoT leverages the 3rd Platform technologies but is not defined by them. While there are a number of use cases that are built on legacy infrastructure or enabled by data produced by 2nd Platform technologies, the four pillars underpin tremendous innovation in the IoT space. IDC's four pillars include:

- **Big data:** Big data technologies enable customers to economically extract value from very large volumes of data from a variety of sources by enabling high-velocity capture, discovery, and/or analysis.
- **Cloud:** Cloud services offer a shared, standard IT service that is packaged as a turnkey solution featuring self-service provisioning and management, elastic resource scaling, a published service interface/API, and elastic, usage-based pricing.
- **Mobile:** Mobility solutions include the devices, software, and infrastructure that enable mobile data services, including tablets and ereaders, portables, smartphones, wireless data and connectivity, mobile operating systems and application, and related services.
- **Social:** Social technologies facilitate collaboration between internal stakeholders, partners, vendors, and customers as well as extract data from these communications. Key technologies include social media platforms, enterprise social networks, and "socialytics."

Addressable Market

IDC views the potential opportunity for IoT by use case. This "use case" approach establishes a rich vocabulary and framework to enable meaningful conversations between vendors and clients by painting a vivid, specific portrait of the potential end state. An IDC use case is a conceptual framework that provides a view of business value that is created when a set of technologies come together. Use cases are not defined by the technology itself. The parameters of a use case are defined by the value being created and recognized by an organization. Use cases can be categorized according to three primary benefits they provide:

- Creating new products and services
- Optimizing operations
- Transforming the customer experience/creating customer loyalty

For each industry segmented in IDC's Worldwide Semiannual Internet of Things Spending Guide, we select key use cases and developed adoption models. We selected the use cases that represent the majority of IoT spending today and in the near term. Our models allow for "other" use cases beyond those listed to account for the "long tail" opportunities that lie outside these key examples. These models help better imagine IoT technology-enabled business scenarios that have the potential to transform existing industry processes and businesses.

Table 4 lists the use cases included in IDC's Worldwide Semiannual Internet of Things Spending Guide. This list is updated semiannually in the forecast documentation to reflect changes in use cases (i.e., net additions, splits from existing, name changes, deletions). In some instances, use cases will be refined into sub-use case segmentation. For example, in the latest spending guide released in May 2017, we segmented five new use cases from the "other" category of the respective industries (e.g., passenger traffic flow).

We detail new use cases; for example, smart grid (water) is segmented out from the utilities vertical. And yet in other instances, we develop use cases from the long tail of IoT innovation — for example, the construction machinery management use case that is built on the value of autonomous and assisted operating machinery for worksite optimization. Finally, some use cases will be retired in the future as maturity is reached and growth wanes.

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
Banking	ATM remote tracking		Automated teller machines (ATMs) are targets of cash theft, data system hacking, and user ID card credential harvesting. Because of remote locations, this use case reflects the security-based technology spending made to secure the ATM, casing, and housing facilities. The solution typically integrates diagnostics and state-of-health monitoring to pinpoint whether it is functional and secure. Features include real-time detection of the presence of a fraudulent device on the ATM (e.g., skimming scanners and fraudulent card readers). The security capabilities protect against attempts to tamper and disables the anti-skimming functionality by using sensors that can detect attempts to drill into the ATM fascia around the card reader area.
Construction	Construction machinery management		This use case is based on owners and operators remotely tracking, monitoring, and maintaining heavy construction machinery assets. This improves uptime and eliminates unnecessary maintenance, with the end goal of improving process efficiency and reliability for construction companies. The challenge is to regularly assess asset conditions and remotely diagnose an asset failure before it happens. By analyzing the live stream of data produced by the construction asset (predictive maintenance), construction companies can reduce the probability of facing "dangerous" situations, since the equipment under consideration is likely to be maintained before a possible failure or an all-out breakdown occurs. At the same time, it increases the chance of using the asset longer and more effectively than under traditional maintenance mechanisms. The latter is based on average usage conditions predefined by the machinery manufacturers, whereas the actual usage conditions within a specific construction process may be different. Predictive maintenance can easily adapt to these "real-life conditions," rather than rely on theoretical usage assumptions.

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
Consumer	Personal wellness		This use case includes wearable technology (wrist wear, eyewear, earwear, headwear, and other wearables) on individuals for personal monitoring of basic health- and wellness-related data (blood pressure, sleep monitoring, and body weight) as well as activity-related data (exercise and walking distances). Connectivity technology includes 2-way (PAN, LAN, and WAN) and 1-way (GPS) connections. It excludes medical- or clinical-specific devices that are part of the remote health monitoring use case.
	Smart home	Home automation	Home automation enhances the living experience by streamlining everyday interactions within the home environment. The value of home automation is realized through time savings, convenient efficiencies, and higher quality of living experience through environmental conditioning (e.g., natural and indoor lighting levels and air quality moderation). The technology creating a connected home enables monitoring (temperature and humidity), consumption tracking (energy and water), and home system setting (lighting, heater, air-conditioner, window shutters, and door locks) remote enablement. Home occupants can remotely monitor and control, through apps or websites, their home systems and home parameters/consumption. These systems can also be integrated to other systems (e.g., utility smart meters and analysis systems) for more efficient energy use or cost reduction programs for consumers. This use case excludes utility smart meter investments, home entertainment, media devices, and gaming consoles.
	Smart home	Home security	Home security technology detects movement, perimeter breaches, and a variety of dwelling conditions that then alarms the resident or monitoring service provider of an event. Remote control to the home and automatic notification on the occurrence of an unauthorized entry or dwelling access are core objectives of this system or service. Networked cameras, environmental sensors, and home automation, such as light control, integrate to enable more advanced functionality. Remote communication and configuration is accessible from any device.
	Smart home	Smart large appliances	Interactions with white goods move from manual and passive to automated and active in this use case. Major appliances equipped with IoT technology enhance the user experience by automating equipment operations management and providing value-added information. For example, these capabilities enable predictive failure to optimize maintenance for maximum uptime and efficiency. Technology that connects smart home white goods products such as washing machines, refrigerators, and ovens enables voice or text queries and can be controlled remotely — for example, scheduling use when energy costs are least expensive. Advanced systems integrate multiple appliances and into the kitchen environment (e.g., preparing, processing, and cooking food).

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Smart home	Smart small appliances	Ordinary home-oriented objects come to life with applied IoT technology. Consumers realize benefits that are measured in cost reductions, time savings, health benefits, entertainment, and others. Smart small appliances are a collection of interactions of this smart home use case. Devices and equipment include IoT-connected kitchen/cooking equipment, personal care, yard and power tools, and other home-oriented devices intended to enhance the user experience with information to operate, maintain, and troubleshoot better. The IoT technology connects small appliances that are typically portable or movable. Devices may respond to voice or text queries and can be controlled and managed remotely. Services may be embedded as a device feature or as an additional purchase (recurring charge).
Cross industry	Connected vehicles	Emergency	Services are designed to identify emergency conditions and trigger actions based on vehicle condition/status. Emergency services are enabled through integrated in-vehicle sensors (e.g., impact/crash, accelerometer, and fire/heat) and rules-based software typically provided by the vehicle manufacturer. Services automate vehicle location and contact to emergency/public safety. Service may be integrated with concierge services using live operators. The European e-Call system is an example of this.
	Connected vehicles	Infotainment	In-vehicle multimedia provides information and entertainment to vehicle occupants going beyond usual radio communication (e.g., via web connection). In-vehicle multimedia systems include nonstandard (radio/stereo system excluded) hardware and network connectivity built into the car as OEM or installed aftermarket that is used to display or interact with multimedia content. Hardware may include video screens, gaming consoles, audio/visual jacks, controllers, storage, and auxiliary batteries. Information services include mapping contextualized traffic, way points, advertising, and other location/origin/destination-related data and functions. Entertainment includes audio and visual content in the forms of movies, music, multiplayer games, and other interactive content. Service components can include information services, entertainment services, and network connectivity services.
	Connected vehicles	Security	Maintaining the security of your vehicle is a shared objective, and this technology applies when security is compromised. This use case leans on services that track vehicle routing and identifies real-time location through installed OEM or aftermarket hardware. In its absence, vehicle recovery is a chance occurrence. With vehicle security in place, services are activated on user request/report or through integrated sensors indicating a breach or theft. System hardware is based on a self-contained computing unit with memory, processor, communications module, and adaptors to connect to the vehicle's data bus and power system. In North America, an example of this service is provided by Lo-Jack or OnStar.

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IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Connected vehicles	Vehicle-to-vehicle (V2V)/vehicle-to-infrastructure (V2I) advanced solutions	Vehicle to vehicle/vehicle to infrastructure solution revolves around increasing situational awareness and reducing or eliminating crashes. V2V/V2I assists in vehicle safety assurance and acts as an infrastructure enabler for other connected vehicle use cases (emergency, security, and infotainment). V2V/V2I are supported in most cases through collaboration between public institutions and private consortia. Vehicles can automatically communicate with other vehicles (cars and also bikes) and infrastructures (e.g., street panels and roads, but also shops and restaurants). Some examples of this are the Volvo IntelliSafe project, with automatic pedestrian and cyclist protection features and forward-collision warning functions, and the Visa-Pizza Hut-Accenture partnership for creating connected in-car purchase experiences, where restaurant team members will be notified through beacon technology as to when the customer's car is approaching.
	Smart buildings	Infrastructure	Operating commercial buildings is a significant expense that enterprises want to control better. Smart buildings ensure occupant satisfaction and safety, command higher property valuation, and operate on a smaller staffing footprint over conventionally operated buildings. Smart buildings can also monetize building assets. Building owners are deploying IoT technology that utilizes advanced automation and building systems integration to measure, monitor, control, and optimize operations. The end goal is optimization — the deployment of a set of building systems capable of adapting in real time to both internal policies and external signals. These systems manage how building equipment operates to use energy in the most efficient and cost-effective way. The technology infrastructure of such an optimized smart building is defined by integrated control systems that automatically change settings and operational parameters utilizing information technology architecture. Analytics and data management are also essential components of smart building technologies. These tools accommodate the increasing volume of data associated with the instrumented and connected equipment in the facility and make this data understandable and actionable.

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Smart buildings	Smart elevators	Smart elevators autonomously adapt to the varying passenger volumes and frequency to move people efficiently and seamlessly as building occupants. The basic capabilities improve operational efficiency while advanced implementations provide occupants with greater convenience and environmental experiences. (Smart elevators include freight elevators [cargo, equipment, and cars] as well as subsegments including escalators and people mover belts.) By streamlining elevator operations, building owners reduce elevator downtime, lower operational cost, decrease scheduled maintenance, and improve passenger experience. Smart elevators can be realized as OEM equipment at the time of building construction or retrofitted to existing elevator infrastructure. The IoT technology includes outfitting lift mechanization (pulleys and fly wheels) and motors with controllers and sensors. Cars and corridors are outfitted with occupancy sensors and video analytics; integration is made to a master building visitor schedule and security systems including occupant guests and garages.
	Smart buildings	Smart lighting	This use case optimizes lighting systems for commercial buildings to provide high energy-efficient outcomes using sensors and software. Lights/ballasts are connected to IP-based networks and controlled/monitored remotely by the building management system, application, business rules to controller, or other means. Integrating/analyzing data (e.g., natural light cycles, room traffic, and work schedules) allows lights to be tuned to meet specific objectives. Smart lighting can then be used as an operational resource for communication.
	Staff identification		Sensor-based IoT solutions at the workplace entrance (also in construction or mining, not just offices) monitor employees' access and number of working hours. This IoT application revolutionizes the usual access to workplaces, going beyond the badge-based readers that are currently used by many business companies.
Government	Environmental monitoring detection		Meteorological, chemical, biological, radiological, nuclear, and explosive sensors are used to make informed decisions — from stopping or diverting traffic, limiting access to certain geographical areas, or triggering immediate actions if harmful substances are detected in certain areas so that inspectors can go out and identify the source of pollution to put in place remediation or plan for emergency services if there is an immediate or future danger. Analyzing long series of data from meteorological, chemical, biological, radiological, nuclear, and explosive detectors provides valuable information for long-term planning.

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IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Intelligent transportation systems	Automated public transit	Information from buses, light rail, subway systems, rail, and other systems (subway and surface) helps in public transportation. The IoT includes GPS capabilities, other sensors, and intelligent systems that relay data about the vehicle or rail location, speed, and internal functions. This information helps communicate schedules to travelers via message panels or mobile apps. Transit supervisory control and data acquisition (SCADA) systems refer to those control systems used to monitor and collect data to control transportation operations. A SCADA system usually includes signal hardware (input and output), controllers, networks, user interface (human machine interface [HMI]), communications equipment, and software, which collect data from the field and send it to a central station master via communications network systems. Included are software and supervisory systems that gather required data about associated processes and remote terminal units (RTUs) connected to sensors of related processes and convert sensor signals to digital data. The IoT in transit systems includes sensors, cameras, and other data collecting devices in office and central control systems, situational management systems, power and facility management systems, field control units, communication networks, passenger information systems (PA and VMS), radio and telephone systems, CCTV surveillance, and access control and fire systems. It also includes things such as GPS sensors, radio, and WiFi sensors, which are installed in public buses/trains/trams/metro.
	Intelligent transportation systems	Parking management	The sensor-equipped monitoring and reporting system determines parking space availability through physical detection of vehicle presence (empty space or not). The system can include integration of payment system based on sensor value. Sensors can be pressure, infrared, or heat types and connected by LAN to a central management system software.
	Intelligent transportation systems	Traffic management	Closed- and open-loop networked traffic control systems are used for road vehicle traffic management, especially public road traffic lights. A series of traffic lights are typically connected and controlled centrally for optimal traffic flow to minimize congestion. Components include input/output (I/O) controllers operated by SCADA systems, local and wide area networks, video monitors, road sensors, and management software providing situational awareness and optimization capabilities.
	Intelligent transportation systems	Traveler information systems	Systems gather and analyze data from various inputs including video cameras, road sensors, and cellular-based vehicle movement aggregation services to provide travel estimation, accident reports, and other conditions impacting travel. Information is provided to roadway displays and billboards, as well as to in-vehicle navigation systems.

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Public infrastructure asset management	General infrastructure	Sensors (e.g., accelerometers and loop detectors), cameras, transponders, and other systems allow government agencies to track the structural health and use of highways, streets and roads, tunnels, bridges, and other surface transportation infrastructure (excluding rail, ports, and airports) and to communicate about these resources to citizens and government workers. This includes the IoT for intersections, signals, tolls, parking, and transportation management systems as well as sensors that track the structural integrity of the infrastructure itself. This technology includes GIS systems.
	Public infrastructure asset management	Smart street lighting	Outdoor IP-connected lighting is remotely programmed, controlled, and optimized through regular information communication of energy consumption and billing. Smart street lighting is intelligently managed to improve municipal operational costs, citizen safety, and road infrastructure management. Benefits include lower power consumption through LED lighting, intelligent dimming and reduced field maintenance with long-life lights. Network-equipped lights are an essential element for high-functioning systems. Valuable uses are being utilized, including signaling lights to indicate road conditions (e.g., blinking) or emergency public safety (e.g., flashing red), which are available to operators through management software. These systems can be interfaced with enterprise systems including traffic management, emergency response systems/911, weather, and other data feeds. This use case also includes utility buyers funded with municipal contracts for bundled multiyear energy purchase agreements. Light pole–based sensors and solutions collecting content information on the area (e.g., weather, noise, and citizen movements) are excluded from this use case, as these are already considered in "other" IoT Spending Guide use cases, such as environmental monitoring detection. Analogously, mobile broadband connectivity provided through city lighting is excluded from this use case. Outdoor lighting includes city- or utility-owned lighting infrastructure on streets, highways, bike or pedestrian paths, and other roadways in cities. Municipal parking, facilities, public parks, and other municipal outdoor lighting are excluded. Indoor lighting in homes, factories, and other public or commercial buildings are excluded from this use case. Note that poles and luminaires are excluded from the hardware component of this use case. Bulbs, if embedding sensors, are instead considered.

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Public safety and emergency response	Body-worn camera	Worn by police, body-worn cameras (BWCs) create real-time data events through video and audio recordings of in-person interactions with citizens. Data is used for evidentiary purposes including citations, arrests, and other criminal enforcement and civil actions in courtroom settings. BWCs can be automatically triggered through integration with police vehicle systems like in-car camera systems and form a component of a set of wearable technologies (e.g., holster sensor and heart rate monitor). Data can be captured locally on the device or remotely via a police vehicle–based system. Real-time data is managed through evidence management software in client, server, and cloud delivery.
		General infrastructure	Spending from national agencies related to defense or civilian public safety services (national or federal disaster and emergency response, homeland security, national police, etc.) is excluded. Public safety services include: ▪ Fire and emergency response services ▪ Local law enforcement and policing ▪ The justice and corrections system, including local courts, locally operated jails and prisons, probation, community corrections, and parole
		In-car camera systems	In-car camera systems create real-time data events through video and audio recordings of in-person and from-a-distance interactions with citizens. Police vehicles can be equipped with cameras in the front, rear, side, and roof and use a single in-car storage device in conjunction with a hard-mounted laptop. In-car systems act as a hub for body-worn cameras and other police officer wearable technology. Real-time data is managed through evidence management software in client, server, and cloud delivery.
Healthcare provider	Bedside telemetry		IoT systems support hospitalized patients whose physiological status requires close attention. In this use case, these patients can be constantly monitored using IoT-driven, noninvasive monitoring. This type of solution employs sensors to collect comprehensive physiological information and uses gateways and the cloud to analyze and store the information and then send the analyzed data wirelessly to caregivers for further analysis and review, providing a continuous automated flow of information. In this way, the IoT system simultaneously improves the quality of care through constant attention and lowers the cost of care by eliminating the need for a caregiver to actively engage in data collection and analysis.

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Hospital asset tracking		Hospital asset tracking is a solution that locates high-value medical assets within a medical facility enabled by pervasive wireless LAN (WLAN) networking and beacons or active RFID (RTLS) associated with each piece of equipment, person, or tracked item (i.e., high-value inventory like medicine … or a baby!). The solution typically integrates with ERP, hospital inventory management, and work management. Capabilities are used to create intelligence for the central maintenance and tracking (audit) of high-value assets to improve quality of patient care, reduce costs, and improve service quality. Active tags can integrate any number of sensors to produce info on temperature, humidity, equipment orientation, movement, and general time in operation through built-in analytics software capabilities.
	Remote health monitoring		Home or remote healthcare system uses the IoT technology platform to improve quality of life and care through accurate and focused medical home/remote monitoring. Typical devices considered are glucometers, blood press cuffs, oximeters, and data gateways.
Insurance	Insurance telematics		IoT technology is for usage-based insurance offerings for vehicles/autos for both consumer and business clients. The driver's behavior is monitored directly through a vehicle-mounted device, which impacts insurance policies and rates. Telematics includes, but is not limited to, Global Positioning System (GPS) technology and accelerometers integrated with computers and mobile communications technology in automotive navigation systems.
Manufacturing	Food traceability		IoT technology tracks the production, processing, and delivery of food across the entire supply chain, from point of harvest to point of sale. These processes are automated to improve efficiency, safeguard public health, increase customer satisfaction, and provide the means to comply with government mandates. IoT will offer real-time access to inventory, production, and shipment histories and removes manual errors and mitigates the risk associated with major quality issues.
	Maintenance and field service		IoT technology can transform field service operations by automating the measurement, recording, transferring, and formatting of service data remotely from the field. IoT for maintenance and field service will also plug readings into the proper enterprise databases and give technicians access to real-time and historical data while in the field.

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Manufacturing operations		IoT supports digitally executed manufacturing, or how manufacturers will use intelligent and interconnected I/O tools — for example, sensors, actuators, drives, and vision/video equipment — to enable the different components in the manufacturing field — for example, machine tools, robots, and conveyor belts — to autonomously exchange information and trigger actions and to control each other independently. The immediate benefit can be measured in the elimination of the need to have personnel acquire and enter data on the plant floor. The greater long-term benefit will be the ability to run autonomic or self-healing processes. When this vision reaches maturity, the interconnected devices of the global plant floor will be able to react autonomously to a broad range of events. They will request each other to perform actions to avoid the bottlenecks of plant operators who would be otherwise overwhelmed by the necessity to quickly make thousands of decisions to maintain system performance.
	Production asset management		IoT helps a company remotely track, monitor, and maintain industrial manufacturing devices that are part of the production value chain. This entails regularly assessing the equipment conditions and being able to remotely diagnose an equipment failure before it happens by analyzing the live stream of data produced by the machine (predictive maintenance). Manufacturers can reduce the probability of facing "dangerous" situations, since the equipment under consideration is likely to be maintained before a possible failure or an all-out breakdown occurs. At the same time, it increases the chance of using the equipment longer and more effectively than under traditional maintenance mechanisms: the latter are based on average usage conditions predefined by the equipment vendors, whereas the actual usage conditions within a specific manufacturing process may be different. Predictive maintenance can easily adapt to these "real-life conditions," rather than rely on theoretical usage assumptions. This improves uptime and eliminates unnecessary maintenance, with the end goal of improving process efficiency and reliability for manufacturers.
Resource industries	Agriculture animal tagging		IoT technology uses sensors and tags to locate and identify animals grazing in open pastures, count their numbers, determine theft, or determine their location in paddocks, large stables, and/or distributed environments.

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IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Agriculture field monitoring		This use case advances the state-of-the-art technology that supports farming and permanent crop cultivation through soil management. Improved crop yield, pest management, and soil management are direct benefits of this technology. In its application, precision irrigation, fertilization, and fungal control are enabled through a series of soil probes monitored by analytics software. The use case is focused on creating a virtuous loop of information that acts on environmental condition predictions with automated system management of control devices like water irrigation and fertilizer applicators and provides information and data that can assist in the overall management and optimization of crop and farm care.
	Connected oil field exploration		This use case forecasts investments made in oil rig–based processes involving drilling, extraction, and well head instrumentation. Investments are directed toward improving equipment reliability, optimizing operations, and creating new value from field-based oil exploration and initial extraction assets in both onshore and offshore settings. Natural gas is excluded from this use case.
Retail	Connected vending machines		Vending machines dispense drinks, food, electronics, books, and various other consumer goods network connected (via SIM card or WiFi connection) to provide inventory levels, automated item replenishment scheduling, machine health, customer message displays, and promotional pricing. Components include monitor/display, touchscreens, processor, memory, communication network module(s), and device management software.
	Digital signage		IoT supports digital screens in retail outlets with a network that is steadily mining, analyzing, and responding to a broad spectrum of real-time and near-real-time data and dynamically tuning and triggering content. In this way, sensors, readers, information systems, and databases are all tapped and intertwined to provide a more meaningful, streamlined customer experience.
	In-store contextualized marketing		IoT enables interactive shopping by capturing continuous, real-time streams of data from mobile devices, online customer activity, in-store WiFi routers/beacons, and video cameras that give retailers insight into customer behavior and desires. Hardware components include digital cameras for face recognition, WiFi components to interact with smartphones, and beacons or Bluetooth sensors to interact with smartphones.
	NFC payment/ shopping		Retail POS terminal is equipped with near-field communication (NFC). Components include processor, memory, communication network module(s), and device management software. LAN communications network infrastructure is included in this use case.

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IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Omni-channel operations		IoT based omni-channel operations support the evolving multichannel retail strategy to provide a seamless consumer experience through any shopping channel — that is, mobile internet devices, computers, brick and mortar, television, radio, direct mail, and catalog. IoT investments by retailers are meeting customer demands by deploying specialized supply chain software that is accessible through multimodal devices. IoT solutions include mobile computers, printers, and RFID systems that enable demand/supply chain operations as well as inventory management, price management, replenishment, store transfers, and task management. IoT spending related to omni-channel operations include investments in technologies relevant to the transitioning of the traditional retail company to become an omni-channel company, such as website optimization, ecommerce platform, automated warehousing, ratings/reviews plug-in, online recommendation system, delivery scheduling system, mobile-optimized apps, and ePOS.
Telco	Telecom basestation remote management		This use case defines a communication service provider (CSP) operational optimization. Basestation equipment monitoring systems provide real-time visibility into the equipment that supports the network facility and equipment. These systems include air-conditioning and equipment coolers, diesel generators, battery backup, and facility security. CSPs can efficiently and effectively manage multiple systems.
	Telecom field services		Field services are connected in the sense that they have tools that allow them to remotely monitor the whole telecom line and intervene on the right asset when needed. At the same time, telecom field services are tracked and the telecom company can always know their positions. IoT technology is transforming field service operations by automating the measurement, recording, transferring, and formatting of service data remotely from the field. IoT for maintenance and field service will also plug readings into the proper enterprise databases and give technicians access to real-time and historical data while in the field.
Transportation	Air traffic monitoring	Centralized (FANS 1/A)	IoT technology replaces air traffic control communication via verbal communication with direct data link between air traffic control and cockpit using ultra-high VHF and satellite communications. Known as Future Air Navigation System (FANS), the next-generation technology FANS-1/A enables more precise flying routes with less spacing between planes in congested airspace in overseas and remote routes. Air traffic monitoring and recording conditions (location, speed, and wind direction) impacting aircraft at diverse locations is a key capability. This system manages air traffic and minimizes air risk based on real-time, continuous data. FANS uses controller-to-pilot data link communications (CPDLC) messages to automate surveillance activities and automatically reposition a plane based on airspace traffic. Communications are software assisted to give control towers an ability to operate by exception. Components include dual-cockpit modules and display units on the plane and control tower–based management system.

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IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Air traffic monitoring	Decentralized (ADS-B)	Airplane GPS positioning is based on ADS-B technology, which combines GPS tracking with communications to replace radar-based systems. Communications is airplane to airplane, with some airplane-to-controller tower/center coordination. Operating as a distributed system, network communication is based on dedicated radio spectrum allocated for airplane use only and does not use commercial terrestrial-based networks. Components include airplane and control tower–based equipment hardware/software modules with integrated computing capacity and specialized communication equipment operating on 1090MHz and/or 978MHz dedicated bands.
	Airport facility automation	Passenger traffic flow	Passenger traffic flow envisions the location and movement of passengers throughout an airport to improve understanding of logistical impact to facilities, gate arrival and departure, luggage logistics, and shopping and retail insights. Data acted upon may include integration with airport security, emergency response, transportation, and parking systems. This use case is enabled with video cameras, sensors, location tags, mobile devices, networking analytics, and facility and passenger systems integration. Buyers may be government agencies or private facilities owners, depending on facility ownership.
	Fleet management		IoT system tracks transportation assets (trucks, railroad cars, and ships) and determines/controls optimal routes. These systems can monitor both vehicle condition and driver behavior. They typically offer route guidance, track idle or stopped time, offer geofencing, and can include remote diagnostics for engine and other systems.
	Freight monitoring		IoT for freight management (air, railroad, land, or sea) is based on the technology of radio frequency identification (RFID), GPS, GPRS, and GIS and creates an intelligent, internet-connected transportation system. This system carries out the intelligent recognition, location, tracking, and monitoring of freight and cargo through exchanging information and real-time communications via wireless, satellite, or other channels.
Utilities	Electric vehicle charging	Electric vehicle charging	Commercial electric vehicle charging stations provide electric utility grid power for scheduled and unscheduled charging events. Charging services can be provided by utility direct or through third-party service providers. Stations are network communications enabled, allowing scheduled reservations, real-time availability, charge notifications, automated billing, and value-added and marketing services. Advanced implementations interface to utility grid management capabilities including auxiliary power services, power storage, and grid balancing. Private charging stations not available for commercial services are excluded. Commercial stations purchased by nonutility entities are counted in this use case — for example, Tesla superchargers, Walgreens, and GridPoint — as long as they are connected to grid power and networked.

TABLE 4

IDC's Worldwide Semiannual Internet of Things Spending Guide by Use Case, 2017

Industry	Use Case	Use Case Detail	Definition
	Smart grid (electricity)	Distribution automation (electricity)	Non–smart meter field devices owned by the electric utility are used to control and optimize power flow to ensure efficient, safe, and reliable service. It applies to distribution grid including line sensing, substation automation, feeder and line equipment control, and optimization. Utility-owned in-home devices are included in this category when used for grid operations. This category includes technology components for IEDs, phasor measurement units, powerline sensors, RTUs, and smart thermostats.
	Smart grid (electricity)	Smart meters (electricity)	Smart metering systems use solid-state meters for billing, technical and nontechnical loss, power quality, and power outage purposes. Components include processor, memory, communication network module(s), device management software, and meter data management software. Private communications network infrastructure is included in this use case.
	Smart grid (gas)	Distribution automation (gas)	Non–smart meter field devices are used for distribution grid leak detection, pressure sensing, distribution metering, technical and nontechnical loss detection, and chemical composition. Components include communication network–based gas flow devices including sensors, pit meters, flow valves, and actuators.
	Smart grid (gas)	Smart meters (gas)	Flow meters are used for measuring gas usage for billing, leakage detection, and nontechnical loss purposes. Components include processor, memory, communication network module(s), device management software, and meter data management software. Private communications network infrastructure is included in this use case.
	Smart grid (water)	Distribution automation (water)	The smart water use case applies networked sensors and connected equipment for easing challenges and reducing costs related to water stress, systemic inefficiency, and technical and nontechnical water loss while improving asset management and customer services. Distribution automation quantifies the investments made to improve water distribution services including water quality, infrastructure efficiency and reliability (e.g., leak detection), and equipment asset management found in pumping stations, valves, backup generators, and more. IoT-enabling technology components build on sensors, wireless communications networks, data management, and advanced analytics.
	Smart grid (water)	Smart meters (water)	The smart water use case applies networked sensors and connected equipment for easing challenges and reducing costs related to water stress, systemic inefficiency, and technical and nontechnical water loss while improving asset management and customer services. Smart meters quantify the investments made to realize more accurate billing, faster cash conversion cycles, real-time network status, and remote service provisioning. IoT-enabling technology components build on smart meters, wireless communications networks, data management, and advanced analytics.

Source: IDC's Customer Insights and Analysis Group, 2017

Technology View of the IoT Market

IDC divides Worldwide Semiannual Internet of Things Spending Guide into 14 technology categories to capture details of the hardware, software and services spending by end users for technology vendor and service provider offerings (see Table 5). Technology categories within this IoT spending guide map in part or in whole to published IDC forecasts called functional markets. For example, server and storage hardware uses standard IDC technology taxonomy definitions. In other technology categories, we have developed custom technology segmentations that are formed from a combination of technology categories (e.g., IoT platform) referred to as competitive markets.

TABLE 5

IDC's Worldwide Semiannual Internet of Things Spending Guide Technology Inclusions and Definitions, 2017

Technology Group	Technology Category	Technology Detail	Definition
Connectivity	Connectivity		Connectivity includes any network access and usage services charges provided by a network service provider to connect an IoT device to a commercial network (e.g., wireless, fiber, microwave, satellite, and powerline). Connectivity also includes network managed services for enterprise networks.
Hardware	Module/sensor		This category includes communicating and computing device modules as well as communication hubs or controllers, sensors, or other wired or wirelessly connected IoT devices.
	Security hardware		This category includes physical security appliances and other security hardware used in an IoT solution and network including IoT security domains in device and sensors, network and edge, analytics and enablement infrastructure, and physical safety and security.
	Servers		A server is a computer or device on a network that manages network resources. For example, a file server is a computer and storage device dedicated to storing files. Any user on the network can store files on the server. And a network server is a computer that manages network traffic. A database server is a computer system that processes database queries.
	Storage		Storage is the part of a computer system or connected system or peripheral device that stores information for subsequent use or retrieval in traditional enterprise infrastructure. It can take the form of storage, which is an integral component of functional computer systems, or additional systems and devices. This spending does not include spending on storage software (captured in system infrastructure software) or storage services (captured in IT services) — for example, does not include IaaS, which is considered an ongoing service.
	Other hardware		This category includes enterprise and consumer networking hardware such as switches, routers, repeaters and gateways, and industry-specific hardware such as RTUs, specialized computing devices (e.g., ruggedized field devices).

TABLE 5

IDC's Worldwide Semiannual Internet of Things Spending Guide Technology Inclusions and Definitions, 2017

Technology Group	Technology Category	Technology Detail	Definition
Services	Ongoing service or content as a service		This category includes BPO, IaaS, and help/service desk such as with OnStar for connected vehicles and ADT for home security.
	IT and installation services		This category includes traditional IT-type services for designing, planning, and implementing IoT solutions.
Software	Analytics software		The software uses the data collected by the connection endpoint to turn it into actionable insights that business decision makers can use to effect change in business processes.
	Application software		The software is used to analyze, organize, and access a range of structured and unstructured information. It is used to either extrapolate information produced by the analytics software or serve as an input mechanism and is designed to deliver a specific functionality, either horizontal or industry specific, within the IoT solution.
	IoT platform	IoT platform — Horizontal	Software middleware package provides the device management, connectivity management, data management, visualization, and applications enablement for connecting IoT endpoints. Analytics can be bundled but is not a mandatory feature. To be considered as an IoT software platform, the vendor must have two or more of the key elements offered under one SKU. A horizontal distinction refers to vendor software packages that integrate and support devices, applications, data schemas, and standards in two or more industries.
		IoT platform — Vertical industry	Software middleware package provides the device management, connectivity management, data management, visualization, and applications enablement for connecting IoT endpoints. Analytics can be bundled but is not a mandatory feature. To be considered as an IoT software platform, the vendor must have two or more of the key elements offered under one SKU. A vertical industry distinction refers to vendor software packages that integrate and support devices, applications, data schemas, and standards of a single industry.
	Security software		Software is used in an IoT solution and network for including IoT security domains in device and sensors, network and edge, analytics and enablement infrastructure, and physical safety and security. This can be an extension or enhancement of preexisting security software solutions.
	Other software		Software that falls outside the aforementioned category (security software segment) definitions are used to implement and operate an IoT solution, including but not limited to unbundled software associated with IoT platform, storage management, structured data management, and integration and orchestration middleware.

Source: IDC's Customer Insights and Analysis Group, 2017

Methodology

The market data and forecast information presented in IDC's Worldwide Semiannual Internet of Things Spending Guide program represent our best estimates of IoT spending by industry, use case, technology, region, and country. The data presented is the output analysis of qualitative and quantitative data from a number of primary and secondary sources, including IDC's worldwide vertical and company size market model, the research practices of IDC's Insights businesses, and IDC's annual ICT survey of end-user organizations.

For this spending guide, IDC uses a bottom-up model to forecast total IT spending. The model components used to determine a market size and forecast for a use case include demand-side data, supply-side data, industry trends, and the economic outlook to generate a model of IT technology spending.

LEARN MORE

Related Research

- *IDC's Worldwide Internet of Things Connectivity Taxonomy, 2017* (IDC #US43151917, October 2017)
- *Market Analysis Perspective: Worldwide 5G Monetization and Adoption Strategies, 2017* (IDC #US43107417, September 2017)
- *Market Analysis Perspective: European IoT Ecosystem and Trends, 2017* (IDC #EMEA42810217, June 2017)
- *Central and Eastern Europe Internet of Things Decision Maker Survey: Trends and Buyer Behavior in 2016* (IDC #CEMA40563016, April 2017)
- *Latin America Internet of Things Ecosystem and Trends CIS: IoT Survey 2017* (IDC #LA42339817, March 2017)
- *Canadian 2017 Utilities ICT Landscape* (IDC #CA41961617, August 2017)
- *SD-WAN in Internet of Things Deployments* (IDC #AP41342816, February 2017)
- *Worldwide IoT Spending Guide Review* (IDC #WC20170111, January 2017)
- *IoT Platforms — A Worldwide Analysis* (IDC #US42186716, January 2017)

Synopsis

This IDC study provides details of IDC's Worldwide Semiannual Internet of Things Spending Guide taxonomy. This document is to be used as a companion piece for IDC's Worldwide Semiannual Internet of Things Spending Guide. Technology suppliers may utilize this forecast structure to help them build an industry-focused outlook to pursue Internet of Things (IoT) market opportunities. The research methodology used to develop the Worldwide Semiannual Internet of Things Spending Guide is also referenced.

"IDC's Worldwide Semiannual Internet of Things Spending Guide issues forecast guidance to vendors about end-user adoption spending in 20 industries, 8 countries, and 53 countries," said Marcus Torchia, research director, Customer Insights and Analysis Group. "This comprehensive forecast offers 54 IoT use cases that detail spending in enterprise and consumer markets."

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

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