June 2, 2016

TO: National Telecommunications and Information Administration
U.S. Department of Commerce
Attention: IOT RFC 2016

FR: Jim L. Kaput, Senior Vice President & General Counsel
Zebra Technologies Corporation

RE: Docket No. 160331306-6306-01; RIN 0660-XC024
The Benefits, Challenges, and Potential Roles for the Government in Fostering the Advancement of the Internet of Things

Attached please find the responses of Zebra Technologies Corporation to select questions set forth in the above-referenced Docket concerning "The Benefits, Challenges, and Potential Roles for the Government in Fostering the Advancement of the Internet of Things."

For purposes of this response, the following information is provided:

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Thank you for your assistance in submitting these comments. Please contact me should you have any questions.

Comments of Zebra Technologies Corporation

National Telecommunications and Information Administration
Request for Comments on

"The Benefits, Challenges, and Potential Roles for the Government in Fostering the Advancement of the Internet of Things"

Docket No. 160331306-6306-01
81 Fed Reg. 19956 (April 6, 2016)
RIN 0660-XC024

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June 2, 2016

Zebra Technologies Corporation ("Zebra") is a global leader in bringing enterprise Internet of Things (IoT) solutions to Business-to-Business (B2B) and Business-to-Government (B2G) markets. With revenues of approximately $3.6 billion and 7,000 employees in more than 40 countries, Zebra is a trusted business partner with more than 95 percent of all Fortune 500 companies.

In addition, Zebra leads the growing category known as Enterprise Asset Intelligence (EAI) which describes the ability of businesses, government agencies and other organizations to track critical assets within their operations and know exactly what they are, where they are and their condition so they can make smarter, faster decisions that improve their bottom line. EAI leverages and recognizes the fact that people, assets and devices – especially mobile devices – are becoming increasingly connected and that this trend is advancing at an exponential rate. A few key facts help illustrate this point:

- By 2020, there will be 1.75 billion global mobile workers accounting for 42% of the global workforce.[1]

- By 2020, there will be 21 billion connected devices in a global Internet of Things.[2]

[1] Source: Strategy Analytics as cited in *Visibility That's Visionary*, Zebra Technologies Corporation (May 31, 2016, 11:15 AM), https://www.zebra.com/content/dam/zebra_new_ia/en-us/campaigns/brand-campaign/zebra-visibility-vision-report-en-us.pdf.

[2] Source: Gartner Group as cited in *Visibility That's Visionary*, Zebra Technologies Corporation (May 31, 2016, 11:15 AM), https://www.zebra.com/content/dam/zebra_new_ia/en-us/campaigns/brand-campaign/zebra-visibility-vision-report-en-us.pdf.

- By 2020, there will be 44 zettabytes of data with 10% of it coming from the Internet of Things.[3]

As a result, Zebra is working with companies, government and other organizations to provide solutions that yield real-time visibility into their processes, assets and people so that faster – and more informed – decisions can be made. The key elements which enable this work include:[4]

- **Sense**. The employment of unrivaled expertise in sensor and device connectivity enables companies, government and organizations to inter-connect devices to software and to mobile workers so that decision makers and workers alike have substantially more real-time visibility into operations.

- **Analyze.** Equally important, the provision of easy access to an unprecedented amount of data that EAI enables allows companies, government and organizations to plan more effective short and long-term strategies by delivering real-time insights into the critical data captured by the sensors in connected devices.

- **Act.** The explosive growth of mobile devices across the private, public and non-profit sectors enables management and workers at all levels to act on these visibility-driven insights in real-time, anytime and everywhere.

Zebra is pleased to provide below, where appropriate, its responses to the questions posed by NTIA in its RFC related to the benefits, challenges, and potential roles for the government in fostering the advancement of the Internet of Things.

General:

1. Are the challenges and opportunities arising from IoT similar to those that governments and societies have previously addressed with existing technologies, or are they different, and if so, how?
   a. What are the novel technological challenges presented by IoT relative to existing technological infrastructure and devices, if any? What makes them novel?
   b. What are the novel policy challenges presented by IoT relative to existing technology policy issues, if any? Why are they novel? Can existing policies and policy approaches address these new challenges, and if not, why?
   c. What are the most significant new opportunities and/or benefits created by IoT, be they technological, policy, or economic?

      To understand the true importance of the Internet of Things (IoT) to American society and the U.S. economy, it is critical to understand the building blocks upon which the IoT rests and how the convergence of key trends in technology has created revolutionary new

[3] Source: Digital Universe Study as cited in *Visibility That's Visionary*, Zebra Technologies Corporation (May 31, 2016, 11:15 AM), https://www.zebra.com/content/dam/zebra_new_ia/en-us/campaigns/brand-campaign/zebra-visibility-vision-report-en-us.pdf.

[4] Source: Zebra Technologies Corporation, *Visibility That's Visionary*, (May 31, 2016, 11:15 AM), https://www.zebra.com/us/en/cpn/visibility.html.

platforms that will enhance future Business-to-Business (B2B), Business-to-Government (B2G), and Business-to-Consumer (B2C) performance and experiences.

As with all new technology platforms, there are or will be technical challenges with IoT that will require an initial solution that will be subsequently subject to ongoing, continuous improvement. Among these challenges will be the need to ensure the security of connected devices, the data those devices capture and transmit and the cloud platform on which the devices interact. Privacy concerns, especially in areas such as health care, will also require thoughtful resolution.

Consequently, the primary policy challenge for policymakers is to foster an environment that supports the rapid development, deployment and subsequent advancement of secure IoT-enabled technologies in a manner that simultaneously addresses concerns over data security, encryption and privacy. The goal must be to encourage the rapid development and deployment of technologies which provide enhanced, secure and real-time visibility and access to information in a way that empowers workers to undertake more effective and timely decisions and actions. It is for this reason that we urge Congress and the Administration to take a thoughtful regulatory approach to governing the IoT and the countless solution applications it enables.

Additionally, Zebra recommends that policy makers appreciate the fact that technology and policy issues attendant to B2B and B2G applications of IoT solutions and wearable technologies may differ – at least in some instances – from issues which arise in a B2C setting and that legislative and regulatory action should take care to identify and appropriately manage any such potential differences. For the U.S. economy, much of the benefit from the IoT will come from its application in an enterprise (i.e., B2B or B2G) setting. Indeed, among the key findings set forth in the October, 2014 study[5] conducted by Forrester Consulting and commissioned Zebra Technologies, it was noted that:

- "Global firms recognize the transformational role of IoT solutions. Over 80% of surveyed firms agreed that IoT solutions will be the most strategic technology initiative for their organization in a decade. These firms represent many sectors, including retail, manufacturing, consumer products, transportation, healthcare, government, oil/gas, and hospitality. Organizations deploy these IoT solutions to address a variety of strategic, operational, and business challenges."

- "Organizations can achieve a wide range of business benefits from IoT solution deployment. Improved customer experience leads the list of benefits, with 49% of firms identifying this as one of the top five benefits of deploying IoT solutions. Supply chain optimization, visibility, and loss prevention closely follow and were identified as a top five benefit by between 45% and 46% of firms. By enhancing supply chain processes, firms can improve business process efficiencies, reduce working capital, and locate assets."

[5] Source: Forrester Research, Inc., "Internet-Of-Things Solution Deployment Gains Momentum Among Firms Globally" a study conducted by Forrester Consulting and commissioned by Zebra Technologies, October 2014.

2. The term "Internet of Things" and related concepts have been defined by multiple organizations, including parts of the U.S. Government such as NIST and the FTC, through policy briefs and reference architectures. What definition(s) should we use in examining the IoT landscape and why? What is at stake in the differences between definitions of IoT? What are the strengths and limitations, if any, associated with these definitions?

   Broadly speaking, the term "Internet of Things" (IoT) in a B2B/B2G context relates to the ability of platforms to interoperate and communicate over a network. Tomorrow's products will be embedded with sensors and "smarts" – software and electronics – that collect data, enable real-time feedback and communication, and exchange information with other platforms (device-to-device), clouds (device-to-cloud), networks (device-to-gateway). In turn, these products or devices send information and insight back to people through back-end data management. As IoT continues to grow in the B2B, B2G and B2C markets, it will expand over time to include more and more connected objects, or *things.*

   In B2B and B2G settings, IoT represents new ways to enhance data flow and management of current/future manufacturing/service equipment with actionable intelligence to improve productivity, and very often, operator safety, with advanced proximity and environmental sensing controls. Additionally, IoT provides new ways in which to enhance the overall customer experience.

   With its leadership in IoT-based Enterprise Asset Intelligence (EAI) in B2B and B2G markets, Zebra agrees with the definition provided in the October, 2014 study[6] conducted by Forrester Consulting and commissioned by Zebra Technologies which stated:

   > "Connected world solutions, often referred to as the Internet of Things (IoT), leverage machine-to-machine (M2M) technologies (e.g., sensors, GPS technology, and RFID tags) to link physical assets to analytics and control systems through the Internet."

   The Forrester Consulting study further noted that the definition of Internet of Things appropriately should reflect:

   > "*Smart interconnected devices that businesses (government and non-profits) use to get more visibility into the identification, location, and condition of products, assets, transactions, or people to drive more effective and timely business decisions or to improve customer interactions."* (emphasis added)

3. With respect to current or planned laws, regulations, and/or policies that apply to IoT:
   a. Are there examples that, in your view, foster IoT development and deployment, while also providing an appropriate level of protection to workers, consumers, patients, and/or other users of IoT technologies?
   b. Are there examples that, in your view, unnecessarily inhibit IoT development and deployment?

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[6] Source: Forrester Research, Inc., "Internet-Of-Things Solution Deployment Gains Momentum Among Firms Globally" a study conducted by Forrester Consulting and commissioned by Zebra Technologies, October 2014.

There are a large number of policies that can impact the development and deployment of the Internet of Things (IoT). In general, it is Zebra's view that policies which artificially inhibit the flow and use of data can have an adverse impact upon economic growth as real-time data has become the life's blood of today's data-centric world. Additionally, policies should help support B2B and B2G users (i.e., enterprise users) in addressing key IoT challenges such as complexity, connectivity and legacy devices, and device management.

4. Are there ways to divide or classify the IoT landscape to improve the precision with which public policy issues are discussed? If so, what are they, and what are the benefits or limitations of using such classifications? Examples of possible classifications of IoT could include: consumer vs. industrial; public vs. private; device-to-device vs. human interfacing.

   The Internet of Things (IoT) is being deployed in B2B, B2G and B2C markets. In each market, the benefits are expressed in terms of supply chain optimization (often associated with the B2B and B2G markets), an enhanced user experience (often associated with the B2C market), or both. Each market has its own characteristics and policy prescriptions should accordingly reflect the unique requirements of each market. Additionally, IoT is found and deployed in different ways, including IoT in physical objects (device-to-device), IoT in the cloud (device-to-cloud) and IoT in networks (device-to-gateway) and policy must be tailored to the unique features of each kind of deployment.

Technology:

Technology is at the heart of IoT and its applications. IoT development is being driven by a very diverse set of stakeholders whose expertise in science, research, development, deployment, measurements and standards are enabling rapid advances in technologies for IoT. It is important to understand what technological hurdles still exist, or may arise, in the development and deployment of IoT, and if the government can play a role in mitigating these hurdles.

6. What technological issues may hinder the development of IoT, if any?
   a. Examples of possible technical issues could include:
      i. Interoperability
      ii. Insufficient/contradictory/proprietary standards/platforms
      iii. Spectrum availability and potential congestion/interference
      iv. Availability of network infrastructure
      v. Other

b. What can the government do, if anything, to help mitigate these technical issues? Where may government/private sector partnership be beneficial?

Federal policy should assist and support business, government and other organizations in successfully addressing Internet of Things (IoT) challenges. As noted in a Zebra Technologies Corporation White Paper on accelerating IoT deployment:[7]

> "Successful IoT deployment must address several challenges to return the most value from Big Data", including:
>
> - Complexity. An IoT deployment is similar to any other complex set of technology – but with potentially more moving parts. Planning, integrating, and testing the ecosystem and ensuring it is mission-critical ready is no easy task. Specifying and connecting sensors and actuators to the cloud in a standard, uniform way is difficult because device manufacturers often use protocols and firmware optimized for that particular device. This complexity is often a barrier to success, and adds risk and costs.
>
> - Connectivity and Legacy Devices. Forrester Research points out that there is no unified interconnection standard to enable seamless integration across IoT devices, applications, and services in all vertical markets.[8] While a growing range of sophisticated sensors and actuators are now capable of connecting to Wi-Fi®, ZigBee®, Bluetooth®, and other networks by design, the vast majority of devices in the field are capable of only very basic local area network (LAN) connectivity. And very few of these devices are truly Internet-aware. These at-the-edge legacy devices include hard-wired sensors, programmable logic controllers (PLCs) using their own communication protocols, and often form the backbone of large-scale operations in heavy industries, energy production and distribution, and transportation and logistics. Integrating legacy devices to an IoT ecosystem and the cloud requires intermediate-edge boxes, which upgrade the capabilities of legacy devices without replacing them.
>
> - Device Management. The growing availability of devices at-the-edge creates a need to manage many different types of information sources, with different formats, frequency of updates, quality, and reliability. Device management is often cumbersome and complex, performing service and maintenance tasks online requires proprietary tools. Currently, applications can only consume specific data feeds from the field and support only specific process needs. The

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[7] Source: Zebra Technologies Corporation, *Zebra Accelerates Your Path To The Internet Of Things: Create a Visible Value Chain across your critical business operations*, (June 1, 2016, 7:54 PM), https://www.zebra.com/content/dam/zebra/white-papers/en-us/internet-of-things-en-us.pdf.

[8] Source: Forrester Research, Inc., "Prepare I&O For the 'Internet of Things," April 11, 2013, as cited in *Zebra Accelerates Your Path To The Internet Of Things: Create a Visible Value Chain across your critical business operations*, (June 1, 2016, 7:54 PM), https://www.zebra.com/content/dam/zebra/white-papers/en-us/internet-of-things-en-us.pdf.

> result falls far short of providing complete end-to-end visibility. There is a clear need to add a layer of middleware that simplifies and streamlines all this information, creating a "single pane of glass" interface for all IoT devices, and securely providing it to enterprise applications.

Though less a policy issue than a business consideration and decision, it is essential for enterprise users to team with the right IoT solution partner. Again, as noted in the Zebra Technologies White Paper[9]:

> "Most IT departments simply do not have the resources or expertise to enable a complete IoT solution that scales and delivers top value. In addition, enterprises are looking for pricing and business flexibility, with proven CAPEX/OPEX models that are applicable to their unique needs. Rather than risk failure, forward-thinking enterprises are seeking IoT solution implementation assistance from device manufacturers.
>
> C-level decision makers realize that firms specializing in the design and creation of enabling technologies such as barcodes, sensors, RFID tags, and GPS devices are the optimal partners for IoT solution implementations. Research demonstrates that 66% of surveyed organizations turn to device manufacturers for help with implementing IoT solutions.[10] Achieving the IoT vision requires a solution provider that understands the complexities of diverse component integration, and brings to the table proven domain expertise from a wide range of vertical markets."

Additionally, a study[11] which focused on IoT solution deployment that was conducted by Forrester Consulting and commissioned by Zebra Technologies notes that:

> "Wi-Fi, real-time location tracking, and security sensors are important technological elements of IoT solutions in B2B and B2G settings. In fact, 83% of firms identified Wi-Fi infrastructure and real-time location tracking technologies as important or very important components of IoT solutions. In addition, sensor technologies to monitor assets and the surrounding environment were identified as important or very important technology elements by at least 80% of global firms. Each technology element has unique characteristics related to security issues, installation costs, and reliability, which must be considered. For example, Wi-Fi, wireless LAN (WLAN), and

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9 Source: Zebra Technologies Corporation, *Zebra Accelerates Your Path To The Internet Of Things: Create a Visible Value Chain across your critical business operations*, (June 1, 2016, 7:54 PM), https://www.zebra.com/content/dam/zebra/white-papers/en-us/internet-of-things-en-us.pdf.

10 Source: Forrester Research, Inc., "Building Value from Visibility," October 2012 as cited in *Zebra Accelerates Your Path To The Internet Of Things: Create a Visible Value Chain across your critical business operations*, (June 1, 2016, 7:54 PM), https://www.zebra.com/content/dam/zebra/white-papers/en-us/internet-of-things-en-us.pdf.

11 Source: Forrester Research, Inc., "Internet-Of-Things Solution Deployment Gains Momentum Among Firms Globally" a study conducted by Forrester Consulting and commissioned by Zebra Technologies, October 2014.

> ZigBee solutions are suited for supply chain applications, while cellular technology solutions are ideal for real-time monitoring assets."

The use of such critical components, in turn, requires and argues for polices which foster or provide for such things as an open standards writing process, interoperability, adequate levels of spectrum availability, and needed levels of network infrastructure.

7. NIST and NTIA are actively working to develop and understand many of the technical underpinnings for IoT technologies and their applications. What factors should the Department of Commerce and, more generally, the federal government consider when prioritizing their technical activities with regard to IoT and its applications, and why?

   Federal efforts to constructively foster Internet of Things (IoT) growth and deployment must recognize, at least in B2B and B2G settings, that companies, government and non-profits must have access to accurate business intelligence in near-real time to be successful. Meeting these needs requires connectivity and visibility of smart devices. As a result:

   > "Businesses are (and have been) adopting a wide range of smart device technologies to improve visibility into processes and operations. The vast majority of these devices include barcodes, radio frequency identification (RFID), global positioning system (GPS), and environmental sensors. More recently, real-time locating systems (RTLS) have also joined the IoT mix for monitoring and communicating the status and movement of physical assets to mitigate business problems."[12]

   The more federal policy and action can support these core component elements of IoT in B2B and B2C settings, the more the overall U.S. economy will benefit and grow.

Infrastructure:

Infrastructure investment, innovation, and resiliency (such as across the information technology, communications, and energy sectors) will provide a foundation for the rapid growth of IoT services.

10. What role might the government play in bolstering and protecting the availability and resiliency of these infrastructures to support IoT?

    Efforts by the federal government to collaborate with U.S. companies on data security and the enforcement of intellectual property laws can play a key role in protecting the availability and resiliency of the infrastructure upon which IoT deployment and growth will rest.

[12] Source: Zebra Technologies Corporation, *Zebra Accelerates Your Path To The Internet Of Things: Create a Visible Value Chain across your critical business operations,* (June 1, 2016, 7:54 PM), https://www.zebra.com/content/dam/zebra/white-papers/en-us/internet-of-things-en-us.pdf.

Economy:

IoT has already begun to alter the U.S. economy by enabling the development of innovative consumer products and entirely new economic sectors, enhancing a variety of existing products and services, and facilitating new manufacturing and delivery systems. In light of this, how should we think of and assess IoT and its effects? The questions below are an effort to understand both the potential economic implications of IoT for the U.S. economy, as well as how to quantify and analyze the economic impact of IoT in the future. The Department is interested in both the likely implications of IoT on the U.S. economy and society, as well as the tools that could be used to quantify that impact.

12. Should the government measure the economic impact of IoT? If so, how?
    a. Are there novel analytical tools that should be applied?
    b. Does IoT create unique challenges for impact measurement?

Zebra Technologies does not offer a specific view as to how to measure the overall economic impact of the Internet of Things (IoT). There may not be a single given measure that can fully calculate the compounding effects of improvements to efficiency that will be gained through the global adoption of IoT across multiple industries. Perhaps a fair starting point for assessing the IoT's impact upon the economy can be found in reviewing the economic impact that resulted from the original introduction of the Internet into manufacturing and services.

On an overall basis, Zebra Technologies believes the economic benefit of IoT deployment in the B2B and B2G sectors – which the company calls "Enterprise Asset Intelligence" (EAI) – will be significant for the United States. This view reflects the company's conviction that:

> "IoT-enabled devices are becoming a key method for providing 'right now' visibility into supply chains, distribution centers, land and seaports, and for helping to secure facilities, indoor and outdoor. These devices are also prevalent in very tight process-driven tasks where instantaneous feedback and control are essential, specifically in the energy sector. Businesses can use this deep visibility to eliminate inefficiencies in industries such as manufacturing, healthcare, transportation, energy, and retail.
>
> For example, IoT can help identify, locate, or measure the condition of assets, people, or transactions within a facility. In such instances, RFID and RTLS tags allow organizations to quickly track and locate high-value items such as tools, large assemblies, and vehicles. Businesses can use this data to optimize processes, reduce shrinkage, and provide better security and safety throughout the workplace. Deep visibility into mission critical operations provides measureable metrics enabling the enterprise to make better-informed decisions and inspire innovation."[13]

[13] Source: Zebra Technologies Corporation, *Zebra Accelerates Your Path To The Internet Of Things: Create a Visible Value Chain across your critical business operations,* (June 1, 2016, 7:54 PM), https://www.zebra.com/content/dam/zebra/white-papers/en-us/internet-of-things-en-us.pdf.

All of these benefits converge to drive higher levels of productivity for individual workers, companies, industry sectors and, over time, the overall American economy

13. What impact will the proliferation of IoT have on industrial practices, for example, advanced manufacturing, supply chains, or agriculture?
    a. What will be the benefits, if any?
    b. What will be the challenges, if any?
    c. What role or actions should the Department of Commerce and, more generally, the federal government take in response to these challenges, if any?

    The Internet of Things (IoT)/Enterprise Asset Intelligence (EAI) contributes to the stream of data that organizations will store and mine by enabling interconnectivity of Internet-aware devices. This ecosystem of connectivity helps provide enterprises with deep visibility into their organizations' operational events, accessible through the cloud, anytime, any-where and in-between. The deployment of IoT/EAI solutions enables this "visibility that's visionary" into operations and drives improvement in overall worker and organizational performance. Examples that Zebra has set forth in a White Paper on accelerating IoT deployment[14] include:

    - Manufacturing. In manufacturing, supply chains span geographical regions and depend on a web of suppliers, distributors, and planners. Each link in the supply chain can create inefficiencies and cost challenges that ripple throughout the logistics, warehousing and manufacturing process. Making operations more efficient not only requires visibility into individual processes, but also interconnectivity and visibility across the entire business ecosystem.

      Manufacturers have materials arriving at multiple sites from suppliers around the world. Likewise, their finished goods ship to retailers and consumers globally. This creates additional logistical visibility requirements that must be met to avoid additional costs, long lead times, and poor customer service. Achieving the visibility goal calls for solutions that reduce IT complexities, connects legacy devices, and that are truly mission-critical ready.

    - Retail. The retail industry faces logistical difficulties similar to manufacturing, and is even more cost-constrained. Maintaining the right level of inventory while tracking and tracing every product requires real-time visibility into both the supply chain and inventories. For large retail chains, the challenge is even greater. Maximizing inventory turns, improving employee efficiency and sales strategies while enhancing the customer experience requires system collaboration and scalability that can span across geographical regions.

      Retailers are seeking better ways to bridge their online presence with traditional brick-and-mortar stores through cross-channel selling. Having the ability to

[14] Source: Zebra Technologies Corporation, *Zebra Accelerates Your Path To The Internet Of Things: Create a Visible Value Chain across your critical business operations,* (June 1, 2016, 7:54 PM), https://www.zebra.com/content/dam/zebra/white-papers/en-us/internet-of-things-en-us.pdf.

collect information, at every point whenever data changes status – from the manufacturer, through the distributor, to the sales floor – is significant. Coupling this data with sales and marketing metrics collected from fixed point-of-sale (POS) devices and smartphones can pay big dividends in driving customer loyalty programs. When properly implemented, retailers can link their smart devices together with their data center and capitalize on each facet of Big Data.

- Healthcare. Heavily regulated and moving to further digitization, the healthcare industry faces major hurdles in the drive to improve patient safety, enhance worker efficiency, and control costs. Electronic health records (EHRs) adoption paves the way for maintaining detailed, accurate, and life-long individual patient records. In addition, medical facilities leverage RFID tags to achieve 100% asset visibility, which helps reduce theft, optimize response times, and improve asset utilization by medical staff.

  Healthcare staff increasingly use the data generated from barcodes on patient wristbands, medications, laboratory orders/results and other diagnostic tests in various hospital departments to positively verify patient identity. Ensuring the right medication dose to the right patient at the right time requires verifiable visibility and precise accuracy. With the right IoT solution, healthcare professionals can integrate with EHR systems, minimizing medication and laboratory errors, while maximizing patient safety and improving the quality of care.

  A recent survey reported that 85% of respondents agreed that smart interconnected devices provide the necessary visibility to drive more effective, timely business decisions and improve customer interactions.[15] The Big Data information collected from IoT solutions can enable more informed decision-making, improve operational processes through real-time analytics, and keep IT costs in check.

14. What impact (positive or negative) might the growth of IoT have on the U.S. workforce? What are the potential benefits of IoT for employees and/or employers? What role or actions should the government take in response to workforce challenges raised by IoT, if any?

    Internet of Things (IoT)/Enterprise Asset Intelligence (EAI)-based solutions are empowering workers in ways that will make them more productive. For example, with IoT/EAI-based wearable technology, workers can instantly access and view essential documents and complex schematics with just a simple voice command or turn of the head. No hands, no laptop nor any fixed mobile workstation is required to get a complex task completed. The savings in time, performance and accuracy are dramatic. Whether it's fixing machines in a manufacturing

[15] Source: Forrester Research, Inc., "Building Value from Visibility," October 2012 as cited in *Zebra Accelerates Your Path To The Internet Of Things: Create a Visible Value Chain across your critical business operations*, (June 1, 2016, 7:54 PM), https://www.zebra.com/content/dam/zebra/white-papers/en-us/internet-of-things-en-us.pdf.

setting or treating patients, wearables are becoming ever more adaptable in their ability to add significant value and assistance to workforces and emergency responders in times of need.

What this means is that performance will be improved and cycle time will be reduced as wearable technology provides enhanced situational awareness by giving people real-time access to critical data and video at the point of work. Imagine a simple verbal command that provides a worker with full access to business critical data and subject matter experts in real-time. Imagine, further, the same worker using another verbal command to respond back and transmit data or pictures to a main office, a remotely located colleague, or to another machine. Now imagine having that ability while suspended high above the ground repairing the electrical grid or working inside an airplane engine. No hands required. IoT/EAI-enabled wearable technology makes it happen.

Policy Issues:

A growing dependence on embedded devices in all aspects of life raises questions about the confidentiality of personal data, the integrity of operations, and the availability and resiliency of critical services.

15. What are the main policy issues that affect or are affected by IoT? How should the government address or respond to these issues?

    There are a large number of policies that can impact the development and deployment of the Internet of Things (IoT). In general, it is Zebra's view that policies which artificially inhibit the flow and use of data can have an adverse impact upon economic growth as real-time data has become the life blood of today's data-centric world. Additionally, policies should help support B2B and B2G users (i.e., enterprise users) in addressing key IoT challenges such as complexity, connectivity and legacy devices, and device management.

17. How should the government address or respond to privacy concerns about IoT?
    a. What are the privacy concerns raised specifically by IoT? How are they different from other privacy concerns?
    b. Do these concerns change based on the categorization of IoT applications (e.g., based on categories for Question 4, or consumer vs. industrial)?
    c. What role or actions should the Department of Commerce and, more generally, the federal government take regarding policies, rules, and/or standards with regards to privacy and the IoT?

       The Internet of Things (IoT) is being deployed in B2B, B2C and B2G markets. In each market, the benefits are expressed in terms of an enhanced user experience, supply chain optimization, or both. Each market has its own characteristics, and policy prescriptions should reflect the unique requirements of each market, including, for example, healthcare, where there is a particular need to assure patient privacy and the confidentiality of patient data. Additionally, IoT is found and deployed in different ways, including IoT in physical objects (device-to-device), IoT in the cloud (device-to-cloud) and IoT in networks (device-to-gateway) and policy must be tailored to the unique features of each kind of deployment.