

January 16, 2018

TO: Members, Subcommittee on Digital Commerce and Consumer Protection

FROM: Committee Majority Staff

RE: Hearing entitled “Disrupter Series: The Internet of Things, Manufacturing and Innovation”

I. INTRODUCTION

The Subcommittee on Digital Commerce and Consumer Protection will hold a hearing on Thursday, January 18, 2018, at 10:00 a.m. in 2123 Rayburn House Office Building. The hearing is entitled “Disrupter Series: The Internet of Things, Manufacturing and Innovation.”

II. WITNESSES

- Rodney Masney, Vice President, Technology Service Delivery, Information Technology, Owens-Illinois;
- Sanjay Poonen, Chief Operating Officer, VMWare;
- Thomas D. Bianculli, Chief Technology Officer, Zebra Technology; and
- Thomas R. Kurfess, Ph.D., P.E., Professor and HUSCO/Ramirez Distinguished Chair in Fluid Power and Motion Control, George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology.

III. BACKGROUND

A. The Internet of Things

The Internet of Things (IoT) generally refers to a growing network in which connected devices, services, and objects collect and exchange data.¹ It has been described as “a blanket term for adding intelligence and connectivity to products and sensors,”² and the phenomenon has also been described as “the Internet of Everything” or “the Industrial Internet.”³ Despite the name, in some cases the devices do not communicate via the internet, but instead communicate through wireless protocols.⁴ Examples of such connected devices and networks are ubiquitous,

¹ <http://www.businessinsider.com/internet-of-things-devices-applications-examples-2016-8>.

² Koetsier, John, *IoT in the USA*, <https://www.forbes.com/sites/johnkoetsier/2017/07/10/iot-in-the-usa-3000-companies-125b-in-funding-613b-in-valuation-342000-employees/#7c0faa803ef5>, Forbes, July 10, 2017.

³ Wasik, Bill, *In the Programmable World, All Our Objects Will Act as One*, <https://www.wired.com/2013/05/internet-of-things-2/>, Wired, May 14, 2013.

⁴ Id.

and extend to fields as diverse as consumer goods (such as watches and other wearable devices), homes, healthcare, automobiles, cities, and even natural environments.⁵ Given the breadth of the term, there is no natural limit to the types of objects and systems that can be connected in this manner, including through applications on a smart phone.

The IoT holds the potential to enhance existing systems by allowing the components within these systems to communicate with one another, as well as interact with other systems and components. This in turn may result in tremendous economic growth:

Recent projections of the economic and social benefits of networked IoT technologies suggest that their technological and economic impact will be significant. These analyses predict that tens or even hundreds of millions of networked devices will proliferate globally as industrial and infrastructure inputs, consumer wearables, smart home technologies, and automated transportation services. The economic gains in terms of cost savings and enhanced productivity growth are projected to be enormous. Trillions in value will be created through cost-savings through preventative health care, minimized accidents, patient monitoring, efficiencies in manufacturing and distribution, and seamless home and municipal infrastructure improvements.⁶

B. The Use of IoT in Manufacturing

The IoT has relevance to the manufacturing sector. GE, a pioneer in the area in terms of both its use and creation, describes the IoT as applied to the industrial sector in the following manner:

The Industrial Internet of Things (IIoT), also known as the Industrial Internet, brings together brilliant machines, advanced analytics, and people at work. It's the network of a multitude of devices connected by communications technologies that results in systems that can monitor, collect, exchange, analyze, and deliver valuable new insights like never before. These insights can then help drive smarter, faster business decisions for industrial companies.

The IIoT is transforming industry—changing the way industries work. Whether it's enabling predictive analytics to detect corrosion inside a refinery pipe, or providing real-time production data to uncover additional capacity in a plant, or driving visibility and control over your industrial control systems environment to prevent cyber attacks, the IIoT—and the software solutions powered by it—are driving powerful business outcomes.

⁵ Meola, Andrew, *Internet of Things Devices, Applications and Examples*, <http://www.businessinsider.com/internet-of-things-devices-applications-examples-2016-8>, Business Insider, December 19, 2016. See also Wikipedia, *supra* at 1.

⁶ Thierer, Adam and O'Sullivan, Andrea, *Projecting the Growth and Economic Impact of the Internet of Things*, <https://www.mercatus.org/publication/projecting-growth-and-economic-impact-internet-things>, Mercatus Center, June 15, 2015.

By combining machine-to-machine (M2M) communication, industrial big data analytics, technology, cyber security, and HMI and SCADA, the IIoT is driving unprecedented levels of efficiency, productivity, and performance. And as a result, industrial companies in power and energy, oil and gas, manufacturing, healthcare, aviation, and many other industries are experiencing transformative operational and financial benefits.⁷

According to a report from PwC and the Manufacturers Alliance for Productivity and Innovation (MAPI), investment in the IoT is beginning to show benefits. A survey of manufacturers shows that “[n]early half of manufacturers say they are seeing returns, with 41 [percent] experiencing returns of up to 5 [percent] of their total revenue in 2016.” According to the survey, manufacturers are optimistic that future trends over the next five years will produce even greater return on investment: 42 percent expect between 10-20 percent of their total revenue to be driven by IoT products and services. Additionally, 80 percent of respondents are currently investing in IoT products and services development, and “40 [percent] of those companies have earmarked between 5-20 [percent] of their total research and development budget specifically for IoT.”⁸

C. IoT Product Manufacturing in the United States

The United States is a hub of manufacturing and development for the IoT. According to a recent article in *Forbes*, there are nearly 3,000 IoT startups in the United States, with \$125 billion in funding, \$613 billion in valuation, and employing over 340,000 workers.⁹

IoT manufacturing occurs throughout the United States. Over half of the U.S. companies involved in building products for the IoT market are located in California (1,345), but there is also a significant presence in New York (246), Massachusetts (224) and Texas (135). Virginia (69), Illinois (66), and Georgia (50) round out the leading State hubs of IoT manufacturing in terms of company presence.¹⁰ Another report from the NEO (Northeastern Ohio) Economic Development Organization states that 350 instruments, controls, and electronics companies with almost 20,000 employees work in the greater Cleveland, Ohio area.¹¹

⁷ GE Digital, *Everything You Need to Know About the Industrial Internet of Things*, <https://www.ge.com/digital/blog/everything-you-need-know-about-industrial-internet-things>, retrieved December 15, 2017.

⁸ Bond, Josh, *PwC and MAPI Release Survey on State of IoT in Manufacturing*, <http://www.logisticsmgmt.com/article/pwc-and-mapi-release-survey-on-state-of-iiot-in-manufacturing>, Logistics Management, September 5, 2017.

⁹ Kranz, Maciej, *Giving Thanks For Five Pioneering Internet-Of-Things Breakthroughs*, <https://www.forbes.com/sites/forbestechcouncil/2017/12/15/giving-thanks-for-five-pioneering-internet-of-things-breakthroughs/#20f9253335ab>, *Forbes*, December 15, 2017.

¹⁰ *Id.*

¹¹ *We Make Things Here*, <http://www.clevelandplus.com/teamneo/wp-content/uploads/sites/2/2017/03/ClevelandPlus-Smart-Devices.pdf>, Team NEO, March 2017.

Many of America's leading technology and industrial companies are also leaders in the IoT space. A report on intellectual property patents showed that GE, Cisco, Google, Amazon, and Verizon are among the top filers for IoT related patents.¹²

D. Challenges to Further IoT Development

While growth in the IoT sector has been significant, there remain challenges to further development. Among other areas that users and developers of the IoT must confront are familiar ones impacting all information-based applications: network security and interoperability of standards to facilitate network effects. Additionally, general concerns regarding protection of intellectual property, the availability of a trained and qualified workforce and the ability to exchange data freely across borders also impact the growth of the IoT.¹³

Other obstacles to the further growth of IoT include the problem of data quality. An information based network is only as reliable as the information it receives--to the extent sensors are damaged or corrupted (through, for example, physical or virtual vandalism, programming errors, or environmental factors), the output of the network will likewise be impacted.¹⁴ A survey of industrial companies also identified concerns about the "high cost of implementation" of the IoT as well as "inadequate infrastructure."¹⁵ However, the historical legacy of lower costs with adoption in the area of information technology generally may alleviate these latter concerns.

E. Regulatory Environment and the IoT

Owing to the broad applicability of the IoT, regulation may depend on the types of components involved, the nature of the data being transmitted, the means of communication, and the geographical area over which the network exists. This potentially broad ranging and uncertain regulatory barrier has been cited as a potential obstacle to further IoT development.¹⁶

The Federal Trade Commission (FTC) has jurisdiction over various aspects of consumer safety, including privacy and data security, which extends to the IoT. In January 2015, the FTC set forth "best practices" recommendations to IoT companies and industries using connected devices, urging them to enhance consumer privacy and security. The FTC's recommendations include building security into the IoT device at the outset, training employees about the importance of security, considering measures to keep unauthorized

¹² Sharma, Jay, *The IP of IoT – Top 5 Companies and How Their IP Pans Out*, <http://www.intellectualpropertyblawg.com/ip/ip-of-iot-top-5-companies-google-verizon-cisco-ge-amazon>, IP Blawg, February 26, 2017.

¹³ See generally the BSA Foundation, *Sensor Sensibility- Getting the Most from the Internet of Things*, <https://software.org/wp-content/uploads/iot-sensor-sensibility.pdf>, retrieved December 19, 2017.

¹⁴ Delgado, Rick, *Biggest Obstacles to Adopting the Internet of Things*, <https://www.smartdatacollective.com/biggest-obstacles-adopting-internet-things/>, SmartDataCollective, May 12, 2017.

¹⁵ *Top 10 Reasons People Aren't Embracing the IoT*, <http://www.ioti.com/security/top-10-reasons-people-aren-t-embracing-iot>, the Internet of things Institute, April 20, 2016.

¹⁶ *Supra* at 6.

users from accessing consumer devices, data, or other personal information, and providing security patches throughout the life cycle of IoT devices when necessary.¹⁷ In June 2017, the FTC also submitted comments to a working group convened by the U.S. Commerce Department's National Telecommunications and Information Administration (NTIA) tasked with developing guidance about ways for IoT device manufacturers to better inform consumers about security updates related to the devices.¹⁸

IV. ISSUES

The following issues may be examined at the hearing:

- How can the IoT help create jobs, lower costs, and improve the lives of Americans?
- What regulatory barriers exist to continuing to develop the IoT in America?
- How do trade and foreign competition impact the growth of the IoT industry in the U.S.?

V. STAFF CONTACTS

If you have any questions regarding this hearing, please contact Melissa Froelich, Gregory Zerzan, or Bijan Koohmaraie of the Committee staff at (202) 225-2927.

¹⁷ <https://www.ftc.gov/news-events/press-releases/2015/01/ftc-report-internet-things-urges-companies-adopt-best-practices>.

¹⁸ <https://www.ftc.gov/policy/advocacy/advocacy-filings/2017/06/ftc-comment-national-telecommunications-information>.