INTERNET OF THINGS: OPPORTUNITIES AND CHALLENGES

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ABSTRACT

The Internet of Things (IoT) is increasing the connectedness of people and things on a scale that once was unimaginable. Connected devices outnumber the world's population by 1.5 to 1. The pace of IoT market adoption is accelerating because of growth in analytics and cloud computing, increasing interconnectivity of machines and personal smart devices, the proliferation of applications connecting supply chains, partners, and customers and the opportunities presented by the IoT far outweigh the challenges if managed with the right partner. The connection of devices, machines, and things allows you to dynamically generate, analyze, and communicate intelligence data, increase operational efficiencies, and power new and greatly improved business models. This paper discusses about this new technology its current challenges and opportunities in various areas.

Keywords: IoT, Internet of Things, Smart Devices

I. INTRODUCTION

The term "Internet of Things" (IoT) is used to describe embedded devices (things) with Internet connectivity, allowing them to interact with each other, services, and people on a global scale. This level of connectivity can increase reliability, sustainability, and efficiency by improved access to information. Environmental monitoring, home and building automation, and smart grids could be interconnected, allowing information to be shared between systems that affect each other [1].

The Internet of Things (IoT) is changing the business, creating opportunities for new sources of revenue, smarter interactions with customers, and greater efficiencies. Yet IoT introduces new technical challenges. We live in an increasingly connected world. Humans are connected to each other and to a vast inventory of information and entertainment in unprecedented ways. Almost half of the world's population now owns and uses a mobile device. In the developed world, most households are connected to the Internet. In recent years, more and more objects in our physical world are now able to communicate with each other – or with us – through embedded sensors, tags, and actuators without human involvement. These "smart objects" can see, hear, feel, and smell the world around them. Intelligence embedded into personal items, household appliances, cars, clothing, factory equipment, and infrastructure generates vast amounts of valuable data that can be collected, networked, and analyzed for a wide range of business, societal, and personal advances. Communication between mechanical or electronic devices is automated by what are collectively known as machine-to machine (M2M) technologies [2].

According to Cisco, billions of devices and objects will be made smart devices by 2020. This kind of growth will make network connections more valuable and will create unexpected opportunities for business and companies [3].
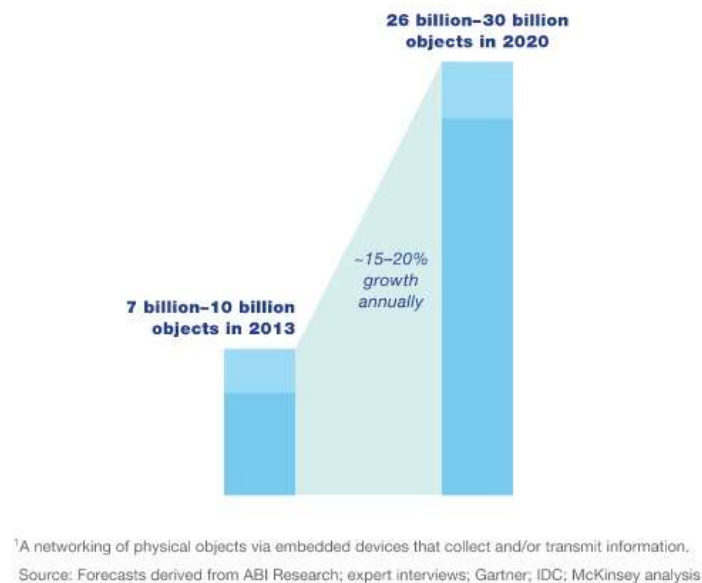

Figure 1. McKinsey Analysis

The IoT is changing lives of the people by bringing network in every physical object that no one can imagine. It will have major effects on working of networked systems as well as their participants. The evolving nature of IoT is not predictable but it is sure it will change the views of the people towards things.

The IoT can potentially transform nearly every industry-locally and globally. It brings networking technology to places where it was once unavailable or impractical. The challenge is to build the right infrastructure. Your company faces changing requirements of scale and data management, and needs standards-based infrastructure that is highly secure and interoperable.

II. DRIVERS OF CHANGE AS IOT EVOLVES

Smaller, lower power, less expensive devices allow for more distributed networks. We can now embrace not just computational devices but all types of devices and sensors, closer to "the edge" where we choose to deploy them.

This enables us to gather more granular data, much faster. Machine sensors that years ago gathered data and stored it in a database for daily or weekly review can now report on conditions or even take immediate action in near real time.

All this granular data is like Big Data on steroids. It will further accelerate the need for better analytics. It will also put a premium on asking insightful questions to provide actionable answers for decision making.

IoT devices in both consumer and business sectors are now spawning new use cases, new applications, new architectures, and new protocols and ultimately will drive new standards. Companies like Octoblu are emerging to address the need for cross-device integration.

These new use cases will in turn drive different customer journeys and unique value propositions that will spur the creation of innovative, new business models.

These business models will open up new markets and reinvigorate existing industries through creative destruction, providing new opportunities for the entire ecosystem.

Many of these breakthroughs will force some companies to morph from being pure hardware, software or systems companies into service companies that provide "whole solutions." Companies not adapting to the new realities fast enough will be acquired or wilt away.

III. CHALLENGING AREAS

Thinking about a physical thing reacting on our actions, is itself a big thing. So, this raises the issues regarding the complexity and challenges that are to be faced in adopting IoT. Traditional working techniques, cost factors are the major reasons regarding its non-adoption. Further, technical problems regarding storage, power are also some issues affecting its use.

Covering all challenges, five major areas are listed here-

- Security- IoT is all about devices, connects every kind of device, which results in larger number of attack points in the network. Every device is not protected and thus susceptible for attacks. Thus new security techniques and procedures need to be inculcated to have secure IoT.

- Trust and Privacy- With remote sensors and monitoring a core use case for the IoT, there will be heightened sensitivity to controlling access and ownership of data. Compliance will continue to be a major issue in medical and assisted-living applications, which could have life and death ramifications. New compliance frameworks to address the IoT's unique issues will evolve.

- Complexity and Integration issues – Connecting different kind of devices on different frameworks, working on different protocols, is difficult. Integration of all may create issues and thus poses a notable challenge. Resource requirements, frameworks are to be adjusted for industries to work on a large scale. New frameworks according to IoT must be developed for its smooth working. IoT application development needs to be easy for all developers, not just to experts.

- Adaptability and Scalability issues – To adopt the IoT architecture, the industries way of designing systems need to be changed. These systems must be scalable also to add more devices among the network so as to deliver the output.

- Maintainability and Updates - IoT is not for a limited period of time, it is there for longer years of time. With continuous changing needs, these systems need to be modified accordingly. Thus maintenance and updates are must for the success of IoT.

IV. OPPORTUNITIES

IoT open up a new world of industries having new systems with higher efficiencies. With the decreasing cost of technologies, IoT will be creating a new business technology. The upcoming technologies will do and interpret unimaginable actions and store vast amount of information. IoT delivers the following capabilities:

Visibility-Driven: The more we can see, the more we can correlate information and apply intelligence to understand context, make better decisions, and take action—either manually or automatically. This capability has broad implications for not only IT security, but also across the entire enterprise.

Threat-Centric: As we focus on detecting, understanding, and stopping security threats through continuous analysis, real-time security intelligence can be delivered from the cloud and shared across all security solutions to detect and remediate against threats.

Platform-Based: Security is no longer solely a network issue. It requires an integrated system of agile and open platforms that cover the network devices, and the cloud.

V. CONCLUSION

The Internet of Things is a new wave of technology that will embrace, extend and enhance cloud, big data, personal/mobile devices and social networks. It will provide entirely new applications and use cases that will drive new business models and revenue opportunities. It will also threaten many existing industries, markets and products. As this technology is evolving, more challenges are coming around. There is a need to develop and manage such systems that will overcome the issues and create new opportunities for business and end users.

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