IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 5, May 2016

Industrial Market Place Survey and Analytics on Internet of Things

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Abstract: Advances that will transform life, business, and the global economy ", the Internet of things (IoT) is one of the top three technological advancements of the next decade (together with the mobile internet and the automation of knowledge work). As the Internet of Things begin transforming businesses, economies and society. IoT platforms are emerging as the central backbone in the overall infrastructure. The Internet of Things is such a sweeping concept that it is a challenge to even imagine all the possible ways in which it will affect business, economies, and society. Sensors and actuators embedded in physical objects are linked through wired and wireless networks, often using the same Internet Protocol (IP) that connects the Internet. The idea is that not only your computer and your smart-phone can talk to each other, but also all the things around you. From connected homes and cities to connected cars and machines to devices that track an individual's behaviour and use the data collected for new kind of services. In this paper we survey on Internet of Things from industrial perspective and analytics. We also survey on different cloud platform released by some industries for the Internet of Things and how 4g LTE is flexible for Internet of Things.

Keywords: Internet of Things, IoT devices, IoT cloud-platform for IoT, Data analytics, 4g LTE.

I. INTRODUCTION

The Internet of things will involve a massive build-out of connected devices and sensors woven into the fabric of our lives and businesses. Devices deeply embedded in public and private places will recognize us and adapt to our requirements for comfort, safety, streamlined commerce, entertainment, education, resource conservation, operational efficiency and personal well-being.", according to Intel's report "Rise of the Embedded Internet [1]. Four companies are emerging as IoT leaders: Intel in the semiconductor space, IBM and Microsoft in the platform/analytic s space and Cisco in the connectivity space. Intel is reclaiming the top spot in the ranking [2].

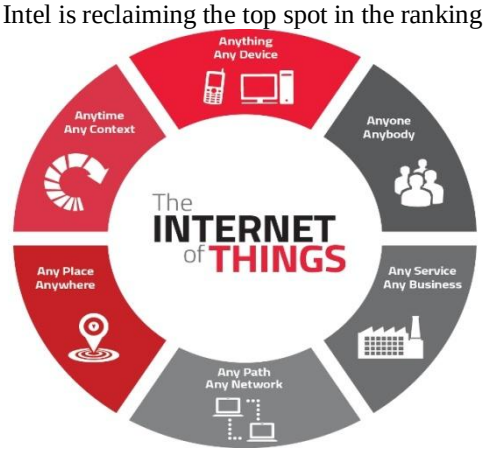

Fig. IoT categories

Internet of Things, offers unique opportunities for enterprises to hyper-connect people, processes and Systems. How ever the IoT ecosystem is quite fragmented and requires customers to deal with multiple vendors. Addressing this challenge, TCS has developed a comprehensive set of service offerings and assets, to help customers unlock business value [3]. We survey on what types of IoT hardware are being used in the market by different industries, cloud platform provided by industries and how 4g LTE is beneficial over 3g network.

II. RELATED WORK

A. Industries working towards the IoT

IoT is described as the broad idea behind these buzzwords is that a whole constellation of inanimate objects is being designed with built-in wireless connectivity, so that they can be monitored, controlled and linked over the Internet via a mobile app. [4] The types of objects span a wide range of categories, from wearables to light bulbs to home appliances (like the coffee maker, washing machine, and Even your car) really, anything. [5] IoT is also being applied to vertical markets like the medical and health-care industry and to transportation systems.

At this point, the easier question might be who isn't working on an IoT product. [7] Big names like Samsung, LG, Apple, Google, Lowe's and Philips are all working on connected devices, as are many smaller companies and start-ups.

[8] Research group Gartner predicts that 4.9 billion connected devices will be in use this year, and the number will reach 25 billion by 2020.

B. Hardware for IoT

Internet of Things has moved on from high-level hype towards concrete ideas and products, and a growing business developer community is eagerly looking for either suitable hardware for rapid prototyping or devices with which to deploy their ideas.

We thought we'd compile a list of some of the more prominent hardware options on the market [9]

IJARCCE

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IoT Hardware		
No	H/W	Summary
1	Raspberry-pi 2	The Open source, Broadcom BCM2835 700MHz processor, GPIO: 8 pins, SD Card socket, HDMI and connectivity via Ethernet
2	Microsoft IoT pack for Raspberry-pi	Open source device and gets you started with Win 10 Core, ARM9 200MHz processor, 8 digital inputs, 2 analogue inputs, 2 digital outputs, 2 serial ports RS-232, 1 serial port RS-485 and built-in web server. Connectivity via Ethernet.
3	Arduino-Uno	Open source, ATmega328 microcontroller, 14 digital and 6 analogue I/O pins, 32k Flash Memory and Internet connectivity via Shields
4	Beagle Bone	Open source, AM335x 1GHz ARM® Cortex-A8, 2GB of on-board flash, a microSD card reader, HDMI, GPIO 65 pins, and connectivity via Ethernet.
5	Wunder Bar	Open source SDK, Main circuit: NXP LPC1837 Cortex M3, connectivity via WiFi BTLEAnd 6 sensor circuits with Cortex M0 processor and connectivity via BTLE: light/colour/proximity, Gyroscope / Accelerometer, Thermometer / Humidity, IR Transmitter (remote control), Sound and Bridge/Grove with 2 GPIO pins
6	IoT Development Platform	Oracle Java ME environment, Customised ARM-based processor, 3G/2G mobile connectivity, WiFi, GPS, Oracle Java ME Embedded SDK, Low Level Device I/O Access, AC adapter and Battery with onboard charging
7	ARMmbed	For IBM cloud environment, ARM® Cortex™-M4 Core, 128x32 Graphics LCD, 5-way joystick, 2 x Potentiometers, speaker, accelerometer and temperature sensor
8	Waspmote	Open source, ATmega1281, Over-The-Air programming, 60 sensors available to connect to Waspmote, On-Board Temperature and Accelerometer, Hibernate mode consumes just 0.06µA, connectivity: 3G/GPRS, WiFi, BT
9	Things EE One	Open source, ARM® based Cortex®-M3, 2G / WiFi connectivity, accelerometer, temperature/humidity, GPS, orientation with 9-axis inertial module, ambient light sensor, SD card slot and one-year-battery-life with 1900mAh battery (charge via m USB).

C. IoT Cloud-platform

Now you can harness the power of the Internet of Things and turn the data generated by every one of your customers, partners, devices, and sensors into meaningful action. [10] With IoT Cloud you can process massive quantities of data, build business rules with simple, intuitive tools, and engage proactively with customers in real time [11].

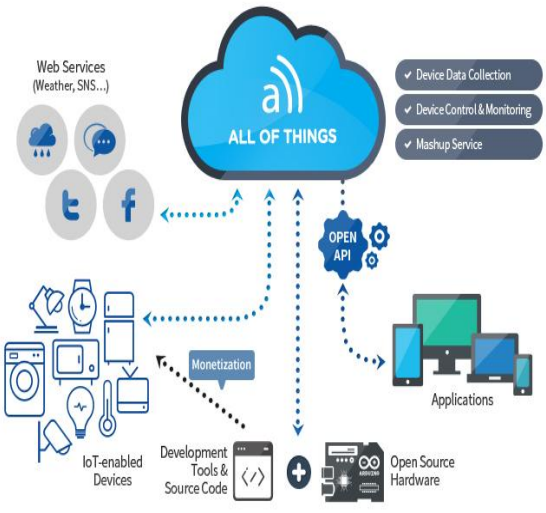

Fig. IoT cloud architecture

[12] The Bosch IoT Suite provides the foundation for service enablement, both in terms of connecting things to the Internet – reliably, securely, cost effectively and at scale – and in terms of delivering the backing application logic for value-added services. It is made up of a set of software services that provide all of key middleware capabilities needed to build a sophisticated IoT application from top to bottom. Customers can use any combination of these IoT services as needed to rapidly implement the desired solution. IoT is vast, diverse and constantly changing. IoT data from billions of interactions between devices and people is not only massive, it is complex and variable. Predefined programs aren't up to the task of analysing it. And traditional systems can't make sense all IoT data combined with unstructured data, like weather and social. A cognitive IoT can make sense of all types of data. In fact, it can choose its own data sources and decide which patterns and relationships to pay attention to. It uses machine learning and advanced processing to organize the data and generate insights. A cognitive IoT can also evolve and improve on its own through learned self-correction and adaptation. IBM released Watson cloud-platform for Internet of Things [13]. [14] The AWS IoT Device SDK helps you to easily and quickly connect your hardware device to AWS IoT. It provides enhanced features so that your hardware device can seamlessly and securely work with the device gateway and device shadow provided by AWS IoT. The AWS IoT Device SDK includes open source libraries, the developer guide with samples, and the porting guide so that you can build innovative IoT products or solutions on your choice of hardware platforms. [15] Cisco Internet of Things (IoT) Cloud Connect is our new mobility-cloud-based software suite. It offers a complete solution for mobile operators to provide exceptional IoT experiences. Cisco IoT Cloud Connect helps you find new ways to make money, while fully optimizing and utilizing your networks. Cisco provides granular, real-time visibility and updates across every level of the network—transport and user, access, core, and cloud.

D. 4g LTE and IoT

Throughput data, practically speaking, 2 to 12 Mbps (Telstra in Australia claims up to 40 Mbps) but potential estimated at a range of 100 to 300 Mbps. [16] Peak upload rate is 500mbps. It uses packet switching and message switching. Services and application are Wi-Fi and LTE and it has 2-8 GHz frequency band. It is most flexible for the Internet of Things. Specifically, it supports for both IPv4 and Ipv6 and uses the stateless auto-configuration. While comparing to 3G it has no packet and data loss, so it is more superior to 3G network. It supports IPv6 [17] addressing mechanism, it is possible to assign unique address to every device in the world. Thus 4g full-fill all the requirements of Internet of Things.

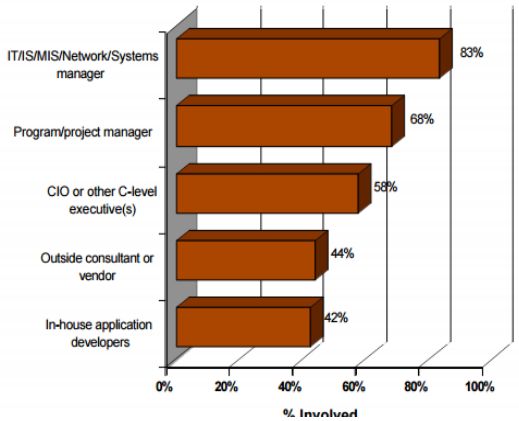

Fig. IPv6 Involvement

DOI 10.17148/IJARCCE.2016.55132

All most all the industries right now using the ipv6 infrastructure, the above survey report is conducted by cisco, [18] from the survey it is clear that every sector is now impacting with IPv6. From Internet of things it is more important factor, if the all the IPv6 infrastructure is ready then it is easier to make things smart using IoT.

III. CONCLUSION

Almost all industries and market sector is impacting by Internet of Things. More industries are involving to fulfil requirements of IoT. Craze of IoT is increasing in market place, most of companies making the hardware (microcontroller) for IoT. And some industries started making their IoT enabled devices. The topmost ranker industries already in market with their IoT cloud-platform. The 2020 can be expected, where IoT can be completely used in real-time life in every sector.

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