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THE WEB OF THINGS

Vamshi Krishna Kollu
Information Technology, MRIET,
Hyderabad, India
vamshikollu@gmail.com

Manikanta Manchikanti
Information Technology, MRIET,
Hyderabad, India
ultimatemmk143@gmail.com

M. Srilatha
Information Technology, MRIET,
Hyderabad, India
Srilatha248431@gmail.com

Abstract— — "How to create easily interactive applications that combine various heterogeneous devices"

Is the main problem that we have dealed in this electronic document. This document describes about the connection of electrical and electronic things around us with web and with each other. These things include different categories like residential, commercial, industrial etc. The connection between things related to different family designed for specific purpose are linked with each other

Index Terms— REST, HTTP, URI, nimbits, xively, EVRYTHNG, internet of things.

I. INTRODUCTION

The Web of Things is an evolution of the Internet of Things where everyday devices and objects, are connected by fully integrating them to the Web. Examples of smart devices and objects are wireless sensor networks, ambient devices, household appliances, RFID or NFC tagged objects, etc Unlike in the many systems that exist for the Internet of Things, the Web of Things is about re-using the Web standards to connect the quickly expanding eco-system of embedded devices built into everyday smart objects. Well-accepted and understood standards and blueprints (such as URI, HTTP, REST, Atom, etc.) are used to access the functionality of the smart objects.

II. HISTORY

One of the early prototypes of the Web of Things is the "Energie Visible" project in which sensors capable of monitoring and controlling the energy consumption of household appliances offer a RESTful API to their functionality. This API is then used to create a physical Mashup.

- Nimbits is an open source data historian server built on cloud computing architecture that provides connectivity between devices using data points.
- Xively is a commercial web of things data aggregator and data mining website often integrated into the Web of Things.
- EVRYTHNG is a platform for making tagged products part of the Web based on a Web of Things architecture.

An application of the Web of Things in smart homes has been recently investigated in, to address the problem of heterogeneous home devices by reusing Web technologies.

III. BASIC WEB OF THINGS

Three steps to create basic web of things :

- Connecting things to the internet (IPv4 or IPv6).
- Embedded web servers.
- Make devices part of web (using REST).

1. Connecting things to the internet

The day to day electrical and electronic appliances are connected to internet using protocols such as IPv4 and IPv6 The closed cube of things connected to the web is known as internet of things. Each object is identified with a specific IP address. This makes the user easily reach the object and promote the work desired by him.

2. Embedded web servers

An embedded web server is a component of software system that implements the HTTP protocol for every specific project, requirements can vary significantly. For example, ROM and RAM footprints can be a very serious constraint and limit the choices of the system designer. C++ or JVM availability for the system can be another constraint. Frequently performance is an issue, because typical embedded systems run multiple simultaneous tasks and an HTTP server is only one of them and may be configured as a low priority task

3. Make devices part of web

Devices are made part of web with the help of REST. Although REST seems suited for embedded devices, these do not always have an IP address and thus not directly addressable on the internet. However it is very likely that more and more real world devices will become IP enabled and have embedded HTTP servers. Such web enabled devices can

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be directly integrated and make their RESTful APIs directly accessible to the web.

IV. INTERNET OF THINGS

The term internet of things was proposed by Kevin ashton in 2009 which was later revealed that the concept was already in existence since 1990 proposed by Mark wiser. The internet of things refers to uniquely identifiable objects and their virtual representations in an internet. Equipping all objects in the world with tiny identifying devices or machine readable identifiers could transform daily life. For instance , a business may no longer run out of stock or generate waste products as the persons involved in the business knows about the products which are required and consumed , in the same way a person's ability to interact with objects could be altered based up on the present needs.

The Internet was a key enabler for the Web, but it was the Web itself which really transformed information technology and society as a whole. Likewise, the Internet of Things is just an enabler for what we really want: the Web of Things. The Internet of Things gives everyday devices an IP address and lets them plug into the Internet. But the Web of Things lets those devices integrate into the fabric of the Web itself and our lives. It is the Web of Things which can truly unlock the potential of device networking. IP enables inter-networking, but Web technologies enable information sharing. The goal for the Web of Things is to provide URIs to all the information trapped inside smart devices, encode that information using standard MIME types, and transport that information via HTTP.

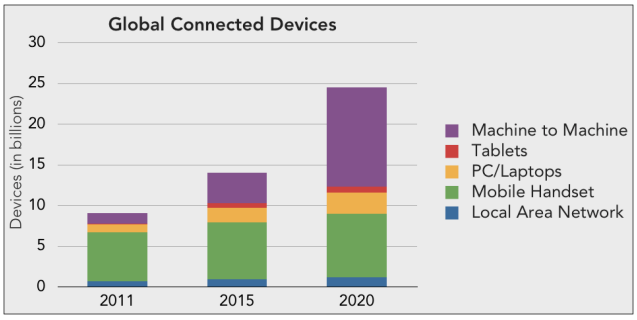

Figure 4.1

According to Gartner there will be 26 billion devices on the internet by 2020. According to ABI research more than 30 billion devices will be wirelessly connected to internet of things by 2020

V. PROCESSING

We start by looking at the state of device networks today, and how IP and Web technologies can become enablers to tap the huge potential of smart devices. Many vertical industries have been networking smart devices for decades. The problem is that each vertical has implemented their own siloed solutions. Contrast the Internet with the state of device networking today in which networks and protocols are stove-piped silos with no interoperability. Historically it was considered too expensive to build IP devices. Even today there is no standard for how to run IP over EIA-485 (the media most commonly used in device networks). But two wireless technologies are quickly shifting the industry: cellular and 6LoWPAN. Telemetry applications such as fleet management have been using cellular communications for many years.

This has huge implications for the Internet of Things - manufacturers can ship devices to the field with automatic, built-in connectivity. For example in a residential application, no installer must be sent to help the home owner get a device onto their home network. The cellular enabled device simply finds the net work and reports itself when powered up. In commercial and industrial markets, getting a device onto a network owned by the IT department can be a bureaucratic quagmire. Cellular devices can bypass all this complexity and jump straight onto the Internet over the air.

VI. SENSOR NODES AS REST RESOURCES

The architectural principle that lies at the heart of the web namely Representational State Transfer (REST) as defined by Roy fielding shows a similar achievement with more well known integration techniques such as WS(Web Services) which is to increase interoperability for a looser coupling between the parts of distributed applications. The goal of REST is to achieve this in a more simpler manner. REST uses the web as an application platform and fully leverages all the features inherent to HTTP such as authentication, authorization, encryption, compression and caching. REST brings the services into the browser in this way. Resources can be linked and bookmarked. The results are visible with any web browser and there is no need to generate complex code out of WSDL files to be able to interact with the service

To achieve this REST proposes two basic rules:

1. The application model is transformed from operation-centric into a data-centric one. This means "everything" that offers services becomes a resource that can be identified unambiguously using URIs

2. The four main operations provided by HTTP (GET, POST, PUT, DELETE) are the only available operations on resources, they define a uniform interface with well-known and shared semantics.

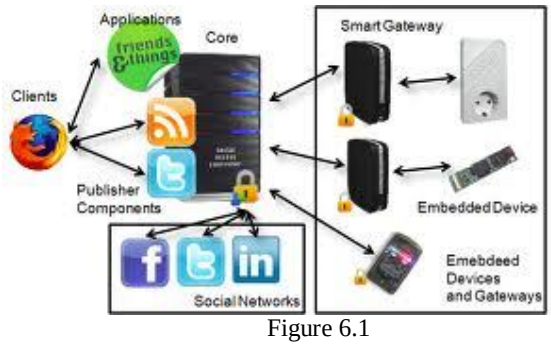

Figure 6.1

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The simplicity of REST and its seamless integration into global networks makes it ideal for creating "tactical ad-hoc integration over the web". These advantages mainly explains the importance of REST, why its services are the technological basis for an increasing number of web 2.0 services as those offered by Flickr, Twitter, Facebook, Del.icio.us, Google and Amazon. REST has been used to integrate websites together

VII. PROPERTIES

The properties of a Web of Things can be summarized as follows:

- Uses HTTP as an application protocol rather than as a transport protocol as done in the world of WS-* Web Services.
- Exposes the synchronous functionality of smart objects through a REST interface (also known as RESTful API) and more generally respects the blueprints of Resource-Oriented Architecture.
- Exposes the asynchronous functionality (i.e. events) of smart objects through the use of largely accepted Web syndication standards such as Atom or server-push Web mechanisms such as Comet.

These characteristics ensure the loose-coupling of services provided by the smart objects, furthermore they offer a uniform interface to access and build on the functionality of smart objects.

VIII. APPLICATIONS AND SERVICES

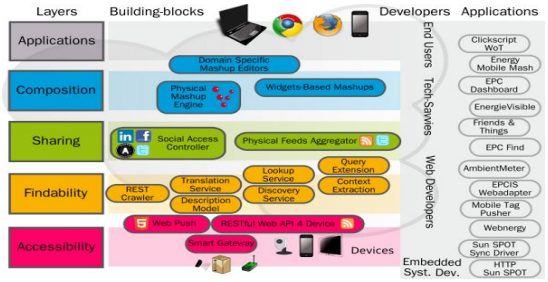

Figure 8.1

Today smart device applications tend to follow the model of vertically oriented stove-piped silos. Increasingly the opportunities to create new value lie in horizontal solutions which cross-cut verticals. For example, building out the smart grid requires device networking across many siloed markets: residential, commercial, industrial, metering, and electricity distribution. Even today, many of these opportunities are not cost effective because it is too complex and too expensive to implement connectivity to the devices. But the Web of Things can change this by making it as easy to query information from a device as it is from a web-site.

IX. ADVANTAGES

There are many advantages of incorporating IoT into our lives, which can help individuals, businesses, and society on a daily basis. For individuals this new concept can come in many forms including health, safety, financially, and every day planning. The integration of IoT into the health care system could prove to be incredibly beneficial for both an individual and a society. A chip could be implemented into each individual, allowing for hospitals to monitor the vital signs of the patient. By tracking their vital signs, it could help indicate whether or not serious assessment is necessary. With all of the information that is available on the Internet, it can also scare people into believing they need more care than what is really needed. Hospitals already struggle to assess and take care of the patients that they have. By monitoring individual's health, it will allow them to judge who needs primary attention. The Internet of Things can also assist people with their personal safety. ADT, which is a home security system, allows individuals to monitor their security systems at home through their phones, with the ability to control it. Also, another technology that has already been released is GM OnStar. This is a system that is embedded in GM cars that can detect if a crash has occurred and it automatically calls 9-1-1. It can also track the movement of the car.

IoT can also function as a tool that can save people money within their households. If their home appliances are able to communicate, they can operate in an energy efficient way. Finally, IoT can assist people with their everyday plans. A very interesting example that was given in a video was the communication between many devices that automatically adjusted to let an individual sleep in. Although this may sound unimportant, the misusage of time costs us "$135 billion a year" (Koreshoff, 2012). By allowing physical devices to communicate, it is taking the data that is individually collected, sharing it, and then translating the information into ways to make our current systems more efficient.

X. ETHICAL ISSUES

There are many ethical problems that may arise from the IoT. In the Code of Ethics for the IEEE it states that it will strive "to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin" (IEEE, 2012). Also, the ACM Code of Ethics states it will "be fair and take action not to discriminate" (ACM council, 2012). Although the Internet of Things claims to strive to close the gap between the rich and poor, it could also have the reverse effect. However, the IoT can discriminate against certain groups of people that do not have access to the internet. There are many countries and lower income families that do not have access to the internet, so they will not be able to reap the benefits offered by the Internet of things. In other words, families that do not have the money to purchase some of these devices will be as well of as other more affluent families. In the end this could cost the lower socio economical families more, and decrease the inefficiencies in higher socio economical classes.

The Internet of Things may also impede on privacy, yet the Code of Ethics for ACM says it will "respect the privacy of others" and "honor confidentiality". By collecting information on people and their habits, companies will have access to and the tools to infringe upon consumers. It is not uncommon for companies to do as so. Take for example

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Google and the recent law suit of them sharing so called "confidential" information with other companies. When companies have this information readily available to them, and they have the possibility to increase their revenue tremendously, they are more likely to infringe upon our rights. Everything that we do on the internet is kept. Even if you delete something, it will always exist. This information can be transformed into many tools for companies to help them generate revenue. For example, the internet can track our likes and dislikes by identifying which sites we go on. Therefore on some websites that allow advertisements, these commercials that appear are specifically generated to entice us to purchase more. These ties into the next bullet of honoring confidentiality. Although ACM is here to help, it does not prevent companies from misusing the technology to begin with. A way for ACM to prevent these mishaps from happening is to solely allow the information that is generated for the specific individual and the parties they allow the information to be shared with. For example, an elderly person can sign a waiver saying that the information that is generated by the chip can be shared with the hospital. This is an obvious example, but a good one nonetheless. The individual will be able to sign a waiver allowing the information they generate to be shared with the parties of their desire.

XI. DRAWBACKS

Although the Web of Things is starting to take shape, there are still a couple of missing pieces. Existing networking using Ethernet, Wifi, or cellular can already leverage Web technologies, although many verticals still cling to running fieldbus protocols over IP. But the ability to utilize Web technology over 15.4 and serial media remains immature, lacking many key standards.
The key missing pieces:

A. IP over serial

One of the biggest holes today is a standard for running IP over media such as twisted pair. The most obvious solution would be to extend 6LoWPAN to utilize another MAC layer. No matter how successful 802.15.4 may be, serial communications will never go away.

B. Roll

Work is progressing within the IETF on the routing standards for setting up mesh 802.15.4 networks. However it will likely still take a couple years before things are really mature. Most likely ROLL will also be required to deal with how serial links are integrated into the PAN.

C. HTTP over 6LoWPAN

Although HTTP is the desired application protocol for the Web of Things, it will never successfully run directly over 802.15.4 or serial links. The memory and packet size requirements for TCP and text headers are an ill fit for the constraints of sensor networks and sleeping devices. This is really no different than why full IPv6 is unsuited for direct use over 15.4. But it doesn't mean we throw out what already exists, rather we figure out how to optimize it for the problem space and still maintain HTTP semantics, URIs, and MIME encoded data for seamless integration with the Web.

Three of the main concerns that accompany the Internet of Things are the breach of privacy, over-reliance on technology, and the loss of jobs. When anything is put on the internet it will always be there. Of course there are security measures that are taken to protect information, but there is always the possibility of hackers breaking into the system and stealing the data. For example, Anonymous is a group of individuals that hacked into federal sites and released confidential information to the public. Meanwhile the government is supposed to have the highest level of security, yet their system was easily breached. Therefore, if all of our information is stored on the internet, people could hack into it, finding out everything about individuals lives. Also, companies could misuse the information that they are given access to. This is a common mishap that occurs within companies all the time. Just recently Google got caught using information that was supposed to be private. Information, such as the data collected and stored by IoT, can be immensely beneficial to companies.

XII. CONCLUSION

We conclude that every electric and electronic device can be grouped together virtually and can be controlled where ever you are by using the universal media web. The main problem that these devices are not manufacture by single company so there should be a common device that can act as interface between the system and the devices . All the early protocols that used to connect internet to the system are not disturbed, but in connecting the system and the local devices we use the LAN protocol so that it is compatible to the system and the device which we are going to connect to the internet. By this type of link we can establish a secured connection for the devices with the internet. The main advantage of this connection is that every individual device has been assigned an IP address so that every device can be accessed without disturbing other device. Finally the aim of the web of things has been achieved without disturbing the gadgets or device manufactured by different companies and not assigning heavy burden on the user for connecting the devices with the internet.

XIII. REFERENCES

1. www.ijct.com
2. www.projectsworld.blogspot.com
3. www.researchcenter.com