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Fourth Coming Internet: The Internet of Things

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Abstract – *Last few decays, our main communication on the web is human-human. However, most likely within the near future soon object will have a unique identification thus every object may be interconnected and also the internet can become as "The Internet of Things." The voice communication forms can expand as human-human to human-human (also cited as H2H), human-thing and thing-thing (also cited as M2M).This will bring a replacement ubiquitous computing and communication era that changes the lifetime of the people's on the far side the bounds. Radiofrequency Identification techniques (RFID) and alternative connected identification technologies are going to be the center of the internet of Things (IOT). Our paper aims to exhibit the structure of the Internet of Things, and we try to address some essential problems with the Internet of Things likes its architecture, and the ability, etc. within the starting we are going to narrate the overview of the Internet of Things Then we propose our structural design of the Internet of Things, and then we aim a specific application model which can be applied to automatic facility management in the smart campus.*

***Key Words*: Internet of Things, M2M, RFID, Omnipresent Computing**

1. INTRODUCTION

The term, internet of things (IOT) that refers to solely particular objects, things, and their primary representations in an Internet-like structure, was originally introduced in 1998 [1]. In the past few years, the idea of IOT has become popular through some typical Applications (e.g. greenhouse monitoring, telemedicine monitoring, smart electric meter reading, and intelligent transportation). IOT has four major sections together with sensing, heterogeneous access, information processing, applications and services; with bonus section likes security and privacy. Today, the IOT as meaninglessness is usually known, resulting business applications associated with the IOT can raise, for example, cyber-transportation systems (CTS), cyber-physical systems (CPS), and machine-to-machine (M2M) communications [2].

Till date, the enormous masses of Internet Connections worldwide are devices used directly by humans, such as computers and mobile handsets. The key communication outline is human-human. It is not in an accessible future, every object can be connected with each other. Things can exchange information by themselves and the number of "objects" connected to the internet will be much larger than the number of "people" and humans could become the minority of generators and receivers of traffic [3]. We combine the physical world and also the Information world together.

The future is not going away to be people talking to people; it's not aimed at people accessing information. It's aimed at using machines to talk to other machines on behalf of people. We are entering a new age of pervasiveness, we are entering the age of the Internet of Things in which new form of communication between human and things, and between things themselves will be accomplished.

A new aspect has been additional to the world of data and communication technologies: from anytime, anywhere connectivity for anyone, we'll have connectivity for the entire world [4]. Figure l shows this new aspect. There is no standard taxonomy of "Internet of Things." Taking into account of functionality and characteristics as central IOT is referred as "Things have identities and virtual personalities in operation insensible areas using intelligent interfaces to connect and communicate among the social, environmental, and user contexts." A similar definition that puts the focus on the seamless combination might be formulated as "Interconnected objects having a dynamic role in what might be called Fourth Coming Internet" [5]

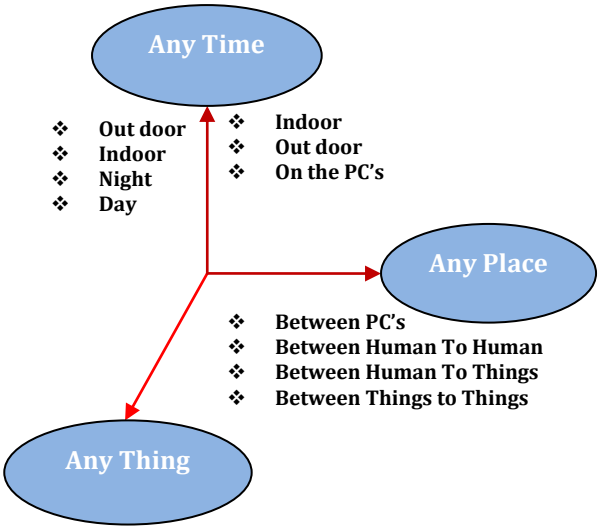

Figure 1 A New Aspects of IOT

2. TECHNOLOGIES FOR THE INTERNET OF THINGS

The Internet of Things may be a technological revolt representing the longer term of computing and communications, and a few innovative technologies need to support their improvement. Radio frequency identification (RFID) is seen as one of the key enablers of the Internet of Things. Identify objects so that they can be connected. This function can be provided by RFID, which uses radio waves to identify items [6]. Sometimes RFID has been labeled as a bar code replacement, but the RFID system can do much more than that. In addition to identifying items, it can also track items in real time to get important information about their location and status. RFID has already had some valuable applications in retail, health-care, facilities management, etc. [7] A mature RFID technology presents a sturdy for the Internet of Things. One of the most important breakthroughs of the internet of Things is building the bodily world and information world together. Sensors play an extremely essential function to bridge the gap between the bodily world and Information world. sensors acquire information from their environment, producing records elevating awareness about perspective. So the modifications of their surroundings can be monitored, and the corresponding matters can make some responses if needed [8].

3. ARCHITECTURE

Currently, Internet has a five-layered architecture, strolling with TCP/IP protocols, which has worked properly for a long time. However, within the Internet of Things, billions of objects are connected which is able to produce a lot of larger traffic and want was more information storage. In addition to these, there still have some other challenges like security, governance, etc. But today's internet was designed within the 1970s for purposing that bears very little similitude to today's usage situations and related traffic patterns. Mismatches between the original design and current utilization are currently getting down to hamper the Internet's potential. Within the BLED Declaration [9] and other supporting statements, all of them imply this time. So, it's cheap and essential to design a brand-new architecture for the internet of Things. Redesign a new architecture could be a terribly complicated project that wants contemplate several factors like reliability, scalability, Modularity, interoperability, interface, QoS, etc. concerning the architecture design of the internet of Things, service-oriented design (SOA), exploiting grouping with internet, and interfacing with a wide move edge technologies and connected networks could be a key objective. For this objective, we should always consider holding a totally inclusive range of "edge" technologies, as well as RFIO for interfacing with the physical world; exploiting evolving object-connected data capture technologies, and networking capabilities-sensory, location native communication, and security; combination with the evolving internet and a few alternative technique issues. In addition to these, we should also view the needs for governance, QoS, security, privacy, and other socioeconomic issues. Anthony Furness gives us a proposal about the Internet of Things' architecture [10] Figure 2, Figure 3 is from this proposal, and they show us the Internet of Things with different level of edge technologies

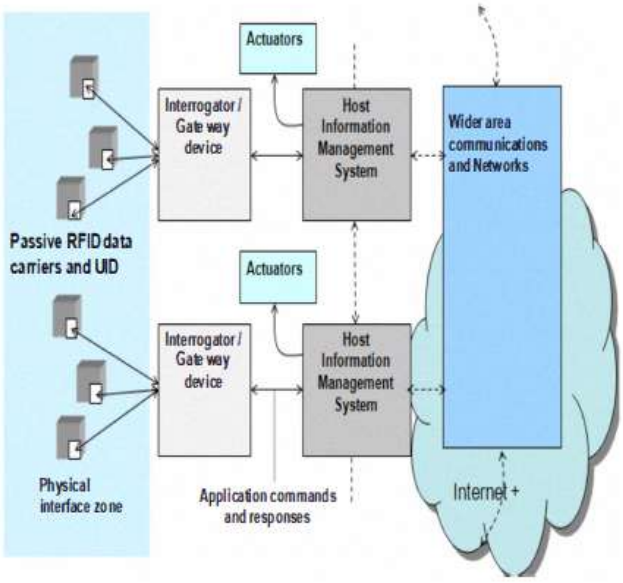

Figure 2 IOT at its basic level

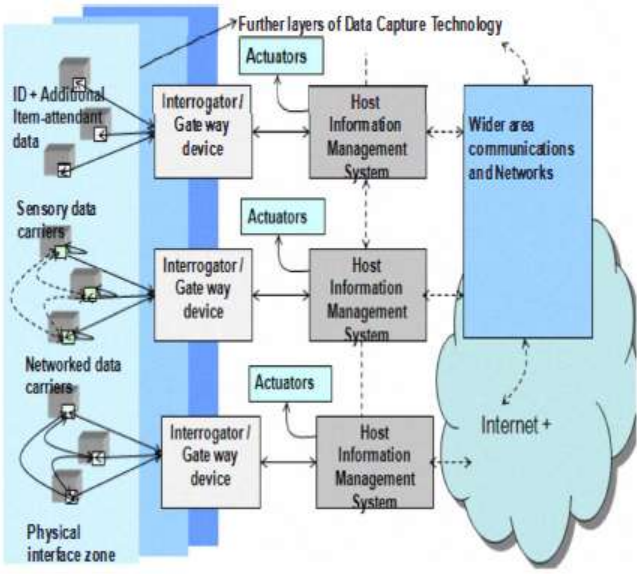

***Figure 3* Internet of Things with different level of edge technologies**

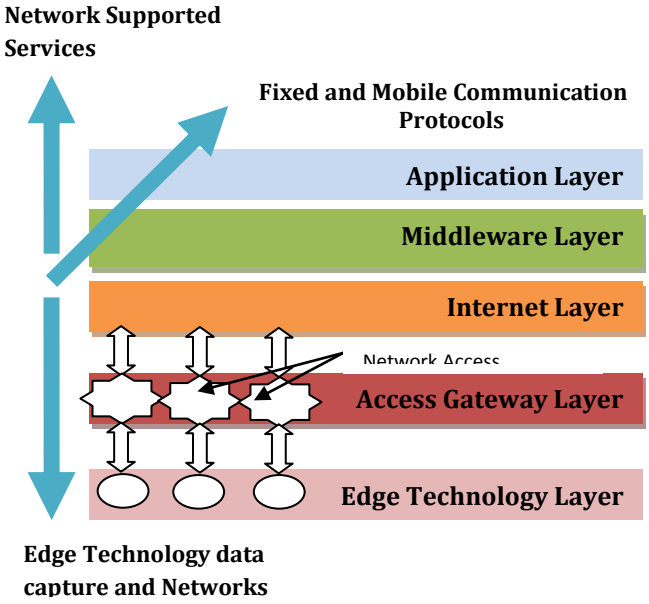

Figure 4 Architecture of Internet of Things

Then he gives the architecture of the Internet of Things he has designed. Figure 4.This is a good proposal which has given us a rough solution to the Internet of Things' architecture. But there still are some further important issues we should think about carefully. The first is if every object is connected and things can exchange information by themselves, then the traffic and storage in the network will increase very rapidly with an exponential way. Can today's Internet really bear this? Do we need a new backbone? Connecting every object and make them can communicate independently is a very attractive vision, and yes we, can imagine many cases in future that a thing needs to "talk" to another thing, but is it really necessary that an object "talks" to all the other objects? Why does a toothbrush need to "talk" to a fridge? In fact, the main connections of an object are with those objects which are in the same the Internet of Things application system like it. And it could be seen that the Internet of Things is made up of many the Internet of Things application systems.

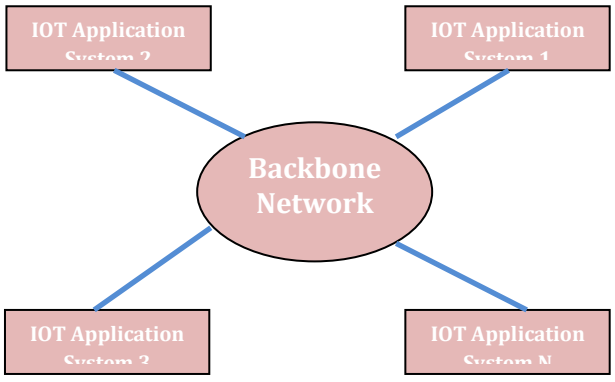

Figure 5 Internet of Things

From this point of view, we can have a new seeing of the Internet of Things. Figure 5 shows us this new viewpoint. The Backbone Network may be today's Internet, maybe not or maybe its expansion. Now the Internet of Things' application situation is there already have been many applications like EPC Global, smart hospital and so on which seem to work well. But the matter is these application systems work alone, and although I discussed before that these days an object mainly communicate with another object who is within the same application system, however, there isn't any doubt that the technical future is connecting each application system and with the expansion of the internet of Things the communication between totally different application systems will become more and more frequently for his or her collaborations. But as the lack of global standards, they may have used different standards and technologies, so the interoperability is a problem. Only if we can solve the interoperability problem we can have a real the Internet of Things. The authors come up with a solution that adding a Coordination Layer into the Internet of Things' architecture design

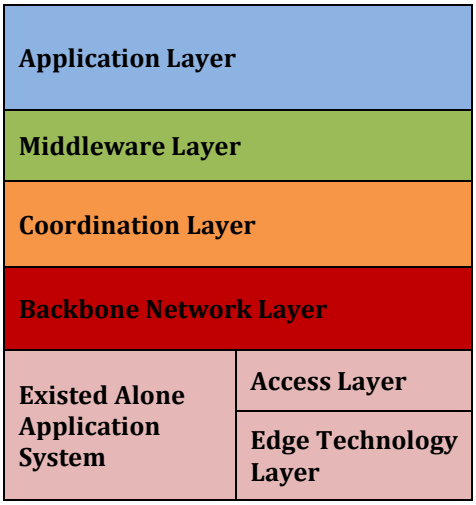

Figure 6 Architecture of Internet of Things

The coordination layer responses to method the structure of packages from totally different application systems and reassemble them to a unified structure which might be identified and processed by every application system. Of course, if the standards of the Internet of Things are completed then the systems which based on the standards will have no problem in interoperability, this problem exists between the existed application systems and the newly deployed systems, and between the existed application systems themselves. Based on all the above, we give our architecture design proposal of the Internet of Things. Figure 6 shows our design.

4. DISCUSSION

The Internet of Things is ongoing, but there are many issues need to be addressed. In this part, we discuss two crucial

issues: standardization, security, and privacy. There's no doubt that for any kind of communication technology an open standard is one of the most significant enablers to make it successful, including the Internet of Things. Without clear and recognized standards such as the TCP/IP on the Internet world, the expansion of the Internet of Things cannot reach a global scale. In other word, there will no real the Internet of Things without a global standard. But the fact is technological standardization of the Internet of Things in most areas is still in its formative years, or remain fragmented. So efforts are needed, collaboration among ISO, ENSI, IETF, ITU and other related organizations are very important and urgent. Security and privacy are always one of the most concerned issues by the public. There is a demand to have a technically sound solution to confirm security and privacy of the customers in order to possess a widespread adoption of the internet of Things. Looking back to history, since at the terribly starting of the internet there's no need for security and privacy thus, there's no design for the security and privacy. As the growth of the Internet many securities, and privacy problems came out, then we could do nothing but build patches, it appears that security and privacy is an add-on feature. However it's feeling that the general public acceptance for the internet of Things can happened only the strong security and privacy solutions are in place. So, we must always take security and privacy a very vital role from the start design and build an integrated approach to security and privacy on the internet of Things. In addition, looking at security and privacy only from the technical perspective is not enough. Besides technology, the regulation, marketing and Sociopathic are also should be considered. Figure 7 shows the facts which need to be considered the security and privacy issue.

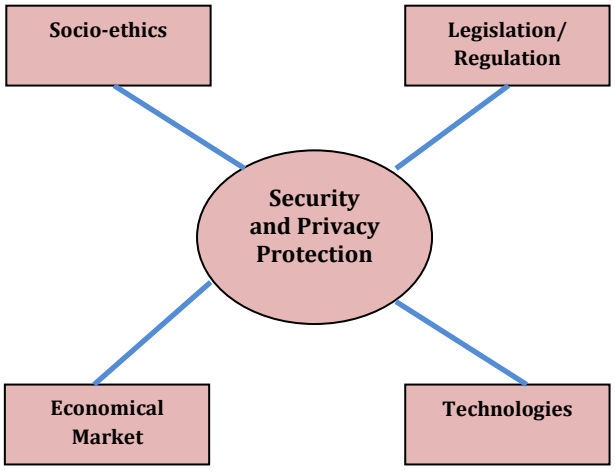

Figure 7 Facts of Security and Privacy

5. CONCLUSION

The Internet of Things is close at hand that brings us into replacement age within which everything from tires to toothbrushes is often identified and connected and things will exchange data and create choices by themselves. The communication forms are human-human, human-thing, thing-thing. Things are the most traffic manufacturers. People's lives will have the benefit of the Internet of Things. The future is bright however, the approach is tough. There still square measure several technical problems ought to be addressed and extended thanks to moving to create a real world the internet of Things.

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