

# Reviews the Internet of Things and Its Relationship with Radio Frequency

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## Abstract

In this paper, we have reviewed the concept of the Internet of Things and challenges will be examined. And we will continue to investigate the reasons for these methods.

**Keywords:** Internet of Things, addressing, variable length coding techniques.

## 1. Introduction

The Internet of Things, for the first time in 1999 was used by Kevin Ashton described a world in which everything, including inanimate objects, have their own digital identity and allow their computers to organize and manage. Now all the people connected to the Internet, but the Internet of things, all objects are connected. But even before that Kevin Kelly in new laws in this era networks (1998) issue of smart nodes (such as open and closed sensor) that are connected to the Internet was suggested.

## 2. The Definition of the Internet of Things

Internet of Things is a concept used to describe the future of computing in which physical objects are connected to one another and are connected with other objects. In other words, the Internet of Things is a new concept in the world of communication technology to where to every creature (human, animal or objects) Ability to send data via communications networks, including the Internet or an intranet, is provided. The architecture for first in the Auto-ID center at the Massachusetts Institute of Technology (MIT) was developed. Although the technology to work in the field of Internet objects from the early 90s began, but the so-called "Internet of Things" Kevin Ashton presented in 1999 [1].

Internet of Things is closely related to the concept of "radio frequency identification" as a method of communication, but includes sensor technologies, wireless technologies, "quick response codes" and so on as well. Internet of Things is important because objects when they can provide digitally eventually something far beyond the generalities that in reality will become. In such circumstances, our relationship is not limited to other objects with the objects around them, as well as data from a database, etc. are connected. When objects are connected with each other, we can speak of an "intelligent environment" in general. New technologies such as RFID and smart calculation promising and interconnected world of network equipment. At that time, anything from cars to toothbrushes wheels into the dawn of a new era of communications that is news and current Internet (which contains data and people) will lead to the Internet of Things.

The Internet revolution that has been done in the past, to connect people and information anywhere and at any time is provided. People to connect to the World Wide Web in addition to sitting in front of your PC, you can also use mobile phones and computers. This technological revolution is the logical next step, connecting objects to the communication network as well as by embedding a transmitter / receiver portable items and ordinary objects, new forms of communication between people and objects and between objects is provided. So in the world of communication and information technologies, communication at any time and any place for everyone, to communicate at any time and any place for everyone and everything forward (Figure 1).

RFID uses electronic tags and sensors, communications and control networks will fulfill potential. The theme of the importance of using new technologies such as RFID sensor

technology together in order to achieve Internet of Things stresses.

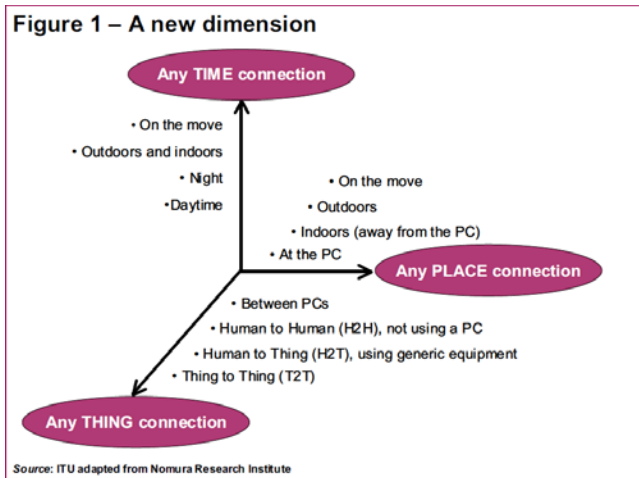


Figure 1. Internet of Things for anything at any place and any time

Kevin Ashton, one of the directors of the company Procter & Gamble, in this regard, "The Internet of Things is creating a way for companies to use sensors to detect objects anywhere of the world were very large. The technology is changing the basic method of tracking objects from production to consumption, and even vice versa. that's why we created the internet of things We do "[1].

And connected in order to achieve the objects, distinguish them over the network via technology such as RFID is a must. Then with the help of sensor technology to be aware of changes in their physical conditions such as temperature change described above. Now by using a combination of these two technologies and how humans can handle objects through the Internet, to give them intelligence. So intelligent discussion of important objects in the Internet of Things. In this regard also Negroponte, head of the Media Lab at MIT, says, "When we talk about the Internet of Things just putting RFID tags on some dumb things that smart people are so that we know where they is not. Rather, about embedding and embed intelligence in them because then things smarter and more than what is expected, doing "[1].

But more than a decade, new concepts were formed in recent years through a series of intelligent products to market has become. Now we were talking about the idea according to which every physical object will be able to connect to the Internet or through other means of communication, interact with other objects.

### 3. History of the Internet of Things

The Internet of Things, for the first time described a world in which everything, including inanimate objects, have their own digital identity and allow them to organize and manage computers. Now all the people connected to the Internet, but the Internet of things, all objects are connected. Objects together and started talking about their smart they develop. In 2008, the number of objects that have been linked together has been more of the world's population. Figure (2) in 2020 will reach 50 billion connections between objects. IDC, the technology research firm said sales of around 8.4 trillion dollars in 2012. Given that the technology companies around the world were taken seriously.

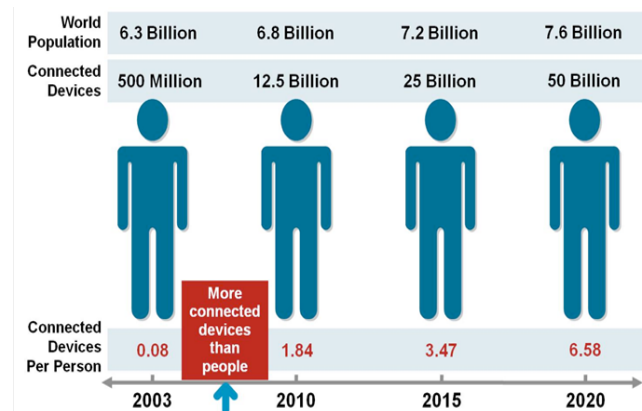


Figure 2. The expansion of the Internet of Things

The advent of the Internet, a great development in the world and according to the welcome of its people, activists are thinking about using technology and Internet technology to people's lives were in different sections. Now more than a decade, it is not only humans who interact with one another through the internet but new concepts are formed and intelligent products to market limitations through technology objects communicate with each other and with humans establish addressing.

If they can talk with you. If all that speaks refrigerator and any food automatically store it near your home orders, time that will listen to you, Thermostat learn that your personal habits, cars that tell you requires new piece or a long iron that is clear and warns you so that you can even remote control, remote switch it off, are each examples of the internet of things.

#### 4. Smart Objects

Internet is a worldwide computer to connect different networks to each design a concept that until a few years ago we had the Internet, using a home computer or laptop to view the sites of interest. In recent years a multitude of different digital tools on the market that any of them be independent connection to the Internet. Smart phones and tablets may know the most important tools, but require different fields of the applied sensors with the ability to send information to cell phones and computers or even directly to the Internet, designed and built. For example, heart rate and other vital signs sensors is made via a Bluetooth connection to a mobile phone transfers or car burglar alarms an ongoing risk to the vehicle owner sends signals wirelessly to a computer. In fact, today we face a world of small and large devices that send and receive different information. This resulted in the formation of a new concept in computer science that includes all the different devices connected to the network in terms of the "Internet of Things," power pricing. Various IT developments as well as changes in modern lifestyles has led to the formation of this new concept. However, in general, not the underlying factors and facilitates the development of the Internet of Things can be understood that these factors are:

- 1- The possibility to assign IPv6 standard definition of IP and enables easier identification of individual objects.
2. expanding the use of technology to cloud computing.
3. An increase in the average speed of the Internet connection and the third and fourth generation mobile phone.
4. The development of useful applications for smart phones.

5. Increase communication and cooperation with the Internet expertise.

6. Pay special attention to the phenomenon of cloud computing developers that allows connection provides a host of tools and equipment and the dramatic expansion of this new technology-based applications.

7. The development of databases in terms of quantity and quality as well as reduce the cost of maintenance and data transmission.

8. provide more tools to connect to the internet in the public market [2].

9. Nanotechnology.

As previously mentioned, this extensive network, covering various fields. It can be said that all aspects of human life has been affected by the massive network will be continued. Taking advantage of this phenomenon is to review some of the coolest look.

#### 5. Internet of Things technologies

Internet of Things is closely related to the concept of "identification through radio frequency» (RFID) as a method of communication, but includes sensor technologies, wireless technologies, quick response codes (QR) and others that will be explained in detail.

##### 5.1. Addressing technology

The process of sending data over the Internet of Things technology is thus subject to a unique identifier and an Internet Protocol (IP) receive the necessary data for the database is appropriate. Data by various devices such as mobile phones and a variety of computers and tablets are visible.

Send process data objects need to engage in internet technology "man to man" or "Human-Computer" will not have the data automatically based on the settings made and at certain times (usually permanent and the moment) are forwarded.

The advent of the Internet of Things is one of thousands of results of the Internet and the development of Wireless Technologies and Micro-Electromechanical systems is.

Due to the many capabilities of engagement "for car" Internet of Things technology is available, it is up to date on industry sectors (especially in a variety of manufacturing), energy and gas have been widely used. Other smart products, communication products that feature "Cars with car", such as smart labels, smart meters will also benefit from Internet technology objects [6].

Tools with which to communicate with the Internet things are made new smart devices bring to our homes. One of the difficulties ahead, finding effective solutions for enabling collaboration between different products. Currently, there is no tool or platform distribution in this area. A group of Norwegian researchers have dealt with this issue. The research project is an integrated service platform to create and distribute apps Internet of Things infrastructure has been installed. The platform includes developer tools Arctic is known as the creators of the apps can use it. In addition, the website was launched ISIS Store to download the apps. The project receives funding from the Norwegian Research Council VERDIKT.

Built Arctic University of Science and Technology, Norway (NTNU) is. One of its members, postdoctoral researcher is Frank Alexander, Kremer. He explains: "Objects and applications needed for everyday life 'smart' often connect to different communication services, sensors and other components needed. At the same time, these objects must be able to react quickly to change and user actions. To do this, we must coordinate systems adequately controlled, although this is not available in conventional programming." Dr. Kremer believes that these tools create new apps and adapt to existing apps and updating software easier to make when needed [8].

Dr. Kremer then adds: "Creating a simple application with the Arctic can easily put two bricks together, but depending on the purpose, it can also create advanced apps. "Ryder, Martin Svendsen, Project Manager of Telecom Norway, Telenor Group (Telenor Group), says:" The system also helps ICE trends (ICE Composition Engine) is responsible for controlling the whole process and provide communication between objects."

ICE can also manage the relationship between objects in the house and it can track each version updating. This system has a modem, a decoder, or an adapter is installed in the house and the possibility that even if offline users, the Internet of things will continue to work. Telenor is keen on playing with apps interface between manufacturers and end users, operator of the Internet of Things. But the success of the company to do that, should the number of those using the tools of production applications to be dealt with sufficiently high.

Mr. Svendsen says: "We've launched the App Store fresh produce on its own to publish apps talented producers and end users can purchase and download them. Basically, applications can be chosen depending on the needs and priorities."

## 5.2. RFID Technology

Internet of Things means that many of the everyday things we use to connect to the Internet, your tasks and information together or share with humans. The Internet of Things, described a world in which everything, including inanimate objects, have their own digital identity and allow them to organize and manage their computers [4].

To make objects interact with each other or with the Internet, it was necessary to be connected manner. Perhaps from the outset that Kevin Ashton established the Internet of Things, using chips called radio frequency identification based on RFID had in mind. The technology of small and inexpensive chips are used and by whom data is sent via radio waves to a receiver chip. Receiver chips, interpret data and information with an internet connection can be used in a huge range and provide for different applications. Although RFID is still due to its unique capabilities, is widely used in different places, such as gate entry and exit and transit system is used, but other technologies for the Internet of Things enters been realized. Some, such as bar codes, and some of these technologies use more simple techniques like IR codes, Kiev, WiFi and Bluetooth are benefiting from alternative techniques. RFID technology can be a replacement for the barcode. In fact, RFID is more than just bar codes because it has an automatic scanner system [3]. These technologies have a major differences. The main difference is that RFID

technology is capable of carrying large volumes of information and the need to have line of sight for data collection and communication.

RFID technology uses radio signals to the automatic identification of an object based storage and remote data respectively. Figure 3. Generally, RFID technology is helping to implement the following equipment:

- A. Label (Figure 4).
- B. Tag Reader (Figure 5).
- C. Antenna signal booster.
- D. Information management software.
- E. Database.

Radio waves information between sender information and devices carry information. The added piece of information, label and to get pieces of information, called a reader or tag reader.

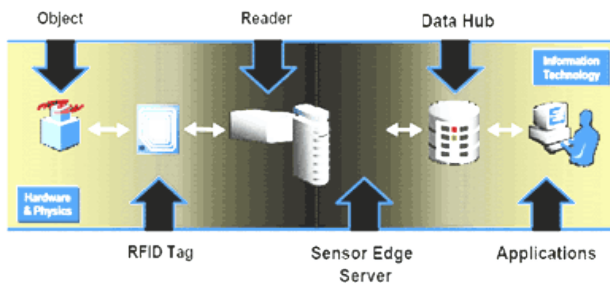


Figure 3. Technology RFID [10]



Figure 4. A sample tag

Labels often placed on the object. If we use labels that are classified by energy source we have three main types of them. Tags active, passive and semi-passive. published a label reader and are of course less active tags have a read range and scope. Passive tags are low cost and long lifetimes and also small dimensions. Semi-passive tags is also another type of

label that in addition to using its internal battery, can also use wave energy emitted by the tag reader. In this article we focus on passive tags are placed.



Figure 5. RFID wireless reader

The antenna used to transmit radio signals between the tag reader and tag that is used for the label and for the reader. Data management software in order to process the data collected there. The special software is usually shown on a local server enables data to be exchanged with the tag reader to be collected and processed and stored in a database and can be retrieved if needed [6].

### 5.3. Wireless sensor network technology

A wireless sensor network is composed of a large number of sensor nodes with a high density inside the phenomenon or very close to it is established [5]. Location sensor nodes need to determine and adjust their predecessors. This allows the establishment of this type of nodes in places inaccessible or dangerous creates a completely random. On the other hand, these features need to consider your ability to configure the protocols and algorithms asks for these networks. Another feature of sensor networks, sensor nodes is a collective effort. Sensor nodes are equipped with a simple processor rather than the raw data received from the environment, process the data and make brief on the local computing to help only of their close ties. This is the low number of necessary data transmission and processing instead of sending multiple raw data and also reduce network traffic and also makes the operation easier and better data fusion to take place. Features defined in the previous section to create a wide range of applications for this type of network. Some possible

uses of health-related applications, and smart homes are military matters. For example, on issues of self-configuration features, quick deployment and fault tolerance applied sensor networks for military systems, command, control, communications, computing, intelligence, surveillance, reconnaissance and targeting is very convenient.

In medical applications, sensor networks can be used to care for patients and help patients with disabilities to be applied. Some commercial applications including warehouse management, product quality supervision and monitoring are accident-prone areas. Wireless Sensor Networks WSN symbol referred from. WSN networks in recent years because of the complexity and breadth of research, much of the research in the field of sensor networks into account. Understanding wireless sensor network applications need to understand the techniques of ad hoc wireless networking. Although numerous protocols and algorithms for wireless ad hoc networks have been proposed, they are not fully fit the characteristics and requirements of sensor network applications [7]. The main differences between sensor and ad hoc networks are:

A. number of nodes in sensor networks can be several times that an ad hoc network.  
B. the sensor nodes are very prone to failure.  
C. to speed sensor networks topology changes.  
D. the sensor nodes are often broadcast communication model while ad hoc communication networks are usually based on point-to-point model.  
E. the sensor nodes usually in the memory, computing power and energy are limited.  
F. due to the large number of sensors and sensor nodes usually do not overload their national identity. The design features sensor nodes are usually scattered in a sensor field. All the nodes capable of collecting data and referring them to the sink node or base station, respectively. Data collected using a multi-step architecture without infrastructure nodes to write dumped into wells. Nodes may well work using the Internet or satellite is connected to Node Manager. Design of sensor networks is displayed, the following main influenced by several factors:

1. fault tolerance.
2. scalability.
3. The cost of production.
4. execution environment.

5. The sensor network topologies.
6. hardware limitations.
7. media and energy consumption.
8. The layered architecture.

The main task of a sensor node in a sensor area and discover what it feels environment, local fast operations and data pre-processing and data transmission is final. As a result, power consumption can be divided into three parts: the feel, data processing and communication that has the highest consumption of communication.

## 6.The Future Internet of Things

Vernon Turner, an executive research firm, believes that the Internet of Things introduce new solutions in information and communications technology (ICT), which is a high potential for monetization. He objects to the use of the Internet already knows very minor and It's just like the tip of an iceberg that is still largely hidden And to learn more about People and companies with the technology and encourage them to use it, we need more time, but what is certain is the future of the Internet of Things. Due to the development of smart cities, smart cars and houses, upgrade communication infrastructure as well as the growing popularity of the Internet of Things, but the project is still in infancy And several factors prevent its progression is accelerated so that dream is closer to reality. Some of these factors to the lack of standards, lack of awareness of the project and its benefits are concerned. Despite these obstacles, Research firm IDC in a new report that opportunity and growing market for Internet of Things is examined predicts that by 2020 around 212 billion objects worldwide on the Internet of Things will work.

## 7.Encryption methods

Compress the process of coding that will effectively reduce the total number of bits required to provide specified information, is called compression [9].

Compression is divided into two main groups:

A. Lossless compression: The compression reduces and eliminates redundancy bits based on statistical and no identifying information will not disappear.

B. Compression waste: reducing the compression bit less valuable information on identifying and eliminating done and this information can not be reversed.

### 7.1. Lossless compression

Lossless data compression, the class of data compression algorithms to obtain complete basic information that enables the compressed information (the same information returned without it to be low). This class is the "Lossy compression data", which is approximately basic information returns, but instead are associated with higher compression rate [17].

Compression without loss in many programs use and in some cases used is important that preliminary data and final data removed from the compressed mode, with identical or deviating from the basic information harmful. Examples of executable programs, text documents and source code are. Some formats such as PNG or GIF images use only lossless compression, while others, such as, TIFF or MNG may use both compression class. Most programs lossless compression, in sequence consecutive two things: First, the production of statistical models for input, and secondly, Using this model for mapping input data in a way that is likely sequence of bits (for example most frequently) shorter output data improbable cause. (simply from these models are shorter and use data compression).

### 7.2. Compression ratio

Compression rate, compression rate is evaluated according to the criteria under which their relationship is as follows:

$$\text{Compression ratio} = B_0/B_1$$

Where the number of bits before compression  $B_0$  and  $B_1$  is the number of bits after compression.

Some compression tools with General users:

WinRar, WinZip, pkzip, compress, gzip

Some extensions in the field of file compression:

.zip, .rar, .gz

Some extensions in the field of Image Compression:

JPEG, JPEG 2000, PCX, TGA, TIFF, WMP

Some extensions in the field of video compression:

MPEG-(1,2,4), DivX, Quick time (MOV), Windows Media Video (WMV)

Some extensions in the field of audio compression:

MP3, RealAudio (RA, RAM, RP), AAC, WMA

## 8. Conclusions

This paper showed how RFID technology with sensor technology with new opportunities to track and monitor the Internet can be accurate and instantaneous on objects and improve the quality of life for the human being is omnipresent. This innovative use of RFID with sensor technology, internet and web technology can reliability, ease of use and functionality and improve the efficiency of our existing system.

With the implementation of these solutions, Internet of Things can be achieved and the potential expansion of communications and network control networks to be met. This solution helps at any time and in any place with anything connected to environmental information and status achieved.

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