

# Internet of Things - Dependability

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## Abstract

The term ‘Internet of Things’ is the rapidly growing networking paradigm. IoT refers to the spatial distribution of devices connected to the online eco system with the capabilities of embedded identification, sensing and (or) actuation. As the number of devices connected to the internet is rapidly growing, many challenges need to be addressed. One of the most important challenges is to overcome the reliability and availability issues. Various sensors work seamlessly together when an IoT application is deployed. These sensors work on the basis of the bandwidth and memory allocated to them. Insufficient resources might degrade the performance of the whole system. Thus making the IoT application unreliable. One other important issue is security and privacy. Since an attack in the IoT ecosystem can lead to huge financial loss as well as can create chaos situation. In this paper, we discuss the technical background of IoT along with some of the dependability, security and privacy issues and the mechanisms which resolve them.

## 1 Introduction

Internet of Things is changing much about the world we live in. It is all around us and making our lives easier. Today’s world is connected with billions of devices and is expected to further increase to 26 billion by 2020 as per Gartner’s report. And also according to the report by GE, efficiency gain on the system of industrial applications by 1year savings of: \$30 billion on jet fuel consumption of airline industry, \$63 billion on health care with optimised solutions, \$66 billion on fuel consumption of global gas fired power plant.

Sophisticated chips and sensors are embedded in the physical devices around us which exchange information among themselves. The diverse set of data collected from this devices on the platform Internet of Things are integrated and analysed to share the most valuable information with applications that satisfy the industry needs. To make it simple we will consider an example of the smart traffic camera, which can monitor the traffic congestions, weather conditions and accidents in the city. The data detected by a camera is sent to the gateway and also data from other cameras in the city is integrated at this point and forwarded to the city traffic management station. This city traffic

management station is in turn connected to another station in a different city, thus creating an intelligent system of systems connected to the internet. Suppose a congestion is detected by one of the camera’s in the city due to an accident, the information is passed to all the traffic management stations in the city as well as stations in other cities. This enables the intelligent systems to analyse the data and derive optimal routes around the accident and send those instructions to digital sign boards spread all over the city. This is one of the many potential benefits of IoT.

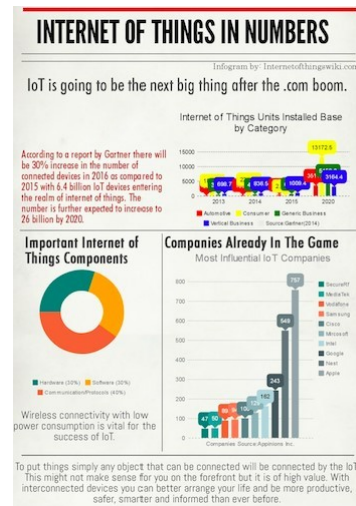


Figure 1: IoT in Numbers

Undoubtedly, IoT will have a high impact on user’s behaviour and several aspects of everyday life. And as we approach the point where IoT becomes part of everyone’s life, it is expected that \$6 billion will be spent on IoT application development which includes system integration, data storage, security and connectivity. IoT is therefore considered as the next Industrial Revolution and the major entities that benefit from this are businesses, governments and consumers. Some of the main environments that use IoT ecosystem are Defence, Agriculture, transportation, food services, logistics, banks, healthcare and many. As of now, there are many leading IoT companies in the market such as Apple, Google, Honeywell, Fitbit, Cisco, Microsoft, GE, Amazon and many are yet to add to the list. The main objective of the paper is to give the reader better understanding of How IoT works along with its applications, What are the dependability (reliability and availability), security and privacy challenges as well as few mechanisms which deal with these issues.

The remainder of the paper is organised as follows. In section 2 , we describe the Architecture of Internet of things and a brief introduction of the technologies used. Security and privacy challenges are explained in section 3, along with few mechanisms in use to solve those issues. Section 4, deals with the dependability of IoT followed by conclusion in section 5 and references.