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# IOT 101

A primer on Internet of Things

**Umang Garg | Kuldeep Singh**

# Neither the ‘Thing’ nor the ‘Internet’ is new

The ‘Thing’ or the ‘Internet’ are not new concepts. IoT is the result of rapid technological evolution of both these concepts that have evolved with time along with their connection mechanism. IoT indicates a plethora of services that were scattered earlier.

And it is not just about connecting things anymore. It also covers analyzing the data produced by these things. The analysis of data leads to new insights and also helps in building patterns, predicting situations, prescribing solutions, and instructing ordinary things to take decision and optimize themselves.

# IoT is the future

The number of connected things is projected to grow at an annual compound rate of 23.1% between 2014 to 2020, reaching 50.1 billion things in 2020. [1]

IDC expects that more than 80% of spend on IoT in 2020 will be on B2B applications and use cases. [2]

Despite being a key strategic conversation across technology and business forums, the landscape around Internet of Things (IoT) and how it actually functions is still an enigma.

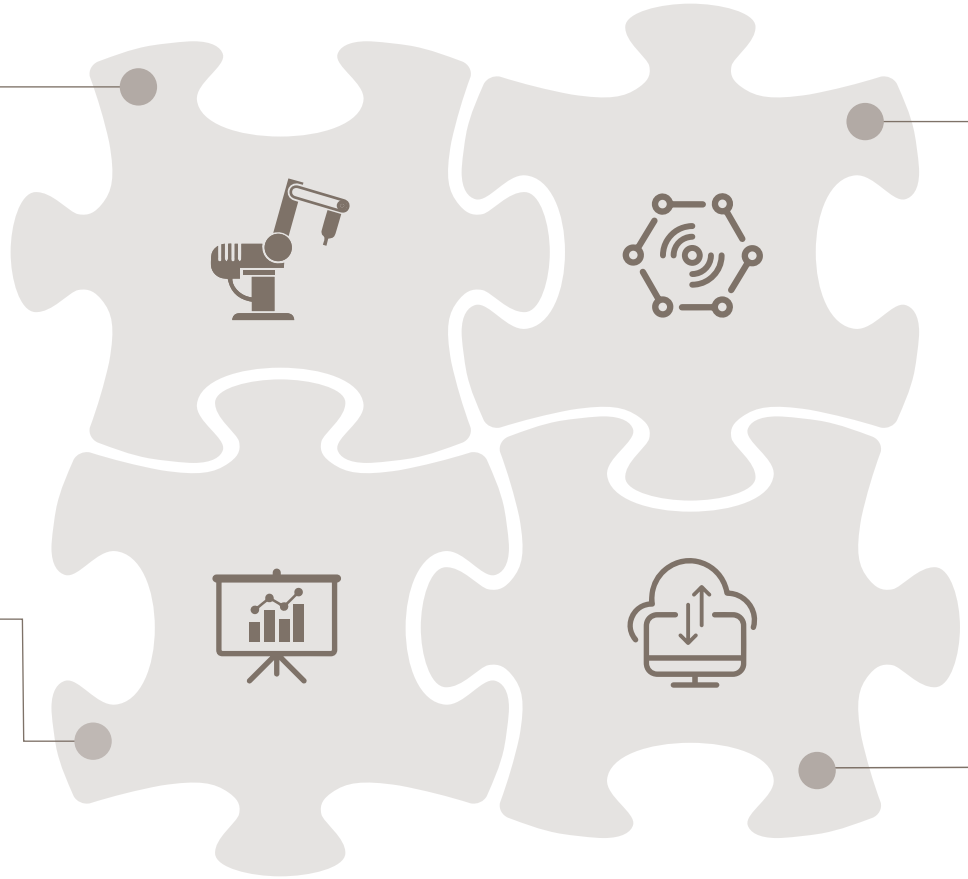
1. http://www.forbes.com/sites/gilpress/2016/09/02/intenet-of-things-by-the-numbers-what-new-surveys-found/#5c0c80243196
2. http://idcdocserv.com/US40999116b

# What is the Internet of Things?

A comprehensive IoT ecosystem consists of many different parts such as electronic circuitry, sensing and acting capability, embedded systems, edge computing, network protocols, communication networks, cloud computing, big data management and analytics, business rules.


But this complex web of varied parts can be classified further.

# 4 parts of an IoT system



## Devices

- Sensors
- Actuators
- Machines

## Connectivity

- Network
- Protocol
- Security

## Business Model

- Outcome driven
- Product as a service
- Leverage existing investment

## Platform

- Storage
- Analytics
- Visualization
- Integration

# Devices

IoT devices are capable of sensing the environment and then acting upon the instructions that they receive.

These devices consist of sensors and actuators connected to the machines and electronic environment.

The electronic environment of a device may pre-process data sensed from the sensor and then send it to the IoT platform.

This electronic environment can often also post-process the data or instruction received from the IoT platform before passing them to actuators for further action.

# Connectivity

Devices connect to an IoT platform and send the data sensed by them. In turn they receive instructions from the platform. The electronic environment has the capability to connect over internet directly or via internet gateways. For connecting to the internet directly, there are multiple wired and wireless communication protocols, including some that use low powered communication networks.

The devices which connect via gateways, generally communicate over short range radio frequency protocols or wired protocols. The internet gateway in turn further communicates with IoT platform over long range radio frequency protocols.

# Platform

An IoT platform is the brain of an IoT system. It is responsible for efficiently receiving the data ingested from the devices, then analysing that data in real-time and storing it for history building and for further processing in future. It also provides services to remotely monitor, control and manage the devices.

The Platform routes the data to other integrated enterprise systems based on the business rules available in the system and provides services to visualize the data on multiple connected tools such as web interfaces, mobiles and wearables.

Finally, it aggregates the information in context for the users so that they get the right information at the right time.

# Business Model

The advent of IoT has the potential to redefine the business models that would open new opportunities for new sources of revenue, improved margins and higher customer satisfaction.

There are broadly 5 trends in business model innovation: product and service bundling, assured performance, pay as you go, process optimization, predictive and prescriptive maintenance.

A successful IoT deployment should clearly identify the type of business service that will be delivered. When this is done at an early stage of IoT planning, it increases the probability of creating a positive return on investment. We will discuss this in more detail in our subsequent paper.

**Connecting ‘Things’ to the ‘Internet’**

The complexity of the IoT system will vary depending on the heterogeneity of technology, platforms, and business needs.

This complexity is bound to grow with the continuous proliferation of more IoT platforms that seek to provide technology and business use case specific value propositions.

Irrespective of the nature and complexity, a holistic IOT system can be understood through this quick guide.

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*In the next part of the series, we will detail out a method to evaluate an IoT system.*

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## About Nagarro

Nagarro provides technology services for digital disruption to both industry leaders and challengers. When our clients want to move fast and make things, they turn to us. We combine design, digital and data to help them outperform the competition. We distinguish ourselves by our agility, imagination and absolute commitment to our clients' business success. Some of our clients include Siemens, GE, Lufthansa, Viacom, Estēe Lauder, ASSA ABLOY, Ericsson, DHL, Mitsubishi, BMW, the City of New York, T-Systems, SAP and Infor. Today we are more than 3,500 experts across 12 countries. Together we form Nagarro, the global services division of Munich-based Allgeier SE.