



# Will IoT be the Next Opportunity for India?



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# 1. IoT - Overview

The Internet of Things (IoT) has generated lot of hype of late. General perception about IoT and its implications are quite varied among the general public.

For a technocrat, the IoT is an ecosystem of IP-connected devices that can deliver significant business benefits. There is a general belief among the industry that the IoT will generate trillions of dollars in the forth coming years. It is true that the IoT has a huge potential to bring considerable savings, and it will bring along higher efficiency into the existing processes. Ultimately, the IoT is expected to boost up the overall productivity. Definitely, these beliefs around IoT will open up doors for numerous innovations which will ultimately result in setting up of hundreds of start-ups. One can expect mushrooming of a set of ancillary businesses around IoT services as well. Further the increased spending on R&D will open up other revenue streams for entrepreneurs.

In India, IoT is still at a nascent stage and it will take few more years for the IoT to become visible in the public domain. The IoT will continue to evolve in the coming months and one can expect significant growth in the long run. However, reliable internet connectivity and overall supporting infrastructure will be a key prerequisite for this growth. If things fall into place, the IoT has a great potential to provide substantial benefits.

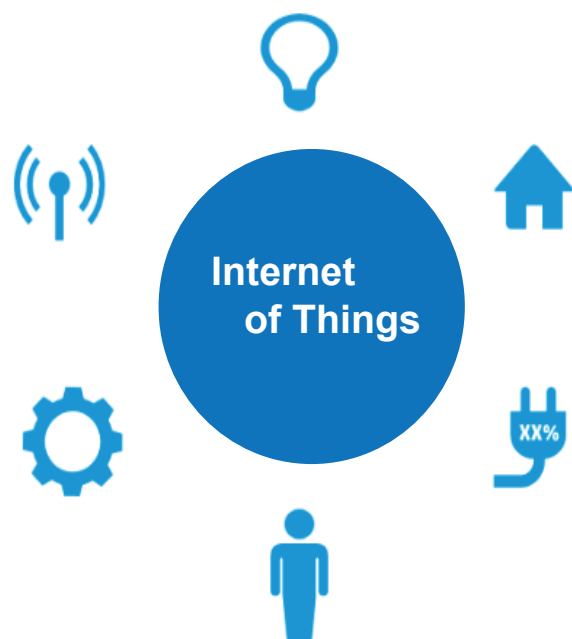
## IoT - Common Beliefs

“IoT will automatically refill the milk box in my fridge”

“IoT will give me direction to park my car”

“IoT will look after my kids for me”

“IoT will switch on and switch off the lights in my house”

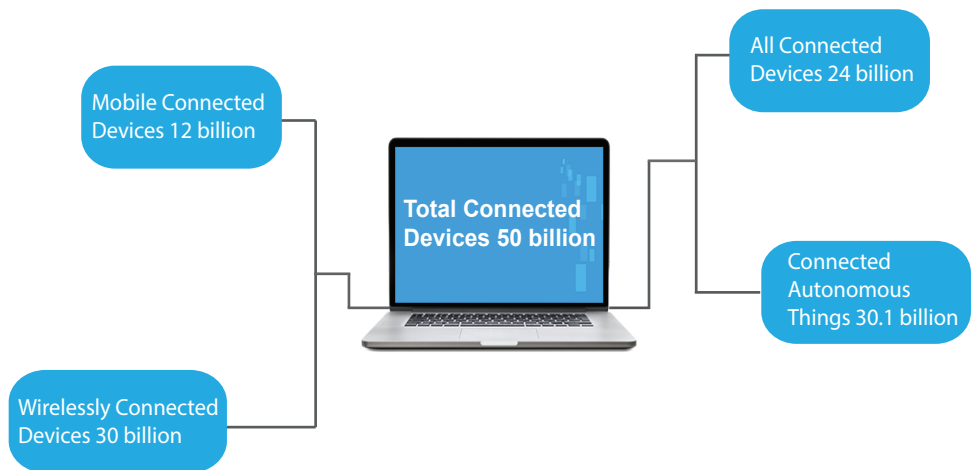


## 2. IoT & Connected Devices

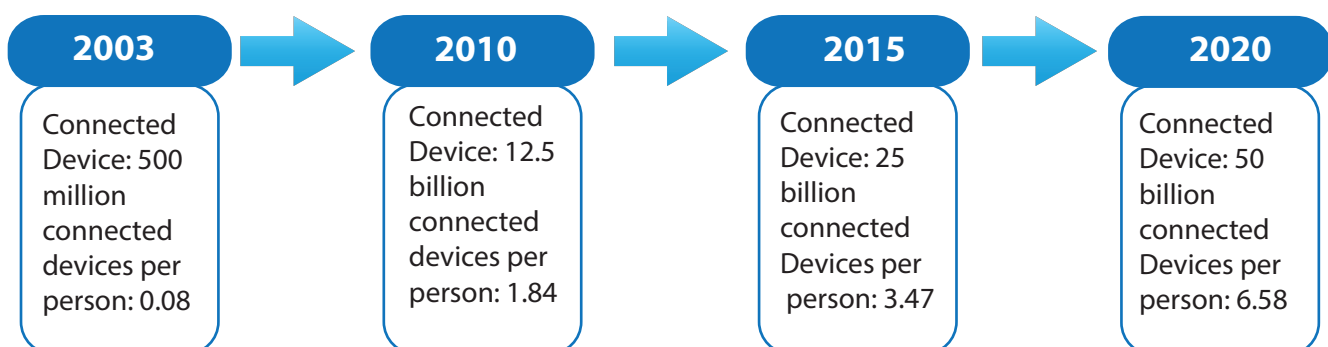
With leading firms from across all industry verticals are getting on to the IoT phenomenon, it can be expected that the IoT will register an exponential growth in the future. However, from a realistic viewpoint, IoT is yet to garner the kind of initial support required for a new technology. Moreover, this technology is yet to receive overall acceptance from all quarters and seeming to be lacking the technical expertise required to implement it. According to market information, only 15% of organizations worldwide implemented IoT solutions for their organizations, while a majority of around 53% is aiming for the same in the future.

- Connected devices all around the world are expected to reach 50 billion by 2020, per study conducted by Cisco.
- The machine-to-machine (M2M) market is estimated to reach 20 billion within the next 10 years, per market news.

### Expected status of connected devices



### Time line for Connected Devices

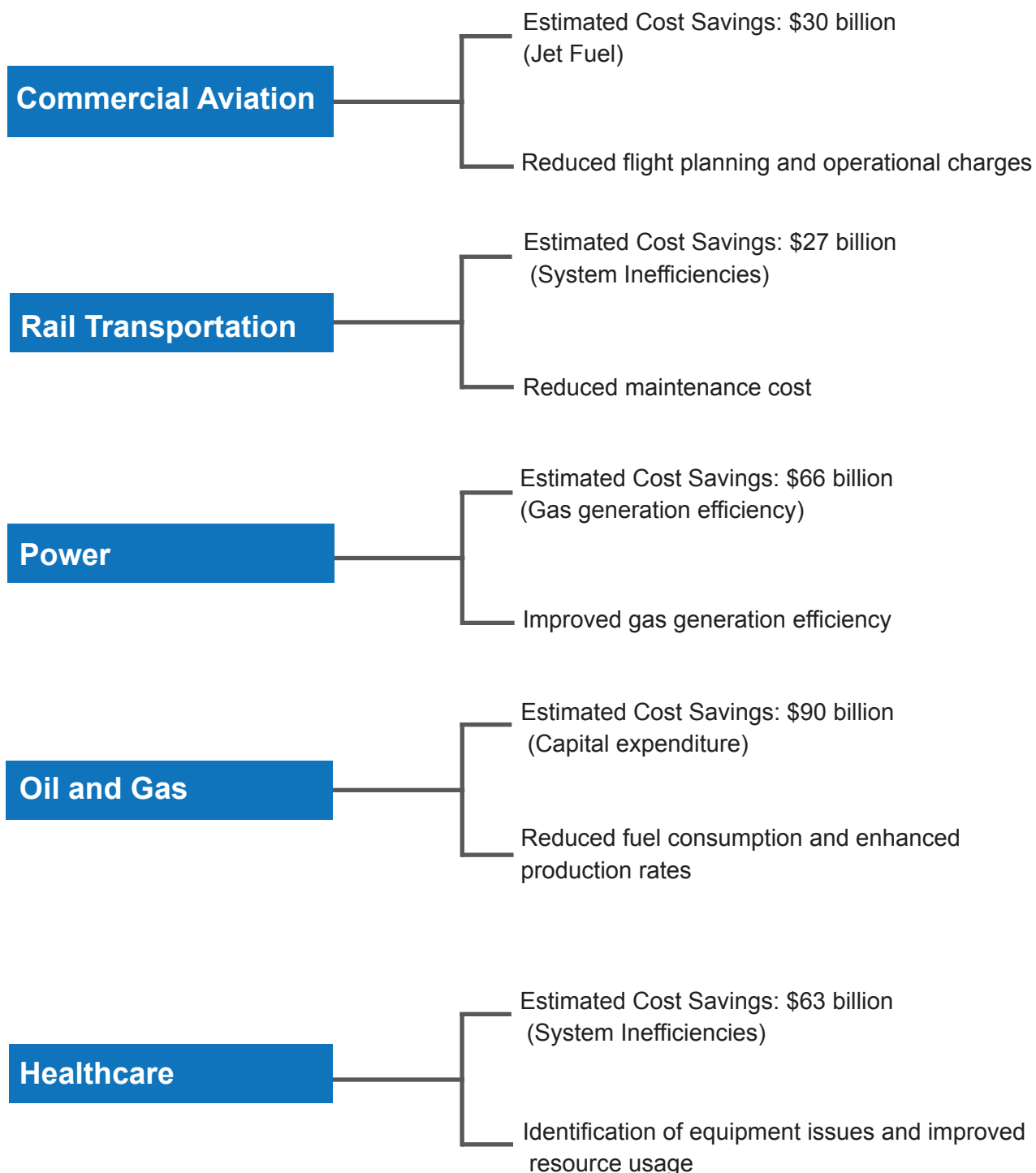


### 3. IoT-Potential Benefits

#### Cost Savings

IoT is expected to enable reduction in operational costs. IoT enabled service such as remote monitoring of patients in a clinic will speed up the workflow and reduce manual costs. Companies such as General Electric have estimated cost savings of billions of dollars in its various departments where IoT was implemented. A few of the instances where IoT can reduce costs are demonstrated below. (Source: GE)

The hype around the IoT is not without valid reasons. IoT has potential to transform existing systems and processes



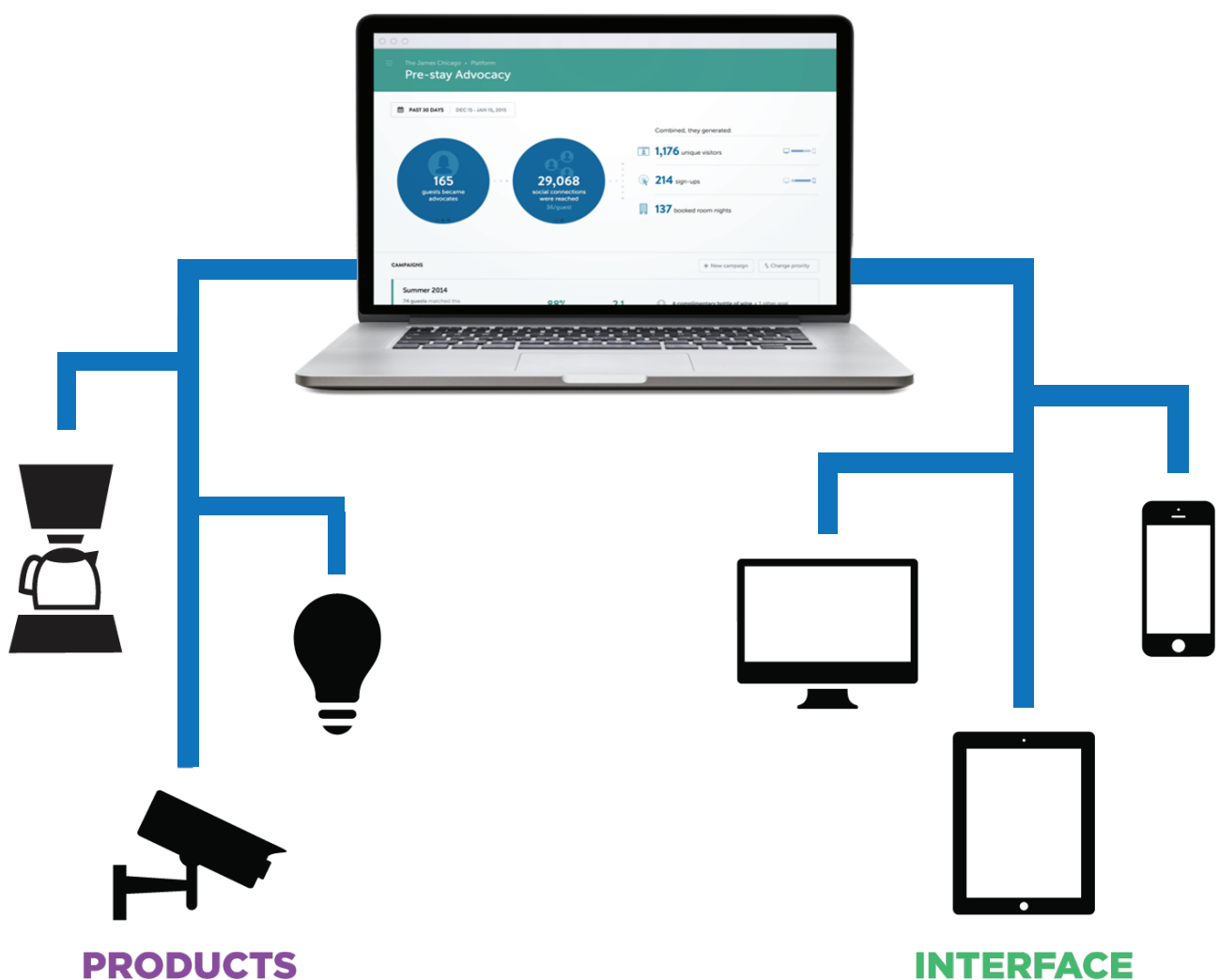
## Better Asset Utilization

Smart meter will result in better asset utilization because it reduces the extra effort required by manual meters. As IoT deals with several sensors and connected devices, monitoring of various assets of an organization such as machinery, equipment and tools becomes a lot easier, as compared to the conventional manual method. This helps organization to enforce better asset management and utilization through real-time monitoring. Thus, the tool of IoT helps organizations to locate its assets and maintain them remotely.

## Improved Process Efficiency

IoT provides real-time insights into asset utilization of organizations. These insights in turn help organizations to make better business decisions which result in reduced operational costs. Sensors incorporated into IoT allow organizations to monitor and improve process efficiency of machineries and equipment, by reducing energy costs and human intervention.

Introducing IoT to an existing process can provide higher leverage on various aspects such as cost, efficiency and productivity. Thus, IoT facilitates better utilization of assets, better efficiency of process and improved productivity. Ultimately, a significant reduction in operation costs is achieved according to market information.



## 4. Supporting Factors for IoT

### Growth of Sensors

The Indian sensors market is growing rapidly with the fastest growing segments being gas sensors, image sensors, accelerometers and position sensors. In India, the automotive and consumer electronics industry are contributing substantially to the demand for sensors. In addition, the growth of the industrial sector is driven by the increasing number of process industries. Additionally, the introduction of MEMS (Micro Electro Mechanical Systems) sensors would add to the momentous growth of the sensors market in India. The revenue of the sensors market in India is expected to grow at a compounded annual growth rate (CAGR) of 14% till 2018.

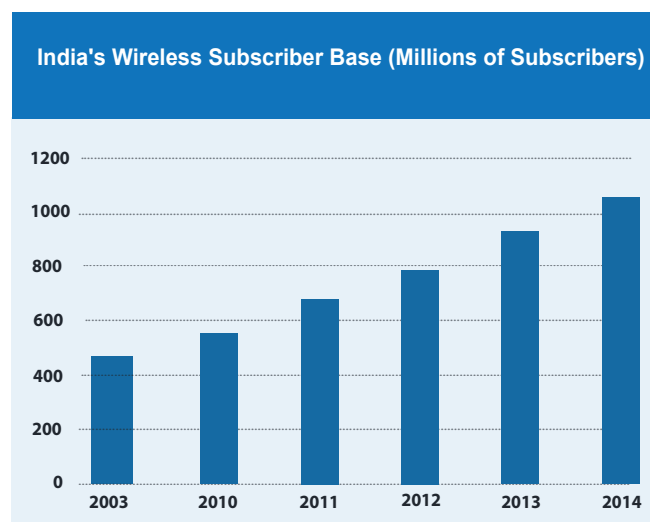
An analysis from Frost & Sullivan on the Indian Automotive Sensors Market reveals that the Indian automotive sensors market revenue was US\$81.7 million in 2005 which increased to US\$ 577.4 million in 2012. Hence, in the coming years the application of sensors for industrial, commercial and residential purpose is likely to increase. This will encourage the implementation of IoT in the Indian marketplace.

### Growth of Wireless Network

Wi-fi and mobile networks have expanded drastically in India. Wireless networks have opened up access to objects that could not have been connected in a static computing environment. Also, India has the second largest wireless networks in the world, next only to China. There were 442 million wireless subscribers as of July 2009, which grew at a CAGR of 65% during the last five years (source: HIS Technology).

### Smart Phone Growth

Mobile access to the Internet coupled with the rapid growth of the smart phone market has begun to generate strong consumer demand for the IoT. Collecting complex and valuable data is possible due to economically viable sensors, controllers and transmitters that are incorporated into daily use devices such as Smart phones. Smart phones will function as a medium to integrate small and powerful chips invisibly into the physical world. Further, the cost of these chips has fallen significantly, due to a huge demand for microchips from the Smartphone and Tablet industry. The lowered cost of these chips has cut down the cost of IoT, thereby increasing the demand for IoT devices.



India's Wireless Subscriber Base (Millions Subscribers)

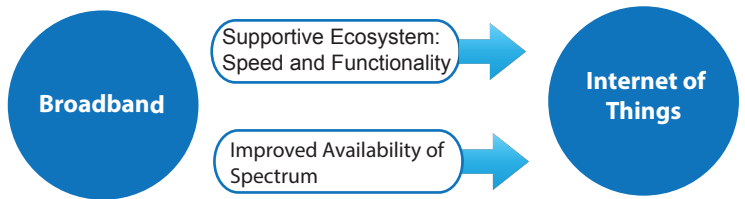


## Adoption Rate of Broadband

For the development of IoT, it is vital to encourage the development of necessary supportive ecosystem with the following attributes:

- Reduced disparities in access, speed, and functionality
- Improved availability of spectrum.

Improving the adoption rate of broadband in India is a one stop solution that will help in building a supportive ecosystem for the IoT. Moreover, according to TRAI reports, the total number of broadband subscribers increased from 58 million at the end of February 2014 to 85.74 million in December 2014, at a monthly growth rate of 4.50%.



## Reduced Cost of Connectivity of 3G data

Reduced cost of 3G services will encourage a greater adoption rate for the same in India. 3G provides faster wireless internet connectivity as compared to its previous versions. Hence, it enables the better usage of internet for IoT and provides large data in a relatively lesser span of time. 3G will enable 3rd Generation Partnership Project(3GPP) in the Indian market place.

## IPv6

New universal standard for internet, the IPv6 allows large data to be processed and exchanged with 128 bits of available address.

## Presence of IT Services

IT provides basic infrastructure for networking and communication services in the market place. The functioning of IT services indicates the presence of a robust internet and networking infrastructure which is the fundamental building block for IoT. Thus, IT services will provide readymade infrastructure for IoT implementation in India. Moreover, India is one of the fastest-growing IT services markets in the world. Hence, it can be concluded that presence of IT services will be very helpful in the implementation of IoT in India.

## Availability of Manpower

IoT is still a new concept in India as far as its implementation is concerned. Currently, no proper infrastructure is available for the implementation of IoT services. Given that IoT will be a crucial part of the government sponsored “Smart Cities” project, India will require large IoT infrastructure to cope up with its rising demand. In order to develop this infrastructure, strong workforces consisting of both skilled as well as unskilled personnel are required.

## Government Support for IoT Ventures

The Department of Electronics and Information Technology (DEIT) has drafted an IoT policy with the goal of creating an IoT industry in the country worth \$15 billion by 2020. The policy aims to increase the number of connected devices in the country from around 200 million to over 2.7 billion in the next 10 years. The purpose of this policy is to develop human resources and technology for IoT relevant skill-sets, undertake research and development in IoT relevant fields, and develop various IoT solutions specific to Indian needs.

## 5. Opposing Factors for IoT

However, there still exist some challenges, especially in Indian market, with regard to the implementation of IoT. These challenges include a lack of standards and technologies, security issues regarding data and information management, and the skills to manage the growing IoT in the country.

### IoT Challenges in India

- Getting devices connected in the Indian infrastructure will be a major challenge. This is due to external factors such as extreme temperatures, high levels of humidity, dust and a general lack of cleanliness. These external factors may cause physical damage to devices and reduce their lifespan. Also, lack of continuous power supply and inadequate telecom coverage will make IoT inefficient and unreliable.
- Security and Privacy: Government policy regarding user privacy in IoT networks is not yet implemented. Hence, user data will be vulnerable to hackers. So there remains a challenge to prevent theft, and tampering of data and devices.
- IoT business models: There is a need to develop an IoT business model, which makes sure that the IoT is affordable for over 1.25 billion people in India.
- Technology and Standards: An IoT solution will involve many stakeholders and it is very likely that most of them will be from overseas. Hence, it is essential to align IoT technology and standards in tune with the global standards.

### External Conditions

IoT devices in general, be it used for external or internal purpose, need to be robust to survive tough conditions. If too much wind, rain or heat causes IoT devices to break down, the whole purpose of communication and convenience holds little substance.

### Scalability

Today, there exists a large security infrastructure that has been built over the last 10 years. A lot of it is in response to the specific trends and needs. Now when one begins to expand that, instead of connecting PCs, one starts connecting tablets, mobiles, laptops and other devices, maybe even cars. As a result, the scalability of the infrastructure comes into question because it was never designed to scale thousands of different devices. This is one of the primary challenges for the implementation of the IoT.

### Security Challenges

Generally, a majority of security solutions are very legacy, perimeter-based solutions. However, IoT is very closely linked, with large amounts of computing, analytics and big data, with a large part of this is happening in the cloud. The challenge is to scale the existing security infrastructure to the cloud in a seamless manner while thinking about IoT at the same time. Using IoT on large scale will give rise to new threats and challenges that may require a different kind of security solution.

## IoT business models: Affordability

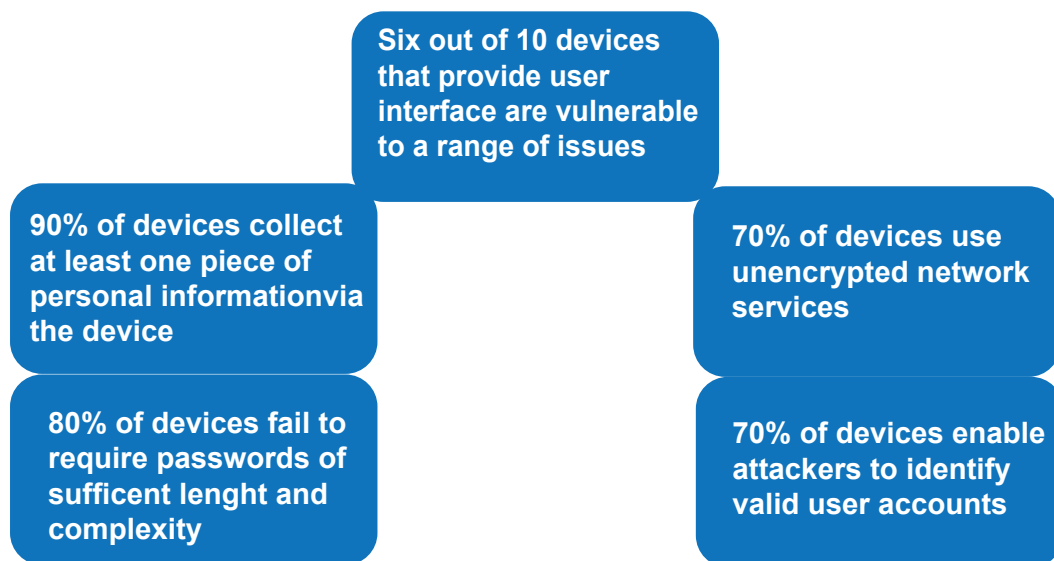
Data will grow bigger and bigger in both quantity and variety. IoT will create volumes of data that will not fit into a standard database and will not respond to current tools. Hence, larger database will be required. Further, the future will need storage technologies that can handle very large amounts of data and keep scaling to keep up with growth in demand. Hyper scale computing environments which run big data will become more mainstream as more data is collected by IoT.

## Cost

One of the major factors that are restricting the rapid growth of IoT is the initial cost involved and the recurring maintenance costs.

## Absence of Universal Standards

Currently, the primary issue with IoT is the fact that there are lot of vendors in the market that provide different standards for different operations. As a result, the interoperability of the devices becomes cumbersome. Each vendor uses different protocols for different technologies and smart devices, and these standards keep changing with the introduction of new smart devices. It thus becomes hard to keep track of the changing standards for organizations, thus resulting in the constant replacement of IoT devices.



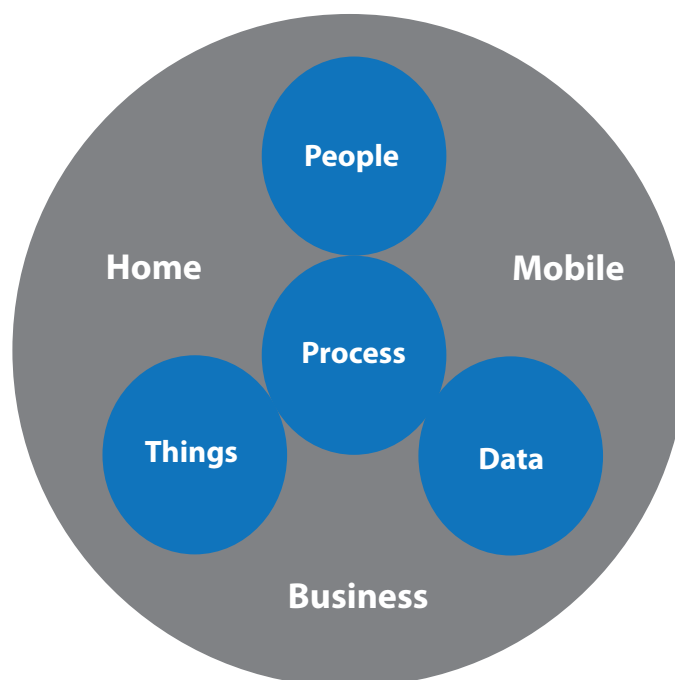
## 6. Recent Activities

To boost the prospects of IoT, government has planned to fund the creation of resource centers and test-beds, as a common experimental facility to conduct experiments. A total allocation of US\$3 million has been made for this purpose. The government will set up incubation centers that are proposed to be called National Centre of Excellence in partnership with IT industry body NASSCOM and other industry associations. It is estimated to cost about US\$3 million for a 5 years period, in order to execute a center with a capacity of 40 people.

A number of early stage IoT startups have already taken off in India and not just in large cities but also in smaller ones. Sense Giz headquartered at Belgaum, is a startup that has a range of tags and sensors which can be clipped or strapped on to human body. These sensors monitor sleep indicators, track athletic activity, detect accidents, and provide panic buttons. They have specialized tags that help consumers tag items so they can be easily found, thus saving search time. Other startups like Bangalore's Get Active are also in the device space for monitoring personal health indicators.

Car IQ claims to “makes cars smarter” with a device which records both traditional data from user car, such as mileage and speed as well as driving patterns. It is also connected to a community of peers where one can compare stats with friends, with people in the same place, or with the same make and brand of car.

Some startups in this space were founded about 7-10 years ago during the M2M era, with RFID tags as popular applications. ConnectM was founded in Bangalore in 2007, with funding from Sasken and IDG Ventures. ConnectM provides solutions for monitoring bank ATM networks and asset management in mobile operators' telecom networks.



## 7. IoT Solutions in the Horizon

All the above challenges and hurdles can be surpassed by building technology's market in an organization. Building IoT market in a new company or a start-up may be comparatively easier than in an established organization as the technology will have to be integrated with the existing traditional infrastructure of the company. Thus, an organization has to take a call on whether to integrate the existing traditional infrastructure with the smart sensors of the IoT or install and build a new set of infrastructure to support the old one. Along with it, the organizations must set up a strong system in place to monitor and manage the assets through the IoT to improve the profits and revenue structure.

### Understanding of IoT and Benefits

In an organization, all the heads of various departments must be aware of the concept of IoT in their organization and the potential benefits it can provide. Thereafter, they should consecutively plan and prioritize the opportunities for the department.

### Strong Data Management System

This must be done by analyzing the organization's requirement regarding the data types used and adopting complementing technologies to improve operational efficiency.

### Analyzing the IoT Data

Analysis of large volumes of data required for the IoT has to be managed in order to reap maximum benefits out of it. This involves the latest developments in the technology, along with the traditional infrastructure of the organization and the basic data management technologies. Keeping an eye on technologies such as cloud computing, big data and analytics will prove beneficial in mining huge data efficiently.

### Training to Manage IoT

It would be wiser for an organization to provide training to its employees on the concept of the IoT so that, it will be easier to maintain its data effectively.

### Hiring Specialists

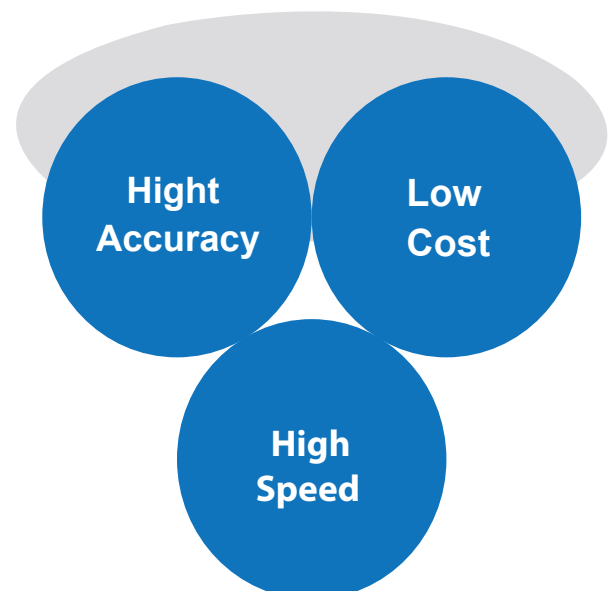
Apart from training internal employees, the organization should approach specialists and other organizations to support its data in a timely manner. By consulting a specialist, the organization will get a better understanding of the technology and domain knowledge.

### Having A Network-Centric Operation

The network-centric operations will allow the organization to monitor the vast IoT ecosystem's network connections and smart devices. This approach makes it easier for the organization to access the information and data across its network.

### Combining Machine Data And Enterprise Systems

It is very important to integrate data from smart devices in the IoT with the business processes of the organization, in order to improve the system's performance. This will also allow the organization to focus on improving the product or process by analyzing the production of data in the IoT.



## 8. Conclusion

Currently, many industry leaders are in the process of integrating IoT in their domains and improving the performance of smart devices and related technologies. The innovations and improvements to the old technologies popping up every day have resulted in providing better quality services to the customers. All these developments in the market can only mean that the leveraging this technology has enormous potential. As it grows, there will be a lot of changes made by various big players and will prove to make a huge mark in the industry.

At the same time the growing IT industry of India will be ready to capitalize on the concept of IoT and exploit it in the near future. With many global companies entering the Indian market to explore the opportunities in the field of IoT, the country has the potential to become the IoT hub of the world. This point can be proved by the fact that the population of India is considered as the major factor which will drive this market, with more than 1 billion people to target in the industry.

Further, India is emerging as a hub for many start-ups in this field and is looking to garner more support from established Indian players to drive the market. If the organizations are able to capitalize on the points presented in the article and apply the same in their working, the industry can evolve at a faster rate in the country. One other main aspect that Indian companies need to concentrate on is keeping pace with changing technology. It will be important for the companies to review their business models constantly and transform their traditional business models according to the evolving digital technologies, devices, connectivity and networks. Thus, having made that point, it should be seen how well India could potentially capitalize the IoT market and exploit it in the near future.



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Pritesh Dalal, Sr. Research Analyst & Author of this report, can be reached at [pritesh@dartconsulting.co.in](mailto:pritesh@dartconsulting.co.in) for any further queries.

