Nishith Desai Associates
LEGAL AND TAX COUNSELING WORLDWIDE

MUMBAI SILICON VALLEY BANGALORE SINGAPORE MUMBAI BKC NEW DELHI MUNICH NEW YORK

Internet of Things

Legal & Tax Issues

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Executive Summary

This century has witnessed rapid developments in technology along with the convergence of the internet and service providers.

Along with the constant evolution in communication and computer technology, the internet continues to connect people across geographies either through wired or wireless connections resulting in a harmonized e-world.

Simultaneously, the medium of computers has also evolved from mobile phones to other smart and wearable devices which have only increased the penetration of computing in our daily lives.

Thus, terms such as *"Internet of Things, M2M, SMAC, Wearables, Fashionable Technology, Big Data & Analytics"* are becoming increasingly relevant and important.

In this paper, we aim to outline the newer models associated with the e-world along with providing insights on IoT, M2M, SMAC, Wearables, Big Data & Analytics.

Further, we have also identified the potential challenges and issues which could be faced from a legal and tax perspective in connection with such new age e-computing.

1. Introduction

I. Internet of Things

In the 1970's, the programmers at the Computer Science department at Carnegie Mellon University faced the problem of walking down to the Coca–Cola machine installed near the main terminal room only to find that either the machine was empty or contained only freshly loaded warm Coca–Cola bottles. In an attempt to save time and physical effort, some programmers got together and installed sensors in the machine to keep a tab on how many bottles were present in the slots and for how long the bottles were in the machine. Subsequently, this was connected to the main computer from where programmers could access this information and accordingly access the Coca–Cola machine.[1] Little could the programmers have realized this small step of fixing the Coca–Cola machine would have far reaching effects on modern day technology.

The phrase "Internet of Things" was first used by Kevin Ashton in the title of a presentation made by him at Procter & Gamble (P&G) in 1999.[2] At that time he used the phrase to refer to **Radio-frequency identification (RFID)** gadgets used for tracking consignments. However, in today's e-world this phrase has evolved and is not just limited to discovering objects and receiving information from them.

Consider the following scenario:

- Your alarm-clock tells the coffee-maker when you wake up, and the coffee-maker is ready with your morning cup of coffee
- The coffee-maker in turn gives a signal to your car to set the temperature inside it to comfortable levels by the time you are ready to drive down to work
- Your car in turn signals your offices' electrical switches to be switched on and signals your computer to prepare your daily schedule

The result being: "Seamless integration of devices which can communicate with each other and undertake activities useful to human beings - Internet of Things".

In other words, where everything can be connected via a sensor and connectivity to enable that 'Thing' to participate in the larger 'network ecosystem'[3] where machines can virtually talk to each other can be called as the Internet of Things (**"IoT"**).

A quick look at the news surrounding the IoT today will show that every major player in the IT and technology industry is gunning to claim its stake in IoT. Frontrunners in this field are not only working on developing business models and marketable applications of the IoT, but also on developing standards and guidelines for those following in their footsteps. The Government of India also released a draft 'Internet of Things Policy' in early 2015, with the aim of promoting the creation of an IoT ecosystem, and the development of IoT products specific to Indian needs in the domains of agriculture, health, water quality, and natural disasters among other things.

Similarly, Governments today are also waking up to the potential of M2M communication in solving urban problems and are increasingly exploring concepts such as smart cities, smart power grids etc.

Global leaders like Cisco, Google, Samsung, Apple, Qualcomm, Freescale – *whether engaged in the business of manufacturing devices, providing network solutions or software development* – have invested heavily in the future of IoT and with predictions that IoT will see a growth of over

1. *See* https://www.cs.cmu.edu/~coke/history_long.txt **(Last visited, April 5, 2016)**
2. Ashton, Kevin, *That 'Internet of Things' Thing*, RFID Journal, 2009
3. See http://www.cisco.com/web/solutions/trends/iot/introduction_to_IoT_november.pdf **(Last visited April 5, 2016)**

350 % in the next 2 years [4], the scope for profit from such investment is tremendous.

II. Wearable Devices

The term 'wearable device' was coined in the 1990's and soon came to be associated with style / trendiness and what is today known as *"fashionable technology"*.

In simple terms, a wearable device is a miniature, smart computing device, which can be worn on the body of a person, and is capable of working independently or together with a smart phone / tablet or computer. These devices typically collect and analyse consumer data to provide valuable information which allows consumers to improve basic functions in their daily lives. Such devices also assist in providing real-time access to information and facilitate collaborative communication between various devices and software applications used by the consumer.

Already considered to be the next big wave in computing, it is estimated that wearable computing device shipments will top 10 million units in 2016 with an increase to 237 million units by 2020.[5] These wearable devices typically connect to the wearer's smart phone / tablet, using ambient internet networks, allowing the sharing of information between devices and, with a number of smart, wearable devices.

With fast moving developments in technology, and a growing market, we are already seeing what is now considered to be the second generation of wearable technology with devices including:

- Apple's iWatch
- Google's contact lenses for diabetic patients
- Samsung's virtual-reality headset
- Smart clothing that adjusts temperatures and keeps you warm
- Devices that monitor your vital signs and send out signals when one senses danger
- Bracelets that help you navigate public transport systems
- Airtype's (an American start-up) 'keyboardless keyboard' device which allows users to wear the device on their hands and type into their phones from anywhere.[6]

The idea of wearable technology has also spread rapidly across industries, with healthcare and security based devices taking a prominent role and providing consumers with the greatest value.

We see a number of devices related to health care which can be worn by individuals for monitoring their health parameters on 24/7 basis, such as blood pressure monitor, heart rate monitor, glucose monitor; pulse oximeter, in the market today.

Security based devices such as watches or bracelets which provide alerts by sensing ambient signals, or upon user inputs are also increasingly popular among consumers.

Each device is connected to the internet, and the use of wearable technology will no doubt result in new highs in the amount and nature of data that can be collected, processed and analysed, to the benefit of not only the actual user / wearer of the technology, but also the technology providers and the platforms on which the technology is developed. With technology and innovation becoming increasingly interactive, it is certain that such devices would not only become more utility driven but would also integrate technology with the e-world of its user.

4. http://www.marketwatch.com/story/internet-of-things-presents-enormous-untapped-potential-for-canadian-businesses-2014-07-15-8173423 **(Last visitedApril 5, 2016)**

5. https://thejournal.com/articles/2016/03/21/wearable-shipments-to-top-10-million-units-in-2016.aspx **(Last visited April 5, 2016)**

6. http://www.digit.in/wearable-devices/airtype-portable-device-lets-you-type-without-a-keyboard-23304.html **(last visited on April 5, 2016)**

III. Big Data

Big Data, one of the buzzwords of the tech industry over the past few years, is typically defined as, *"large and complex sets of structured and unstructured data which are rapidly collected due to the convergence of machines / devices on the internet"*.

Consider a neighbourhood which has incorporated devices (such as cameras and trackers) to monitor traffic congestion and the real time data collected by these devices is analysed. If a driver tells his car the destination, the car automatically seeks information from the data centre, which in turn will analyse the data obtained from other traffic monitoring device and provides information on the quickest route to the destination.

As a result of increased connectivity in today's world, the quantities of data processed by data centres have increased rapidly, for instance in the example above, a few years ago, the data centre would likely receive inputs from a limited number of monitoring devices, controlled by the local government / traffic police. Today, data can not only be obtained from such public resources, but also from a massive array of user based sources, such as social networking websites and applications, smart phones and tablets connected to ambient internet networks.

The growth of the IoT, and the number of devices that are 'connected' and capable of generating and providing data, has and will lead to a massive increase in both the quantity of 'big data' out there, as well as the potential applications for data analytics.

IV. SMAC

Short for 'social, mobile, analytics, cloud', the concept of 'SMAC' refers to the growth of these tools and the use of these platforms in business technology stacks.[7] These technologies i.e. social media, mobile, analytics and the cloud have been buzzwords in the technology industry for a few years now, however, the combination of these technologies and their integration and use as a business model in itself, i.e. the SMAC stack (as it is often referred to), has been hailed as the next wave of computing, and the next step towards convergence.

The four basic pillars of the SMAC stack are [8]:

- Social: Social media while traditionally viewed by a lay person as a form of communication and interaction with a network of people, has today become an integral part of business strategy. Among other things, social media allows businesses, to advertise, communicate with their customers, and obtain feedback as well as valuable customer data.
- Mobile: With the evolution of smartphones and tablets over the past few years, 'mobile' has changed the way people communicate, receive and digest information, and transact business – whether shopping, banking transactions or payment of their utility bills.
- Analytics: As discussed above, big data and analytics have become key to running a successful business, especially in an online space.
- Cloud: The cloud ensures that the availability of data and technology are no longer limited to specific locations. With customers, workers and even office spaces becoming increasingly mobile, the cloud has become the ideal answer to the quest for coordination and access to data and information across the globe.

The key benefit of SMAC lies in the idea that *the whole is greater than the sum of the parts*.[9] The integration of social, media, analytics and cloud provides a holistic approach to business and customer care. Some of the best examples of real world application of SMAC can be seen in the remote healthcare sector – with medical devices and machines becoming increasingly versatile,

7. http://www.zdnet.com/article/future-of-it-will-be-driven-by-smac-stack-and-connectivity/ (last visited onApril 6, 2016)

8. https://www.kpmg.com/IN/en/IssuesAndInsights/ArticlesPublications/Documents/The-SMAC-code-Embracing-new-technologies-for-future-business.pdf (last visited onApril 6, 2015)

9. http://www.infosys.com/IT-services/independent-validation-testing-services/white-papers/Documents/testing-social-mobile-analytics-cloud.pdf (last visited on April 5, 2016)

the process of monitoring patients and identifying issues has gone mobile. Today, patients can send across data from the medical devices they use at home to doctors sitting in locations across the world, and doctors are able to diagnose problems and provide their recommendations based on information that is made available to them via their phone / tablet.[10]

Another classic example of the use of SMAC is the success of disruptive businesses such as Netflix, Facebook, Apple, Google, Amazon etc.[11] These companies have not only successfully digitised information and content to cater to a more tech savvy customer base, but have also adapted their business models, whether relate to marketing or customer service, in a manner that integrates the various aspects of SMAC successfully.

V. M2M

M2M refers to communication amongst machines without any human intervention and referred to as Machine to Machine (M2M) communication. Technically, M2M communication is the automated exchange of data between machines, installations, individual modules, and systems - all without additional human intervention.[12]

Considering the overlap between M2M and IoT it is imperative to understand the technical difference between both. M2M is typically used to describe technologies and concepts that was the precursor to IoT and to that extent M2M is largely been the platform on which IoT is built. Whilst M2M focuses on communication amongst machines, about connected devices with remote computers, IoT on the other hand seeks to build on this concept and connect 'things' with 'systems', 'people', and other things.

While M2M has traditionally been used as a tool for inventory management, fleet tracking etc. it is now increasingly being recognised as a tool to provide better governance.

The Indian Government has already announced a large number of M2M mega projects. Few of them are listed as under:

- Ministry of Urban development has proposed to develop 100 Smart cities;
- Ministry of Power has taken up 14 Smart Grid pilots with average Customer base of around 20000 each;
- Ministry of Road transport has mandated that all commercial passenger vehicles of more than 22 seating capacity be enabled with GPS, emergency calls etc.

While machines have been communicating with other machines for a while now *(for example: use of a credit card at a POS automatically instructs the bank to deduct and consequently transfer funds to the recipient)*, it is only now that we have realised the power of data and how we can leverage that to simplify lives.

10. http://www.cognizant.com/latest-thinking/digital-business (last visited on April 5 , 2016)
11. http://www.cognizant.com/InsightsWhitepapers/dont-get-smacked.pdf (last visited on April 5,2016)
12. http://www.gi-de.com/ind/en/products_and_solutions/solutions/machine_to_machine/machine-to-machine-solutions.jsp (Last visited April 5, 2016)

2. Key Market Segments

Today, with leading tech companies such as Cisco, IBM, and Qualcomm embracing and promoting the idea of IoT, there are innumerable business opportunities for market players that integrate the concept of IoT into their products and services.

Although the ideas behind IoT have been around for over a decade, the successful implementation of these ideas in business models that affect consumers on a large scale is still nascent. However, with an estimated connectivity of 20.8 billion devices by 2020 [13], small start-ups and industry giants are scrambling to get a foothold in the market.

Some key industry verticals, where the IoT is expected to make an impact over the coming years are identified below:

I. Home Solutions

From security features such as sensors that are capable of detecting fires and intrusions, and control doors and locks at your home, to luxury features that allow one to control heating, lighting and an array of smart devices, service providers related to home automation constantly have something new to offer consumers.

With integration, in terms of management of multiple devices as well as control settings, being vital to the success of a complete home automation system, the concepts behind IoT are being used to provide unified management facilities.

With the home security industry buzzing with IoT based solutions, the reach of IoT has now spread to general automation solutions which help users control anything from the thermostats and hot water supply at home, to their TVs, fridges, and coffee makers with software applications connected to their smartphones and computers.

A diagram on the same is illustrated below:

image source: http://www.forbes.com/sites/brucerogers/2014/07/08/apple-and-google-dominate-internet-of-things-influence-with-home-automation-efforts/#72ae97777f4a

13. http://www.gartner.com/newsroom/id/3165317 (Last visited April 5, 2016)

II. Healthcare and Medical Services

Prospects for the application of IoT in the healthcare industry are very wide, and can range from a device like 'GlowCaps'[14] *(internet enabled medicine bottle caps, which can send a patient reminders about taking medicines regularly, refilling prescriptions and even scheduling doctor's visits)*, to remote healthcare systems which provide for effective monitoring of a patient's medical statistics, using sensors that automatically record and process data on a continuous basis.

The use of wearable devices which can track data such as the heart rate, sleep cycles and activity logs of patients is also an important aspect of IoT in the healthcare industry.

The fundamental benefit of IoT in the healthcare industry being two-fold; (i) reduction in the need for constant and in-person monitoring of patients by healthcare professionals; (ii) reduction in human errors associated with the collection and processing of basic patient data.

III. Retail Industry

With potential applications across supply chain management, customer experience, and new channels and revenue streams , IoT is poised to revolutionize the retail industry.[15] Some of the benefits of IoT are as follows:

- Supply Chain and Inventory / Warehouse Management – Information about availability, transport, delivery timelines, wear & tear and condition of raw materials and finished products alike, being made available on a real time basis, by connecting the raw materials / products themselves to the retailer, using RFID tags / ambient internet networks.
- Marketing and In-store experiences – RFID tags and similar inventory management systems are already used extensively in the retail industry. However, with big players like Cisco and SAP competing to provide an edge in the market, services related to marketing and in-store experiences would only improve.
- Smart Store Windows – Increase in smart store windows which collect and analyse data regarding the number of customers that stop and view a window display, resulting in an improved assessment of market trends. Simultaneously, embedded software applications seamlessly providing relevant information to the sales personnel at the store, allowing for immediate delivery of products to the customer.

IV. Automotive Industry

In today's world of 'connected vehicles' and 'connected drivers', IoT has led to one of its most talked of sub-segments, *"the Internet of Cars"*.

These connected vehicles use sensors, software applications, in-vehicle operating systems, data and analytics software, speech recognition software and a myriad of state of the art technology to provide a constant stream of information regarding everything from traffic and weather conditions, to driver / vehicle performance, to both drivers / car owners and automobile companies.

While many concerns have been raised about safety – with the potential for drivers being distracted by many available applications, or even a computer virus / bug that could disable features in a car, the automotive industry, and the Internet of Things seem to be collectively moving towards a common goal – the self-driven vehicle.

Google has been testing a driverless car over the past few years [16], and a number of other technology companies such as Uber and Apple are also said to be developing their own driverless technology.[17] At the same time, automobile

14. http://www.glowcaps.com/product/ (Lasted visited 5 April, 2016)
15. https://www.accenture.com/in-en/insight-internet-things-revolutionizing-retail-industry.aspx (Last visited April 5, 2016)
16. http://www.cbronline.com/news/internet-of-things/smart-technology/googles-iot-push-continues-with-london-driverless-cars-vr-headset-go-ai-match-4804528 (last visited on April 11, 2016)
17. http://www.theatlantic.com/technology/archive/2015/12/driverless-secrets/417993/ (last visited on April 11, 2016)

companies have also stepped into the game, with Tesla claiming that the company is only two years away from launching its fully autonomous vehicles.[18] Equipped with sensors and software to sense objects on the roads, and drive around such objects, these cars are also fully connected to their owners, with abilities to park themselves, to be called by their owners within a certain range.

With both technology and automobile companies joining the race in the development of driverless technology, there is wide speculation on the performance and eventual availability of these driverless cars. However, the key to the success of driverless cars lies in how these vehicles work with available infrastructure not only in terms of roads, and driving conditions but also the legal framework surrounding such vehicles.

V. Shipping and Logistics

The shipping and logistics industry has been one of the most direct and immediate benefactors of the exponential growth in international trade over the past 2 decades – and management of cargo whether at sea or in air, thousands of miles away has been an integral part of the daily business of stakeholders in this industry. Any mismanagement of cargo or even accidents could lead to huge losses, especially where perishable goods are being transported.

IoT based applications can go a long way in easing the amount of oversight and monitoring required in this industry – and service providers are increasingly turning to internet and GPS based solutions in order to track their shipments and ensure that cargo arrives in good condition at the destination.

One of the foremost examples of the use of IoT in this sector is in relation to the food supply chain – the use of connected testing equipment can help determine the quality of the food products, the results of which can then be leveraged to ensure that proper conditions *(such as temperature and packaging)* are constantly maintained until the food products reach their destination – through state of the art technology such as sensor-enabled refrigeration systems.

These systems can keep the suppliers informed of the status of the products, who can then ensure that adequate quantities of the products are available in good condition for delivery to customers.[19]

VI. Smart Cities

Barcelona, Amsterdam, Busan, Songdo - are some of the examples of cities that have adopted IoT based solutions to improve urban planning.

These cities now have smart parking, lighting and traffic solutions that provide residents with improved facilities and are moving towards the goal of a completely connected "Smart City" –

An ideal urban space where roads, street lamps, parking meters, traffic signals, toll booths, weather instruments, waste management systems, cell phone communication towers, and local governance bodies are all able to communicate with each other.

With such enhanced communication, residents will be able to check anything from traffic data, and availability of parking locations to safety concerns in a particular location from the comfort of their homes.

The Government of India has embarked on an ambitious plan of developing 98 'Smart Cities' which relies heavily on M2M through usage of smart grid, automated waste management etc. and list of the first 20 cities which are expected to be developed into smart cities in 2016 has already been announced. [20]

18. http://www.dezeen.com/2016/01/11/elon-musk-predicts-completely-autonomous-driverless-tesla-cars-in-two-years/ (last visited on April 11, 2016)

19. http://www.foodlogistics.com/article/11366603/food-and-more-for-thought-how-the-internet-of-things-is-revolutionizing-food-logistics (last visited April 5,2015)

20. http://www.business-standard.com/article/economy-policy/smart-cities-need-institutional-reforms-for-pvt-participation-116040800193_1.html (Last updated on 5 April, 2016)

3. Convergence

The IoT offers exciting prospects in today's networked world – the application and use of which can be endless. However, in order to apply the concepts and ideas made possible by IoT, the cross functionality with technology and business is imperative.

We have identified certain key areas where convergence would be imperative for the success of IoT:

I. Interoperability and Standardization

Re-engineering the Internet and developing IoT are issues that logically demand international cooperation right from the start. In the absence of such collaboration there is a risk of bias and fragmented developments that compromise the vision and ambitions of the future networked society.[21]

While IoT is based on the basic premise of devices / things communicating with each other, the basic issue facing the successful application of IoT is that such devices may be manufactured by different entities / companies across the world. Further, there may be a number of different operating systems, internet identifiers, and different data communication protocols that may be installed by the manufacturers and distributors of such devices.

Take the typical example of communication between devices that can be found in any household –

AN ALARM CLOCK, A COFFEE MAKER AND A CAR.

It is likely that each of these devices are manufactured by a different company. Further, each such manufacturer may install an operating system so as to enable the device to connect to the internet and communicate with other devices.

However, integration of these devices *(manufactured by different manufacturers)* so as to communicate with one another would only be possible if each such device is compatible with the other.

Thus, ensuring the interoperability and standardization of devices and applications connected to IoT is crucial to the success of any business model dependent on IoT.

Public policy / international organizations like the International Telecommunications Union, and the European Union's CASAGRAS (Coordination and support action for global RFID-related activities and standardization) are working on mandates to assist standardization efforts in this field.

Also, a number of private company sponsored consortiums are vying to set standards and promote interoperability of the potential billions of devices that could be connected to each other in the near future.

Qualcomm led 'AllJoyn' / 'AllSeen Alliance' which aims to provide a universal, open source software framework for cross-manufacturer operability across connected devices [22], and Cisco led 'Industrial Internet Consortium', which aims to identify requirements for open interoperability standards and define common architectures to connect smart devices, machines, people, processes and data [23] are some of the leading contributors in this field.

II. Connectivity

Network connections and related solutions have an important role to play in the success of IoT. Such network / connectivity service providers are taking steps to keep up with the incredible growth in IoT and related software / hardware technology.

21. Discussion Paper, CASAGRAS and the Internet of Things, (authored by CASAGRAS and AIDC European Center of Excellence) (Last visited 5 April, 2016)

22. http://www.wireless-mag.com/features/26702/alljoyn–qualcomms-bid-to-standardise-the-internet-of-things.aspx (Last visited 5 April, 2016)

23. http://www.zdnet.com/consortium-wants-to-standardize-internet-of-things-7000027791/ (Last visited 5 April, 2016)

With an increasing number of IoT applications depending on ambient networks to provide holistic solutions, today in addition to the more traditional forms of connectivity – broadband cable / Wi-Fi, there has also been a constant spate of new ideas and standards such as Weightless, ZigBee and Z-Wave have emerged.

Such standards aim to provide low cost / low power consumption based solutions which would not only be cost competitive but would also enhance connectivity.

Google and Samsung have also recently launched a non-profit called the 'Thread Group' which aims to provide a wireless network protocol with a focus on devices at home.

III. Software Applications

While devices are constantly connected to one another via the internet, the data picked up by these devices is required to be communicated to the concerned person by way of a software application / app on a smart phone / tablet / computer. Development of these software applications, and user interfaces is crucial to the successful application of IoT.

On a technical level, the multiple operating systems in the market – Windows / Linux for computers or iOS / Android for phones and tablets, pose an additional challenge since software developers need to ensure that their software applications cater to each of these operating systems and platforms.

Similarly, there is a need to ensure that the software platforms and applications that devices work on are such that devices can be used across industries, thereby providing the software providers with a larger area of impact and allowing them to converge at a macro level.

IV. Big Data: Analytics

Today, Big Data typically includes data collected based on information provided by consumers / users, based on their online activities.

For example, if a person 'X' visits an online store, searches for a smart phone, compares prices and features, and buys a particular make of smart phone, a certain amount of data will be created and collected, which will provide the store, the makers of the smart phone, and other stakeholders a certain amount of data regarding X and his / her interests.

Big Data and Analytics in this case refers to the collection of data regarding searches, purchases, interests etc of hundreds and thousands of people online and the analysis and processing of such data to spot market trends / consumer demands.

The IoT not only offers consumers / users more avenues to connect to the internet, but also allows 'things' to communicate with one another, thereby generating more data.

Therefore, an increase in the number of 'things' connected to the internet, automatically means an increase in the volumes of 'big data' being collected by such 'things.

With the growth of the IoT there is also an increasing reliance on analytics and Big Data - while considered extremely useful in fields such as retail / marketing, today we have various other fields / industries such as healthcare and security becoming dependent on data analytics to track consumer interests, and provide solutions to their customer base. However, as discussed below, this could lead to increased privacy and data / information security risks.

Also, another challenge in data convergence is in relation to the five **V's**:

- **Volume** - Enormous volumes of data are generated in today's internet fueled world. Data is collected every time a user logs on to the internet, and does a search, clicks on a page, visits and participates on social media sites, contributing to hundreds and thousands of gigabytes of data generated on the internet and stored on the cloud.
- **Velocity** – In addition to the volume, the intense pace at which data flows from various sources such as business processes, machines, networks and human interaction with things

like social media sites, mobile devices, contributes another factor to be kept in mind during the process of analytics. Estimates suggest that about 90% of the data in the world today has been created in the last 2 years – suggesting that not only do data processors need to cope up with the amount of data being created, but also the pace at which such data is being created.

- **Variety** – Collected based on GPS location sensors, number of 'likes' on a Facebook page, the number of 're-tweets' on Twitter, the number of visits to a certain merchants website or even webpage on a market place, transactions on a particular website, user reviews, and innumerable other sources, Big data comes in different forms and formats, and requires data processors to provide for the collation and translation of such data from one form to another.
- **Veracity** – With data being collected in various shapes and forms, it is also very important to ascertain both the accuracy of such data, and the relevance of the data to the analytics process.
- **Volatility** – Another important issue in the Big Data industry – the question of when certain data is no longer useful, and whether such data should be retained, used, or discarded.

Thus to streamline / filter the sheer amount of data collected and considering its variability, velocity and volatility, there would be a requirement for massive expansion of data storage and processing facilities. This in turn may require substantial investments and expertize.

Further, another peculiar issue with regard to the reliance on data analytics is the answer to the simple question – can data analytics be considered a 100% accurate

There could be a number of reasons why the results produced by data analytics are faulty – the data entered could be incorrect, the wrong data parameters may be considered relevant, or the algorithm / program undertaking the analytics could be faulty in itself.

The term 'convergence' has been a buzzword in the tech world for over a decade now, and with the continuing growth of the internet, and the sheer variety of technological advances we see on a daily basis in today's world, convergence is key to ensuring both accessibility and compatibility of technology in different aspects of our lives.

Below we discuss some of the legal and taxation related issues that could be faced by various industry players and market segments in the world of IoT.

4. Legal Issues & Concerns

I. Privacy and Data Protection

IoT and its convergence with Wearables results in a lot of Big Data which has the capability and the potential to transform lives of everyone especially in the area of health, home automation, retail and transport. It will connect more things and more people to the Internet, and ultimately, connect more people with each other.

Our devices will be able to profile us and know us more than ever – as a result, one of the most significant issue which arises is "privacy".

The moment multiple devices are able to communicate with each other there is an enormous amount of data that will be transferred and communicated between the devices and its users. This would also result in the sharing of personal information thereby raising concerns in relation to privacy and data protection.

The primary compliance that is required with privacy laws of most countries is informed consent. Obtaining an informed consent from the user in this context becomes difficult as many applications are running in the background and processing personal information autonomously.

Thus, the ability of the individuals to control the use of their personal information or giving informed consent becomes technically and legally challenging. Also, the risk that personal information may be used for purposes other than what it was originally contemplated for also increases.

The recent action taken by the **US Federal Trade Commission against TRENDnet** provides us a glimpse of potential calamities that might occur if steps are not taken to address the privacy issues that will plague IoT and its convergence. TRENDNet is a company that sells Internet-connected cameras that can be used for purposes ranging from home security to baby monitoring. The defective software allowed unfettered online viewing and in some instances listening, by anyone with the camera's IP address. As a result, hackers posted live feeds of nearly 700 consumer cameras on the Internet, showing activities such as babies asleep in their cribs and adults going about their daily lives.[24] The US Federal Trade Commission claimed that TRENDNet failed to employ reasonable and appropriate security during the design and testing of consumer software and failed to monitor third-party security vulnerability reports.

> The European Commission has always been ahead in terms of addressing privacy concerns of European citizens. The draft Data Protection Regulation was put forward by the European Commission in 2012, and was agreed upon by the European Parliament and the Council of the European Union in December, 2015.[25] The final text of the reform package is being negotiated and is expected to be formally adopted in 2016.[26]

In April 2016 the Council of the European Union published what will most likely be the final text of the Draft Regulation.[27] The Draft Regulation provides that *'taking into account the state of the art, the cost of implementation and the nature, scope, context and purposes of processing as well as the risks of varying likelihood and severity for rights and freedoms of natural persons posed by the processing' a data controller must 'both at the time of the determination of the means for processing and at the time of the processing itself, implement appropriate technical and organisational*

24. *James Denvil and Adam Solomon, FTC Brings First "Internet of Things" Enforcement for Security of Internet-Connected Security Camera* available at http://www.hldataprotection.com/2013/10/articles/consumer-privacy/ftc-brings-first-internet-of-things-enforcement/ **(last visited April 5, 2016)**

25. http://europa.eu/rapid/press-release_IP-15-6321_en.htm (Last visited 5 April, 2016)

26. http://www.dataprotectionreport.com/2016/04/eu-data-protection-reform-eu-council-of-ministers-publishes-updated-version-of-the-gdpr/ (last visited April 9, 2016)

27. https://www.dlapiper.com/en/us/insights/publications/2016/04/final-text-of-the-gdpr-finally-available/ (last visited April 10, 2016)

measures, such as pseudonymisation, which are designed to implement data-protection principles, such as data minimisation, in an effective manner and to integrate the necessary safeguards into the processing in order to meet the requirements of this Regulation and protect the rights of data subjects'

Since IoT is still evolving, it may be cost effective for technology developers from a compliance perspective to design wearables and its embedded software in such a way that they address privacy concerns. The cost of the product is an integral consideration of product design. Similarly it will be essential that privacy issues are taken into consideration at the product design stage itself.

In the Indian context the provisions relating to data protection of individual personal information are covered under the Information Technology Act, 2000 (**"ITA"**) and the *"Reasonable practices and procedures and sensitive personal data or information Rules, 2011"* (**"Rules"**) issued under Section 43A of the ITA (as amended).

Section 43A of the ITA, *inter alia*, deals with protection of data in electronic medium by providing that when a body corporate is negligent in implementing and maintaining *'reasonable security practices and procedures'* in relation to any *'sensitive personal data or information'* which it possesses, deals or handles in a computer resource which it owns, controls or operates and such negligence causes wrongful loss or wrongful gain to any person, such entity shall be liable to pay damages by way of compensation to the person so affected.

The Rules, *inter alia*, provide guidelines to protect *'sensitive personal data or information'* in the electronic medium by a corporate entity which possess, deals or handles such information. The Rules mandate the basic principle of privacy law that the body corporate needs to obtain informed consent along with certain privacy compliances.

Since the law on data protection in India has been recently introduced, it does not encompass protection of personal information, in all situations, when used / shared in the context of IoT.

However, with the constant evolution in technology, it is hoped that laws would accordingly evolve to address such concerns arising from modern electronic computing in this e-world.

II. Patents

In order for IoT and its convergence to exist and function properly, devices need to communicate with each other for which devices need to use standardized technology.

This is needed because different devices from different commercial sources have to connect and also the existing architecture should allow addition of devices.[28] However, if standardized technologies are patented then it will create obstacles for the development of IoT as any party adopting standardized technology will end up infringing patents of third party patent owners. Thus, it is essential that standard setting bodies take these factors into consideration while setting a standard and declare such patents as standard essential patents (**"SEPs"**).

The standard setting organization need to impose a condition on the SEP owner to license their patents to third parties on fair, reasonable and non-discriminatory (**"FRAND"**) terms. Experience from the smartphone industry has shown that agreeing FRAND terms is not always straightforward.

The recent spate of litigation that has occurred in the smartphone industry is caused by Microsoft, Apple and Google and also because of the fact that, there are many more 3G and LTE patents and many of the owners are not manufacturers but rather are the so-called trolls.

28. Paul England and Kathleen Fox Murphy, *Patent issues and the Internet of Things* available at http://www.taylorwessing.com/download/article_patent_iot.html **(last visited on April 5, 2016)**

Another, question that is unanswered in many jurisdictions is what role the FRAND obligation plays when an SEP owner seeks to enforce an SEP against an alleged infringer.

With the development of IoT, SEP in relation to standardized technology will play a much greater role in IoT's fast development. FRAND issues such as those already experienced in the telecommunications sector can be expected. However, with the smartphone and telecom market providing a model, it is hoped that a suitable way forward on some of these issues will soon be found. [29]

From an Indian context, software programmes per se are not patentable in India. However, certain computer related inventions, which involve software could be patentable in India but would need to be examined in light of the "Guidelines for Examination of Computer Related Inventions" issued by the Indian Patent Office.

Further, the Department of Industrial Policy and Promotion has issued a "Discussion paper on Standard Essential Patents and their availability on FRAND terms", inviting stakeholder comments with a view to develop a suitable policy framework to define the obligations of essential patent holders and their licensees.[30] It will be interesting to observe how this space evolves when Indian patents would be determined as SEP along with the FRAND terms which would be sought by Indian patent owners in relation to such SEP.

III. Net Neutrality

Network neutrality is the principle that all internet traffic is treated the same, regardless of its nature or destination. Network neutrality preserves the free and open Internet. Under this principle no data can be prioritized over another. It means Internet Service Provider's (**"ISP"**) can't discriminate between different kinds of content.

Network neutrality has been a bone of contention in the United States between consumer groups, government regulators and ISPs for over a decade, although it hasn't been much of an issue outside North America at present. However, et neutrality has far reaching implications outside the United States as bandwidth capacity to consumers is only increasing, which would result in high quality content being streamed seamlessly over the internet.

Without net neutrality an ISP can charge a user more for using Youtube in comparison to using Gmail.

One of the most critical aspects for the success of IoT is the convergence of different services, networks and applications which are integrated seamlessly. Without Net neutrality, this will be a big challenge, as service providers will have control over what services, applications and devices can use their networks to communicate with others.[31] Also, what needs to be considered is how IoT and its convergence would be affected if there is no Net Neutrality.

There are proponents who believe that having no Net Neutrality might actually be beneficial. These proponents argue that for IoT vendors and services, there is some attraction in ISP's being able to offer prioritized traffic for critical systems like supply chain management and public safety, where reliability of the connection is essential. When the capacity of networks are overloaded *(say at sporting events or during disasters)*, being able to shed non-critical traffic may be important for emergency services and the devices they may depend upon.[32]

29. *Id*

30. http://www.ipindia.nic.in/Whats_New/standardEssentialPaper_01March2016.pdf (Last visited April 10, 2016)

31. Rachel Ramsey, *What the Net Neutrality Ruling Means for The Internet of Things* available at http://www.machinetomachinetechnologyworld.com/articles/366860-what-net-neutrality-ruling-means-the-internet-things.htm **(last visited April 5, 2016)**

32. Paul Wallbank, *Network neutrality and the internet of things*, available at http://paulwallbank.com/2014/01/16/network-neutrality-and-the-internet-of-things/ **(last visitedApril 5, 2016)**

At the same time there are proponents who strongly advocate that not having Net neutrality will hinder progress. These proponents argue that without Network neutrality ISP companies would have the legal power to block IoT devices that want to use their networks to communicate with other devices.

The person who makes the chip in your car would need the permission of a mobile carrier; so would the person creating software to allow your iPhone to control all of your appliances. These developers of devices and software would have increased legal and business costs, and some of them might never see the light of day.

It could set back the future, making our world of things less connected.[33] For example, Google Nest can enter into an agreement with an ISP to giving priority bandwidth for its services, so if a user of Google Nest signs up with another service provider he will end up having substandard services.

Only time will tell how critical Net Neutrality would be for the IoT industry and whether it will be a hindrance or a boon to its progress.

Telecommunications (including internet services) are still heavily regulated in India. However most of the regulations were framed years back and often do not take in to account newer concepts.

While there are no specific laws that deal with net neutrality in India, the Department of Telecom, Government of India does place an obligation on all telecom operators to provide telecom services in a non-discriminatory manner unless the government directs otherwise. This obligation is part of the Unified License which is the umbrella license that governs the provision of most telecom services in India.

Bharti Airtel, one of the biggest mobile service providers in India, introduced a differential pricing model based on the type of mobile internet usage i.e. internet browsing versus voice over internet protocol (VoIP) based usage. This move was widely reported in the Indian media, and became a controversial topic among net neutrality activists in India. As a result, the telecom regulator indicated that a process would be initiated to define the concept of 'network neutrality' in India, and provide adequate regulations. The telecom regulator issued a consultation paper on net neutrality and over the top services [34], receiving an overwhelming response from the public, largely as a result of a public campaign mounted by activists, and backed by a number of popular local businesses in India.

After much discussion, the telecom regulator recently issued a regulation that prohibits internet service providers ('ISPs') from offering data plans to subscribers on the basis of the content accessed. The regulation now prevents ISPs from throttling internet traffic in an unreasonable manner, or prioritising one type of content over the other, thereby preventing ISPs from acting as gatekeepers to the internet.

IV. Formation & Validity of e-contracts

Data ownership, security and privacy issues plaguing IoT can be adequately addressed to an extent by way of contracts between the device manufactures and the users and in many scenarios the contracts will be entered into between the users and the manufacturers by way of e-contracts such as click wrap and shrink-wrap contracts. In case of a shrink-wrap agreement the contracting party can read the terms and conditions only after opening the box within which the product (commonly a license) is packed. Thus, it becomes important to examine the validity of these contracts.

33. Marvin Ammori, *The Next Big Battle in Internet Policy* available at http://www.slate.com/articles/technology/future_tense/2012/10/network_neutrality_the_fcc_and_the_internet_of_things_.html **(last visited July 16, 2014)**

34. Consultation Paper No: 2/2015, available at http://www.trai.gov.in/WriteReaddata/ConsultationPaper/Document/OTT-CP-27032015.pdf **(last visited June 25, 2015)**

In the US, there have been instances where the courts have struck down specific terms of contracts which were held to be unconscionable. In the case of Comb v. PayPal, Inc the California courts found that the e-commerce agreement which obligated users to arbitrate their disputes pursuant to the commercial rules of the American Arbitration Association which is cost prohibitive in light of the average size of a PayPal transaction is unconscionable.

In India, e-contracts like all other contracts are governed by the basic principles governing contracts in India, i.e. the Indian Contract Act, 1872 (**"Indian Contract Act"**) which inter alia mandate certain pre-requisites for a valid contract such as free consent and lawful consideration. What needs to be examined is how these requirements of the Indian Contract Act would be fulfilled in relation to e-contracts. In this context it is important to note that the Information Technology Act, 2000 (**"IT Act"**) provides fortification for the validity of e-contracts.

There is no requirement under the Indian Contract Act to have written contracts physically signed. However, specific statues do contain signature requirements. For instance the Indian Copyright Act, 1957 states that an assignment of copyright needs to be signed by the assignor. In such cases the IT Act equates electronic signature with physical signatures.

Further, unless expressly prohibited under any statute, e-contracts like click-wrap agreements would be enforceable and valid in India if the requirements of a valid contract as per the Indian Contract Act are fulfilled.

In India, the jurisprudence on the issue of whether standard form online agreements are unconscionable or not is not very developed. However, Indian laws and Indian courts have dealt with instances where terms of contracts (including standard form contracts) were negotiated between parties in unequal bargaining positions.

However, in case of unconscionable contracts, the courts can put a burden on the person in the dominant position to prove that the contract was not induced by undue influence.

When it comes to IoT, in general there is little or no scope for negotiations to be held between the device manufacturer and the users regarding the terms of e-contracts. Also, in most cases there is no privity of contract between multiple device manufacturers, hence what continues to remain a challenge is what terms would govern the inter–relations between the multiple device manufacturers who e-compute with each other while providing services to the user.

V. Data Ownership

The architectural landscape of IoT brings its own set of data ownership issues. As devices will be seamlessly connected and communicating with each other, a large amount of data will be generated. Google Nest is the best example to understand the potential data ownership issues that might arise in the future.

Google Nest thermostat is a device that learns a person's schedule, programs itself and can be controlled from the phone. It is claimed that this technology can lower your heating and cooling bills up to 20%.

Google Nest is currently working with companies such as Mercedes to develop cars that can constantly interact with Google Nest thermostat and know what time a person will be arriving home and accordingly Google Nest thermostat will adjust itself so that the moment you arrive you will have your desired temperature.

Now this communication between the car and Google Nest thermostat will involve multiple sensors including geo location sensors that will generate data. This data will provide insights into a person's habit such as preferred routes, arrival timings, fueling habits etc. This data could be a gold mine for advertisers which could potentially take targeted advertising to another level.

Now the question is who owns the data: The User or Google Nest or Mercedes?

Unfortunately there is no straight answer to this question. It will be purely based on the commercial arrangement between the user, Google Nest and Mercedes. One strong argument that can be made is that the data belongs to the owner of the device once a sale of the car and the thermostat has been completed.

However, the counter argument being that the device manufacturers could have the data rights because they may have specifically excluded the same upon the point of sale of the devices.[35]

Further, another interesting scenario that can arise in relation to data ownership is when there is an absence of any agreement between Mercedes and Google, which determines the ownership of the data that is being generated by the interaction of the car and Google Nest.

In such a scenario the question that needs to be answered is who owns this data - Is it Google or Mercedes or is it jointly owned.

Under traditional copyright law principles, a joint ownership in a copyright work is created when a work is prepared by two or more authors with an intention that their contributions should be merged together. This principle does not look into the aspect of the amount of contributions of each author, what is important is the element of intention of the authors. One argument that can be made is that the mere fact that two entities let their devices interact with each other and create data could reflect the intention of the parties to create joint ownership. However, there is no settled jurisprudence on this subject in relation to IoT and its convergence under Indian laws.

Further, issues may get more complicated and murky when there are multiple devices interacting with each other which results in the creation of data.

With the passage of time, we will await to see how Indian courts interpret / opine on the same.

VI. Security

As IoT becomes embedded in everyday life, reaching through industrial controls to personal devices and infrastructure such as transport and power, the security issues in these scenarios become more complex and have graver consequences.

IoT and its convergence provides hackers with more vulnerabilities to exploit and create significant security risks. Such risks could take a variety of forms, depending on the nature of the data and devices in question.

For example in the context of e-health, the collection and rapid exchange of sensitive personal information in an interconnected and open environment not only increases risks in respect of patient confidentiality, but also has the far more alarming potential to endanger life if one takes the example of implanted medical devices administering drugs on the basis of autonomous data inputs.

A system failure or more sinister malicious attack on such device could have dire consequences.

In the context of energy, hackers could target smart meters to cause major blackouts, and in the context of home security, it takes little imagination to contemplate the potential effects of a system failure or a malicious attack.[36]

Large companies such as Google and Cisco are aware about the security issues and are working to address the same. The best way to address

35. *New guidelines on data ownership and liability could be issued to address 'internet of things' phenomenon* available at http://www.out-law.com/en/articles/2014/july/new-guidelines-on-data-ownership-and-liability-could-be-issued-to-address-internet-of-things-phenomenon/ **(Last visitedApril 5, 2016)**

36. Amy Collins, Adam J. Fleisher, Reed Freeman and Alistair Maughan, *The Internet of Things: The Old Problem* available at Squared http://media.mofo.com/files/Uploads/Images/140320-The-Internet-of-Things-Part-2.pdf **(Last visited April 5, 2016)**

security issues in devices is at the designing stage itself and to constantly update the devices from potential new threats.

In addition, legal and legislative developments also need to take place in order to address the above mentioned security issues. The next question that needs to be answered is do we need a new law at the state level or is there a requirement for an international legislation.

One proponent has argued that in light of the manifold factual scenarios that can arise, it appears to be hardly possible to come to a homogenous legal framework governing all facets. Moreover, a heterogeneous and differentiated approach would need to be undertaken while framing any legislation. [37]

A national regulation might not be the most effective way to address security issues due to the involvement and convergence of the e-world, however any international framework would be faced with challenges on jurisdiction and enforceability.

VII. Jurisdiction

One of the primary issues that would arise in a dispute between the device manufacturers or between the device manufacturer and the user is jurisdiction.

The reason being when multiple devices are involved there is a possibility that such devices could be located at different locations and in some cases outside the territorial limits of a particular country.

Thus, it would have to be determined by the court (on a case to case basis) whether or not it has jurisdiction to try the dispute. According to the traditional rules of jurisdiction determination, the courts in a country have jurisdiction over individuals who are within the country and/or to the transactions and events that occur within the natural borders of the nation.

Therefore in an e-world if the device manufacturer is selling its devices in a particular country directly to the customers, it may be required to defend any litigation that may result in that country.

As a result, the device manufacturer should review the local laws before marketing or selling its products or services as it may run the risk of being sued in any jurisdiction where the goods are bought or where the services are availed of.

In general a lot of local statutes provide for a 'long arm jurisdiction' whereby the operation of such local laws have extra-territorial application if an act or omission has resulted in some illegal or prejudicial effect within the territory of the country. Below we set out certain provisions of Indian laws which provide for extra territorial jurisdiction.

Information Technology Act

Section 1(2) of such Act read along with Section 75 provides that:

- the Act shall extend to the whole of India and, save as otherwise provided under the Act, it shall apply also to any or contravention thereunder committed outside India by any person and
- the Act shall apply to any offence or contravention committed outside India by any person if the act or conduct constituting the offence or contravention involves a computer, computer system or computer network located in India.

Indian Penal Code, 1869 ("IPC")

- Section 3 of the IPC provides that any person who is liable, by any Indian law, to be tried for an offence committed beyond India shall be dealt with according to the provisions of the IPC for any act committed beyond India in the same manner as if such act had been committed within India.

37. Rolf H. Weber, Internet of Things – New security and privacy challenges ,Computer Law & Security Review 26 (2010) 23-30

VIII. Product Liability and Consumer Protection

Product liability is the area of law in which manufacturers, distributors, suppliers, retailers, and others who make products available to the public are held responsible for the injuries those products cause to property and bodily harm. In the context of IoT product liability has far reaching consequences for device manufacturers such as:

- Bodily Injury
- Property Damage
- Financial Harm

If an IOT device malfunctions, or if data or software is compromised or lost, individuals and businesses may suffer devastating losses. Dosages of critical medication might be missed or needed medical treatments omitted or a malfunctioning fire alarm that fails to alert homeowners of a fire. Such device failures may result not only from a device defect but also from a network failure to provide communications as needed.

In most common law jurisdiction product liability is based on traditional principles of negligence or absolute liability or strict liability under tort law. A court in a product liability claim involving an IoT device will use these principles to determine liability of the manufacturer of the device.

Originally, product liability claims had to be proven under the principle of negligence. In order to prove negligence of a manufacturer the consumer would usually need to prove duty of care of the manufacturer, breach of duty of care, causation and damages.

However, as the law evolved courts across various jurisdiction started applying the principle of strict liability in product liability cases, this principle is more consumer friendly. Under this principle the manufacturer is liable if the product is found to be defective, even if the manufacturer was not negligent in making that product defective.

The reason behind courts adopting the strict liability principle is that a manufacturer can anticipate potential hazards in relation to the product and take measures to safeguard the products from these hazards, whereas a consumer cannot.

The cost of a bodily injury, financial harm or property damage when it comes to a consumer is a misfortune whereas a manufacturer can guard himself by way of product liability insurance and this is an additional cost of doing business that can be distributed to the public.

It will be important for IoT device manufacturers to purchase and cover themselves with product liability insurance and take this into consideration while doing business. Insurance companies should explore offering tailor made product liability insurance to IoT device manufacturers, as in some scenarios traditional product liability insurance might not completely protect the IoT device manufacturers.

In addition to strict liability and related torts, India has a number of legislations including the Consumer Protection Act, 1986, the Legal Metrology Act, 2009, that protect consumers against defective products, deficient services, anti-competitive practices and prices, deceptive marketing (in the case of hazardous goods), among other things. These consumer oriented laws also provide for special courts / forums that work on a fast track basis and protect and allow consumers to sue and obtain remedies easily when sold defective products.

Considering the number of players in the IoT field – including device manufacturers, software application developers, and network and connectivity service providers, and the integrated nature of the final solutions that are sold to end users, it will be interesting to see how liability is divided and potential consumer disputes are resolved in this space.

IX. Taxation

Developments in technology, internet, cloud computing and IoT have given rise to various tax issues globally. In the Indian context, global enterprises catering to Indian customers have faced difficulties with Indian tax authorities taxing e-commerce and internet-based business models in a manner that conflict with international approaches. There has been significant litigation in this respect, especially in relation to characterization of income and withholding taxes. Therefore, it becomes important to carefully structure IoT-based business models so as to mitigate tax risks, especially risk of double taxation.

Further, in October, 2015, the OECD has come out with the BEPS Action Plan 2015, which lays down a set of 15 action plans for the global tax framework. Action Plan 1 pertains to tax challenges with respect to the digital economy. We have summarized the key recommendations and conclusion of Action Plan 1 in relevant portions below.

A. Direct Taxes

i. Income tax regime

Taxation of income in India is governed by the provisions of the Income Tax Act, 1961 (**"ITA"**). Under the ITA, residents are subject to tax in India on their worldwide income, whereas non-residents are taxed only on income sourced in India. However, non-residents, who are resident of a country with which India has signed a tax treaty, have the option of being taxed as per the tax treaty or the ITA whichever is more beneficial.

The corporate tax rate [38] in India is 30% for resident companies and 40% for non-resident companies (to the extent of income sourced in India). The Finance Minister, in his budget speech in 2015, had proposed to reduce the corporate tax rate from 30% to 25% (excluding surcharge and cess) over the next four years, coupled with rationalization and removal of various exemptions and rebates.

An initiation towards this gradual phasing out is proposed to be made by the Finance Bill, 2016, which states that manufacturing entities set up on or after March 1, 2016 are entitled to a lower rate of 25% subject to certain conditions. Furthermore, it has been proposed to lower the corporate tax rate to 29% for those domestic companies whose turnover in the financial year 2014-15 does not exceed INR 5 crores (approx. USD 800 K).

The Finance Bill, 2016 has also proposed to introduce a new patent box regime under which worldwide income received by way of royalty in respect of a patent developed [39] and registered in India should be subject to tax on a gross basis at a concessional rate of 10%. This is applicable only in case of patents 'registered' in India and resident inventors who have filed for patents in offshore jurisdictions rather than under the Patents Act in India may not be eligible for this proposed benefit.

Withholding tax of 10% (on a gross basis) is applicable in case of royalties and fees for technical services (**"FTS"**) paid to non-residents. In case of failure to withhold, the payer could be liable for the principal tax amount, interest (at 12% per annum) and penalty (up to 100% of the principal tax amount). Further, the payer could face the risk of not being allowed to claim expense deduction (for the royalty / FTS payment) while computing its taxable profits.

IoT-based business models gives rise to two key issues: a) Characterization of income i.e. whether income earned is royalty, FTS or business income, and b) Risk of permanent establishment (**"PE"**) exposure on account of presence of any server / other electronic terminal in India, hosting of websites or other technical equipment, etc.

38. All tax rates mentioned in this paper are exclusive of surcharge and cess.

39. ("developed" has been defined to mean "the expenditure incurred by the assessee for any invention in respect of which patent is granted under the Patents Act")

ii. Key tax issues

a. Characterization of Income

Ordinarily, business profits earned by a non-resident should not be taxable in India in the absence of a PE / business connection [40], unless the profits qualify as royalties or FTS. Royalty and FTS are taxable at 10% (or at lesser rates prescribed under a tax treaty). However, if a non-resident has a PE / business connection in India, the non-resident would be taxable in India at 40% to the extent of profits attributable to the PE. Further, if a non-resident has a PE / business connection, it could also be liable to tax on royalty and FTS at 40% (as against 10% or reduced rates prescribed under tax treaties). Therefore, characterization of income impacts the tax cost of doing business in India. Particularly, where characterization by Indian tax authorities is not in consonance with international principles, non-residents could potentially face the risk of double taxation (arising from non-availability of credit for taxes paid in India).

In determining whether a payment amounts to royalty, several issues arise in the Indian context as the domestic law definition is wider than the definition accepted internationally. It is wide enough to include consideration for license of computer software without any transfer of underlying IP (for example, sale of off-the-shelf shrink-wrap software). This deviates from internationally accepted principles which treat such license like a simpliciter sale of copyrighted books. The domestic law definition of 'royalty' also includes payments for access to or use of scientific / technical equipment even if no control / possession is granted over the equipment (for example, hosting website on third party servers without renting the server / obtaining any administrator rights over the server). This again is a deviation from internationally accepted principles which do not treat such payments as royalty unless the payer is also given control / possession over the equipment.

Further, under domestic law, payment of royalty between two non-residents is also considered to be sourced in India, if the payer utilizes the information, property or rights for a business or profession carried out in India.

But, as outlined above, a non-resident is entitled to the benefit of the more restricted definition of 'royalty' prescribed under tax treaties. However, India has expressed several reservations to the OECD commentary on the definition of 'royalty' and Indian tax authorities have many a times contended that tax treaty provisions should be interpreted as per domestic law definitions. Recently, in the case of *New Skies Satellite BV*, the Delhi High Court has held that the retrospective amendment to the definition of 'royalty' under the ITA cannot be extended to India's tax treaties. We discuss below some key issues in this regard that could be faced by internet and technology-based business models.

i). License of software

There are issues in relation to taxation of license of both, standalone and embedded software. In case of payments for standalone software (for example, mobile apps), as mentioned above, the domestic law definition of 'royalty' (as retroactively amended in 2012) is wide enough to cover such payments. As per the more restrictive definition of 'royalty' under tax treaties (especially, when read with the OECD commentary), such payments are not treated as 'royalty' as license of such software does not involve transfer of any underlying IP. However, India has expressed its reservation to the OECD commentary on this point.

In case of embedded software (for example, software embedded in wearable devices), certain license rights are granted with respect to the software for the limited purpose of operating the device as a whole. As per internationally accepted principles, the license of software is considered to be incidental to the sale of the device and therefore, any consideration received for such license of software is clubbed with the consideration for sale of the device and is not characterized separately. Therefore, irrespective of whether payment of standalone software is

40. Business connection is the corresponding domestic law concept, which would be applicable in the absence of a tax treaty. Its ambit is generally wider than the ambit of PE as defined under tax treaties.

taxable as royalty or not, payment for embedded software is not taxed as royalty. This principle has also been upheld in India in the case of *Ericsson*[41] and *Nokia Networks*[42], where consideration for license of software embedded in telecom equipment was sought to be taxed as royalty.

However, in a recent case involving sale of software and hardware as an integrated product, the Mumbai Tribunal[43] held that consideration payable for the software is taxable as royalty. The tribunal came to such conclusion for the following reasons: (i) the hardware and software were sold under separate agreements; and (ii) license of software (even if made without license of underlying IP) amounts to transfer of a right in respect of a copyright contained in a copyrighted article. While this decision dealt with embedded software, it could also be relevant to standalone software as the decision has dealt with taxation of software licenses in general.

ii). Use of industrial, commercial or scientific equipment

Majority of IoT and e-commerce business models usually involve the use of or access to different kinds of scientific / industrial equipment. Such use of or access to scientific / industrial equipment does not generally involve any control / possession over such equipment. For example, in case of satellite broadcasting services, transponder services, bandwidth services, medical diagnosis, treatment or surgery using medical equipment, etc., no control / possession is granted to the service recipient. The domestic law definition of 'royalty' (as retroactively amended in 2012) is wide enough to cover such payments.

But, internationally, such payments are not construed as 'royalty' unless some element of control / possession is also granted over the equipment. Therefore, while interpreting tax treaties (which override domestic law), courts have held in cases like *Dell*[44] that such payments do not constitute 'royalty'. Further, in the context of online banner hosting / advertisements, in cases like *Yahoo*,[45] it has been held that the payer should be able to positively utilize the scientific / industrial equipment on its own (as compared to merely being benefitted by the operation of the equipment by the payee / other entity).

However, the Indian tax authorities have been contending that, even as per India's tax treaties, no element of control / possession is required to characterize payment for use of equipment as 'royalty'. In some case like *IMT Labs*[46] and *Cargo Community Network*,[47] it has been held that payment received by a non-resident from Indian customers for providing access to software/portal hosted on its server outside India is royalty, even though the non-resident did not grant any control / possession over its server to the Indian customers. This approach appears to be particularly gaining momentum in light of the 2012 retrospective amendment of the domestic law definition. Recently, in the case of *Cognizant*[48], it was held that payment for bandwidth services and router management services is 'royalty'. In interpreting the definition of 'royalties' under the applicable (India-US) tax treaty, the judgment did not follow internationally accepted approaches and instead relied upon the ITA provisions. This is in contrast with other decisions[49] which have held that amendments made under domestic law cannot be relied upon for the interpretation of provisions in tax treaties.

41. *Director Income Tax v. Ericsson* AB, [2012] 343 ITR 470 (Delhi)
42. A similar position was taken by the Delhi High Court in the case of *Director Income Tax v. Nokia Networks OY* (2012) 253 CTR (Del) 417
43. *DDIT vs. Reliance Infocomm Ltd/Lucent Technologies*, 2013 (9) TMI 374.
44. *Dell International Services (India) Pvt. Ltd., In re,* 305 ITR 37 (AAR); Similar position was also taken in the case of *Cable and Wireless Networks India (P) Ltd., In re,* 315 ITR 72 (AAR).
45. *Yahoo India Pvt. Ltd. v. DCIT*, ITA No.506/Mum/2008; Similar position was also taken in the cases of *Pinstorm Technologies Pvt Ltd v. ITO*, TS 536 ITAT (2012) Mum and *ITO v. Right Florists Ltd*, I.T.A. No.: 1336/ Kol/ 2011
46. *In re: IMT Labs (India) P. Ltd.* [2006] 287 ITR 450 (AAR).
47. *In re: Cargo Community Network Pte Ltd,* [2007] 289 ITR 355 (AAR).
48. *DCIT v. Cognizant Technology Solutions India Private Limited,* ITA. Nos. 1535, 1536/09, ITA 460 & CO.27/2010, ITA Nos. 751, 864 & 1922/Mds/2010.
49. *DIT v. Siemens Aktiengesellschaft*, ITA No. 124 of 2010 (Bom); *DIT v Nokia Networks OY*, 253 CTR 417 (Delhi)..

Alternatively, tax authorities have been contending that such access to or use of scientific / industrial equipment constitutes use of a secret formula or process, payment for which is also taxable as 'royalty'. In the case of *Standard Chartered*, [50] it was held that payments made by customers for data processing services did not amount to use of any secret process. The decision reasoned that the payment was made for data processing services and not for use of the hardware or software (which was only required for providing the services). This decision could be relevant in the context of processing Big Data generated from various IoT applications.

b. Permanent Establishment

Developments in technology, including IoT, have created unique PE related risks due to the intangible nature of transactions. As mentioned earlier, PE exposure could lead to taxation of business profits at 40% in India to the extent attributable to the PE. Generally, a PE may be constituted if a non-resident carries out an income generating business in the other contracting state either through a fixed place or through employees or dependent agents.

Internationally, the mere existence of a website does not constitute a PE as a website does not have a physical location. However, Indian tax authorities have been contending a website could constitute a PE in certain circumstances and have expressed reservations to the OECD commentary in this regard. Some other important reservations pertain to PE exposure from (i) websites hosted on a third-party server which is not leased or otherwise available at an enterprise's disposal; and (ii) leased automated equipment which is not operated and maintained by the lessor enterprise post set-up. For example, in the context of computerized reservation system (**"CRS"**) for air tickets, the Delhi Tribunal[51] concluded that booking fees received from Indian entities by non-resident companies providing CRS are liable to be taxed in India. The Tribunal came to such conclusion on the ground that these companies have a "virtual" presence in India which constitutes a "virtual" PE.

In contrast, the OECD approach states that mere advertisement by an enterprise of its products and services through a website should not constitute a PE. This principle applies irrespective of whether the website is hosted on a server in India (as the business itself is not carried out through the website). A PE is constituted only where the business of a non-resident is being carried out through a website hosted on a server in India and where the non-resident has the server at its disposal (as an owner, a lessee, etc). But, if the server is not located in India, the website, by itself, should not give rise to PE exposure. This principle has been upheld by Indian courts in relation to advertisement revenue earned by Google and Yahoo from India. [52]

The OECD, in its BEPS Action Plan 2015, has suggested that the definition of PE be expanded by limiting exemptions to activities which are purely preparatory/auxiliary in nature. Thus, if proximity to customers is key to the business model, a domestic warehouse for delivery of goods sold online may also be considered as a PE. This suggestion could thus, materially increase the PE risks faced by enterprises with internet-based business models.

c. Equalization Levy

The Finance Bill, 2016 proposes to introduce an equalization levy of 6% to be payable after 1st April, 2016, on the gross amount paid for 'specified services', if payment for such services is made by a resident of India or a non-resident having a PE in India to a non-resident (subject to certain exceptions). The services that have been currently specified under the Finance Bill 2016 relate to online advertising services. Payment for any other online service has not been specifically identified by the Finance Bill, 2016 yet, although it could be notified in the future. This levy is required to be deducted by the payer from the consideration paid for such specified services.

50. *Standard Chartered Bank v. DDIT*, [2011] 11 taxmann.com 105 (MUM).

51. *Amadeus Global Travel v. Deputy Commissioner Income Tax*, [2008] 19 SOT 257 (DELHI)

52. *ITO v. Right Florists Limited*, I.T.A. No.: 1336/ Kol/ 2011

This levy will not apply if the gross amount receivable by the non-resident from 'specified services' does not exceed INR 100,000 (approx. USD 1,500) in the relevant financial year or if the non-resident payee has a PE in India and the 'specified service' is effectively connected with the PE of the non-resident. Further, this levy is intended to apply only to B2B transactions.

The equalization levy is proposed to be introduced in addition to and as a separate levy as distinguished from income tax levied under the ITA. Based on various statements made by government officials, it appears that the government is taking the view that relief under tax treaties is not applicable in relation to such levy. This position is questionable in light of the ambit of tax treaties, characterization of the levy, etc.

However, till there is clarity on the same, non-resident payees offering such "specified services" may seek to contractually negotiate a grossed-up payment of consideration by the payers.

B. Indirect taxes framework

Various indirect taxes are levied at the central and state levels which have been discussed below. However, please note that the Indian government is proposing to implement a unified Goods and Services Tax (GST) regime. Once introduced, this would be a significant step in simplifying the indirect tax regime in India.

i. Service tax

Service tax is currently levied by the central government at 14.5% (inclusive of Swachh Bharat Cess of 0.5%) on all services provided in India except certain specified services. Service providers can take credit for service tax paid on input services utilized and for excise duty paid on inputs and capital goods (barring certain specified inputs). Services provided outside India are not subject to service tax in India. Typically, services are considered to be provided in India if the service recipient is located in India (even though the services may actually be provided outside

India), except when specifically provided otherwise.[53] In case of online information and database access or retrieval services, it has been specifically provided that the services would be construed to be provided at the location of the service provider.

The Finance Bill, 2016 proposes to increase the service tax to 15% by way of levy of Krishi Kalyan Cess of 0.5% to finance and promote initiatives to improve agriculture.

ii. Sales tax

In India, there are two types of taxes on sale of goods - central Sales Tax (**"CST"**) at the rate of 2% levied by the central government on sale of goods in the course of inter-state trade and value added tax (**"VAT"**), levied by the state governments on intra-state sale at standard rates of 0%, 1%, 5%, and 14.5% for different goods, although there may be variations in some states. In case of VAT, tax credits are available on VAT paid on input goods procured by the dealer.

One of the key issues in the context of software and other information technology (IT)-based applications and equipment is in relation to simultaneous levy of both service tax and VAT. The general principle is that service tax and VAT cannot be imposed simultaneously. However, in the context of software, the issue has not been settled. Tax authorities administering both taxes being different, in many instances, both authorities have claimed that software or IT-based applications are subject to the respective tax administered by them.

53. Place of Provision of Services Rules, 2012

iii. Excise duty

Excise duty (or central value added tax or CENVAT) is levied by the Central Government on all goods that are produced or manufactured in India, marketable, movable and covered by the excise legislation. The primary rate of excise is 12.50%, although there are other rates ranging upwards, or based on an ad valorem / quantity rate, depending on the product description. A manufacturer of excisable goods may avail of credit for service tax paid on input services utilized and for excise duty paid on inputs and capital goods (barring certain specified inputs).

iv. Customs duty

Customs duty is levied by the Central Government on goods that are imported into India and exported from India. Levy of export duties are restricted to limited kinds of goods. Levy of import duties is quite wide. Import duties primarily comprise the basic customs duty, additional customs duty, countervailing duty, safeguard duty and education cess. While the highest rate of basic customs duty for import of goods is 28.85%, the actual rate may vary according to the product description.

5. Conclusion

As seen from the sections above, the "Internet of Things" following the footsteps of e-commerce, cloud computing and big data, has become an inescapable part of the e-world.

With the passage of time our lives have become more intertwined and dependent on technology, wherein e-commerce brought us the convenience of online shopping, cloud computing – the ease of storing, accessing and availing e-services and big data – the capability to take minute pieces of unrelated information, to create a comprehensive study of an entire industry.

However, IoT has moved a step ahead. It envisages a future where businesses, industries, governments and lives are interconnected through devices that significantly reduce the need for human intervention.

This in turn provides a galore of business opportunities but at the same time (as described above) there are a number of issues, both technical and legal which would need to be factored.

In the months to come, we hope that such issues would be adequately resolved in order to allow for an open market, where consumers / customers have access and the ability to utilize the incredible number of options which would be available in this IoT driven e-world.

About NDA

Nishith Desai Associates (NDA) is a research based international law firm with offices in Mumbai, Bangalore, Palo Alto (Silicon Valley), Singapore, New Delhi, Munich and New York. We provide strategic legal, regulatory, and tax advice coupled with industry expertise in an integrated manner.

As a firm of specialists, we work with select clients in select verticals on very complex and innovative transactions and disputes.

Our forte includes innovation and strategic advice in futuristic areas of law such as those relating to Bitcoins (block chain), Internet of Things (IOT), Aviation, Artificial Intelligence, Privatization of Outer Space, Drones, Robotics, Virtual Reality, Med-Tech, Ed-Tech and Medical Devices and Nanotechnology.

We specialize in Globalization, International Tax, Fund Formation, Corporate & M&A, Private Equity & Venture Capital, Intellectual Property, International Litigation and Dispute Resolution; Employment and HR, Intellectual Property, International Commercial Law and Private Client. Our industry expertise spans Automobile, Funds, Financial Services, IT and Telecom, Pharma and Healthcare, Media and Entertainment, Real Estate, Infrastructure and Education. Our key clientele comprise marquee Fortune 500 corporations.

Our ability to innovate is endorsed through the numerous accolades gained over the years and we are also commended by industry peers for our inventive excellence that inspires others.

NDA was ranked the 'Most Innovative Asia Pacific Law Firm in 2016' by the *Financial Times - RSG Consulting Group* in its prestigious FT Innovative Lawyers Asia-Pacific 2016 Awards. While this recognition marks NDA's ingress as an innovator among the globe's best law firms, NDA has previously won the award for the 'Most Innovative Indian Law Firm' for two consecutive years in 2014 and 2015.

As a research-centric firm, we strongly believe in constant knowledge expansion enabled through our dynamic Knowledge Management ('KM') and Continuing Education ('CE') programs. Our constant output through Webinars, Nishith.TV and 'Hotlines' also serves as effective platforms for cross pollination of ideas and latest trends.

Our trust-based, non-hierarchical, democratically managed organization that leverages research and knowledge to deliver premium services, high value, and a unique employer proposition has been developed into a global case study and published by John Wiley & Sons, USA in a feature titled 'Management by Trust in a Democratic Enterprise: A Law Firm Shapes Organizational Behavior to Create Competitive Advantage' in the September 2009 issue of Global Business and Organizational Excellence (GBOE).

A brief below chronicles our firm's global acclaim for its achievements and prowess through the years.

- IDEX Legal Awards: In 2015, NDA won the "M&A Deal of the year", "Best Dispute Management lawyer", "Best Use of Innovation and Technology in a law firm" and "Best Dispute Management Firm‹http://idexlegalawards.in/ArticlePage.aspx?aid=6›". Nishith Desai was also recognized as the 'Managing Partner of the Year' in 2014.
- Merger Market: has recognized NDA as the fastest growing M&A law firm in India for the year 2015.
- Legal 500 has ranked us in tier 1 for Investment Funds, Tax and Technology-Media-Telecom (TMT) practices (2011, 2012, 2013, 2014, 2017)

- International Financial Law Review (a Euromoney publication) in its IFLR1000 has placed Nishith Desai Associates in Tier 1 for Private Equity (2014, 2017). For three consecutive years, IFLR recognized us as the Indian "Firm of the Year" (2010-2013) for our Technology - Media - Telecom (TMT) practice.
- Chambers and Partners has ranked us # 1 for Tax and Technology-Media-Telecom (2014, 2015, 2017); #1 in Employment Law (2015 & 2017); # 1 in Tax, TMT and Private Equity (2013, 2017); and # 1 for Tax, TMT and Real Estate – FDI (2011).
- India Business Law Journal (IBLJ) has awarded Nishith Desai Associates for Private Equity, Structured Finance & Securitization, TMT, and Taxation in 2015 & 2014; for Employment Law in 2015
- Legal Era recognized Nishith Desai Associates as the Best Tax Law Firm of the Year (2013).

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Research is the DNA of NDA. In early 1980s, our firm emerged from an extensive, and then pioneering, research by Nishith M. Desai on the taxation of cross-border transactions. The research book written by him provided the foundation for our international tax practice. Since then, we have relied upon research to be the cornerstone of our practice development. Today, research is fully ingrained in the firm's culture.

Research has offered us the way to create thought leadership in various areas of law and public policy. Through research, we discover new thinking, approaches, skills, reflections on jurisprudence, and ultimately deliver superior value to our clients.

Over the years, we have produced some outstanding research papers, reports and articles. Almost on a daily basis, we analyze and offer our perspective on latest legal developments through our *"Hotlines"*. These *Hotlines* provide immediate awareness and quick reference, and have been eagerly received. We also provide expanded commentary on issues through detailed articles for publication in newspapers and periodicals for dissemination to wider audience. Our *NDA Insights* dissect and analyze a published, distinctive legal transaction using multiple lenses and offer various perspectives, including some even overlooked by the executors of the transaction.

We regularly write extensive research papers and disseminate them through our website. Although we invest heavily in terms of associates' time and expenses in our research activities, we are happy to provide unlimited access to our research to our clients and the community for greater good.

Our research has also contributed to public policy discourse, helped state and central governments in drafting statutes, and provided regulators with a much needed comparative base for rule making. Our *ThinkTank* discourses on Taxation of eCommerce, Arbitration, and Direct Tax Code have been widely acknowledged.

As we continue to grow through our research-based approach, we are now in the second phase of establishing a four-acre, state-of-the-art research center, just a 45-minute ferry ride from Mumbai but in the middle of verdant hills of reclusive Alibaug-Raigadh district. The center will become the hub for research activities involving our own associates as well as legal and tax researchers from world over. It will also provide the platform to internationally renowned professionals to share their expertise and experience with our associates and select clients.

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