ACCELERATING IoT as a SERVICE

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ABSTRACT

IoT is an amalgam of various technologies starting from devices/sensors connecting through networks to the cloud, to processing data from devices using various techniques to draw actionable insights. The complexity is further increased by applications that are enabled through various levels of technology from different vendors that require varied skill sets to implement, maintain and improve.

The lack of expertise within the company has been a hurdle for many an operator in making rapid inroads into IoT. With the IoT industry changing rapidly and offering new avenues to monetize, operators have found a very interesting business model offering IoT as a service. This provides an opportunity for the operators to foray into a wider range of business verticals and offer varied customized services. This whitepaper will take a deeper look at the IoT as a service model and what can help an operator accelerate its journey in realizing this model.

Driving Digital Transformation – Internet of Things

Operators, embarking on their digital transformation journey usually focus on a single-use case, to begin with, and may not envision IoT offerings or other digital technologies as a service. However, once the digitization steps are taken, and the overall ecosystem is built, the operator inadvertently becomes a service provider for both their internal stakeholders (for instance, Customer service, R&D, Field engineers, Logistics and other departments that use the data collected from devices) and external stakeholders – their B2B and B2C customers.

Figure 1: Benefits - IoT As A Service

'As a Service' Business Model

`zIn the past few years, the software industry has embraced offering 'As a service' business models. This is mainly fueled by the need for numerous industries to get on to the digital bandwagon and make use of the latest technologies such as IoT, Artificial Intelligence, and Machine Learning to name a few. While the need to use the most recent technology stack to digitize their offerings, these companies do not necessarily have the expertise or the time to commit and develop solutions in-house.

The advent of *'as a service'* business model has brought about a scenario where a company does not necessarily need to build software expertise in digital transformation to improve its products and customer experience. They'll need to identify the right products/solutions in the market and get service providers to implement those. While this makes it look effortless from the service consumer's perspective, the service provider has its own set of challenges in offering viable 'as a service' solutions in the digital world.

IoT AS A SERVICE

Operators take the IoT route for multiple reasons – from providing connected experiences such as smart home or a connected car to large scale implementations such as transportation or public safety in a smart city. Ideally, the following entities are needed to build an IoT ecosystem:

- Devices, sensors, and assets
- Communication infrastructure
- An IoT platform on cloud
- Applications

DEVICES   COMMUNICATION   IOT PLATFORM   APPLICATIONS
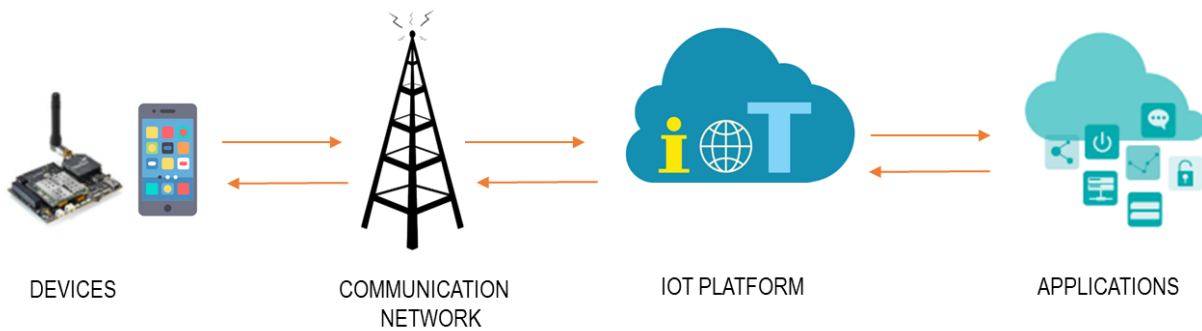   NETWORK

Figure 2: IoT Ecosystem

An operator has to have a foothold in all four major components of the IoT ecosystem mentioned above if they are looking at launching their IoT journey across verticals and monetize it further by offering it a service to their customers. The operator will have expertise in the communication infrastructure as it's their core area but will need help in the other areas.

However, the provider's complexity of the current IoT ecosystem is that while there are thousands of companies offering specialized services in each of the areas mentioned, expertise in all these areas from a single source is hard to come by. Especially the sheer number of device manufacturers and the variety of devices they have in the market is mind-boggling for a new entrant.

To stitch together a robust IoT solution, the new entrant will need support and expertise right from device selection to choosing the right communication protocol and infrastructure, the platform that offers the right features and finally help in delivering the best end consumer experience. There are also related aspects to consider, such as setting up the software infrastructure, monitoring, and end to end production support and the most important of all – data security through its lifecycle.

QUESTIONS AT THE START OF THE IOT JOURNEY

An operator starting fresh on its digital journey may not have considerable knowledge or experience in the IoT specific areas. The central point of any IoT implementation is the IoT platform on the cloud, and the critical decision for the customer to make is the choice of IoT platform and its associated business model

The first question facing the company will be: **Should I build an IoT platform in-house or buy from the market?**

	Time to Market	Device Communication	Network Security	Technical Expertise
Build	IoT platform and related software could take anywhere from 2 years and above	Building communication protocol capabilities from scratch	Security needs to incorporate regulations right from design device to end user application.	Build teams and capabilities for development of platform and support it through its entire lifecycle.
Buy	Platform and cloud infrastructure setup in weeks if not months	IoT solution partner's expertise can be leveraged in setting up the communication layer	Built-in latest security features would make the product compliant to industry regulations	Readily available partner's expertise and support infrastructure
Great to have	Complete control over the infra so that it can be scaled when needed	The ability to customize for specific use cases	Audit and keep a tab on all security aspects	A partner with expertise in key areas such as telecom, cloud, etc.

Figure 3: Build Vs Buy Decision Criteria

The fierce market competition does not allow a lot of lead time before the product hits the market. In such scenarios, the buying option turns out to be favourable in many aspects.

The decision to buy an IoT platform should never be based on a single-use case. The benefits of digital transformation are long term, and use cases will keep evolving. It has to co-evolve with the company's near and long term aspirations.

The second major question is: **What business model should I choose when it comes to the IoT platform?**

- A route commonly taken by many companies is to go with one of the large public cloud-based PaaS service providers. This has advantages in the fact that things can be set in motion very quickly as a myriad of related PaaS components is available for easy integration. However, their cost model is based on the number of devices connecting to the cloud and the size of data that is exchanged. The cost increases exponentially as the subscriber base starts swelling than initially estimated. This model also creates stickiness with the cloud service provider and complete dependency on them for upcoming platform features.

- Another option is to buy a platform with a flexible license model (with the freedom to develop and further improve). This has a significant advantage in the fact that it's a one-time cost and no recurring device-based or data-based metered charges. The cost of ownership initially starts steep due to the one-time license cost but gradually comes down when compared to the metered costing model. This is a better option when IoT services will be offered to customers, and there is no way to estimate accurately how many devices will connect and their usage patterns.

To summarize, for a company charting out its *IoT as a service* provider journey, the fastest and most cost sensible option would be to buy a proven platform instead of building it and own the platform instead of going for a PaaS option.

What should I look for in an IoT Platform?

A plethora of IoT platforms are available in the market catering to specific industry verticals, specific use cases, specific business models, etc., what are some of the critical features the customer should look for while choosing the IoT platform that is right for their needs?

Platform Flavor

Companies should choose IoT platforms that are not very specific to a particular use case. While this looks like a specialized option, this will severely limit the company's chances of leveraging it for different use cases across its business. It should not target any industry vertical and should cater to multiple non-related verticals. Maintaining numerous platforms for different use cases is not going to be a cost-effective option.

Security Strategy

Security is one of the top concerns in the IoT industry today. Security & Identity management solutions must be robust and enable easy integration of the platform with standard enterprise identity management systems and security solutions.

Data Ownership

Different use cases have different data security requirements. Data could reside on the public cloud, private cloud, or on-premise servers. However, it would be best if the company has complete ownership of the data that is collected from devices so that any data security and privacy-related risks are eliminated.

Interoperability

The open-source ecosystem is rapidly growing, and the platform should be able to integrate easily with third-party providers to take full advantage of interoperability. The system should be ready to plug into other third-party systems via APIs for a variety of functions such as data analysis, machine learning, business intelligence, etc.

Flexible Deployment options

The platform architecture should allow easy and quick deployments over a variety of infrastructure options.
- On-premise deployment
- Cloud Deployment
- Hybrid Deployment
- Granular deployment support with microservices

Enterprise Integration

The full benefits of the IoT platform are realized only when it integrates seamlessly with the existing enterprise systems. Easy integration with enterprise systems like CRM, Salesforce, etc. is vital to put the data that is collected from devices to the best use.

IoT Platform Features That are Essential for an IoT as a Service Provider

The service provider cannot afford to have multiple instances of platforms running on different physical servers to cater to different service lines (use cases). Some of the features such as multi-tenancy, data isolation, and security need to be built into the platform to enable this.

Multi-Tenancy:

Multi-tenancy allows a common single instance of the application to be used for multiple tenants (businesses). Hence the customer does not need to run and maintain different cases of the platform catering to different use cases.
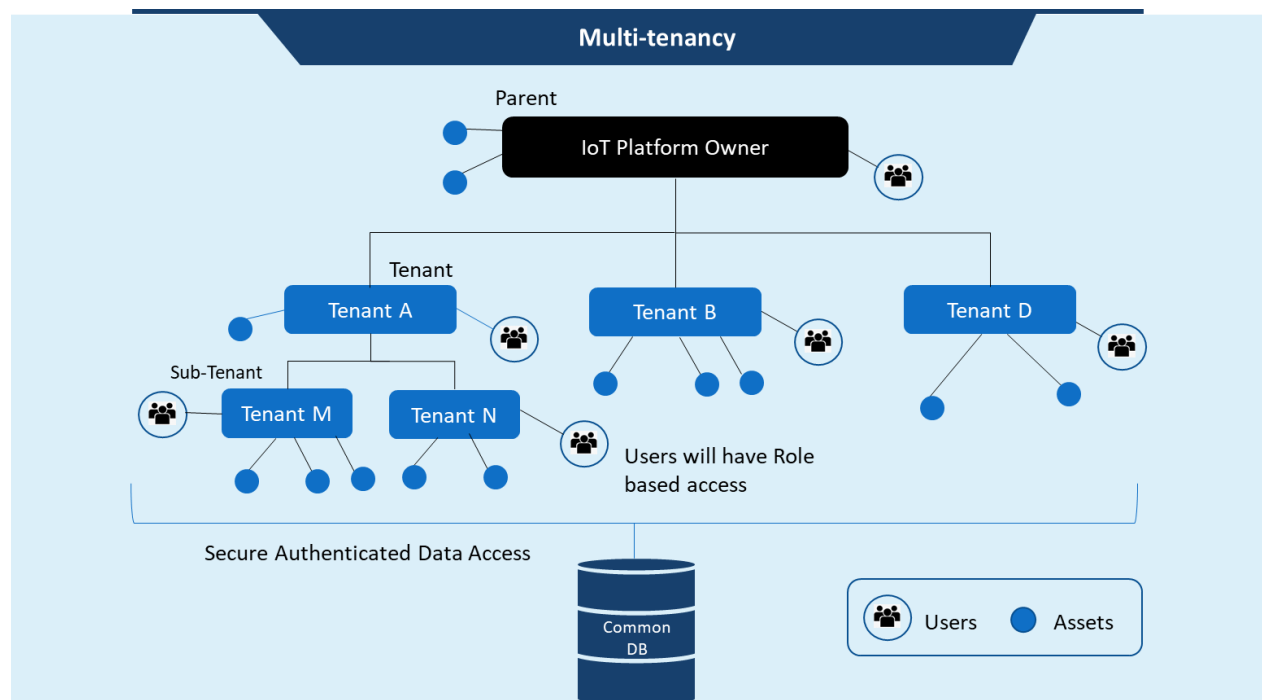

Figure 4: Multi-Tenancy Architecture

Examples of Tenants:

Multi-tenancy can be explained better by the illustration shown below. Considering an automotive use case where an OEM automaker uses the IoT platform to drive 3 different vehicle programs – commercial vehicles, passenger vehicles, and electric vehicles. The Auto OEM here is the owner of the IoT platform instance, and each of these vehicle programs (different use cases) are tenants. They, in turn, have sub-tenants such as different models of the vehicle.
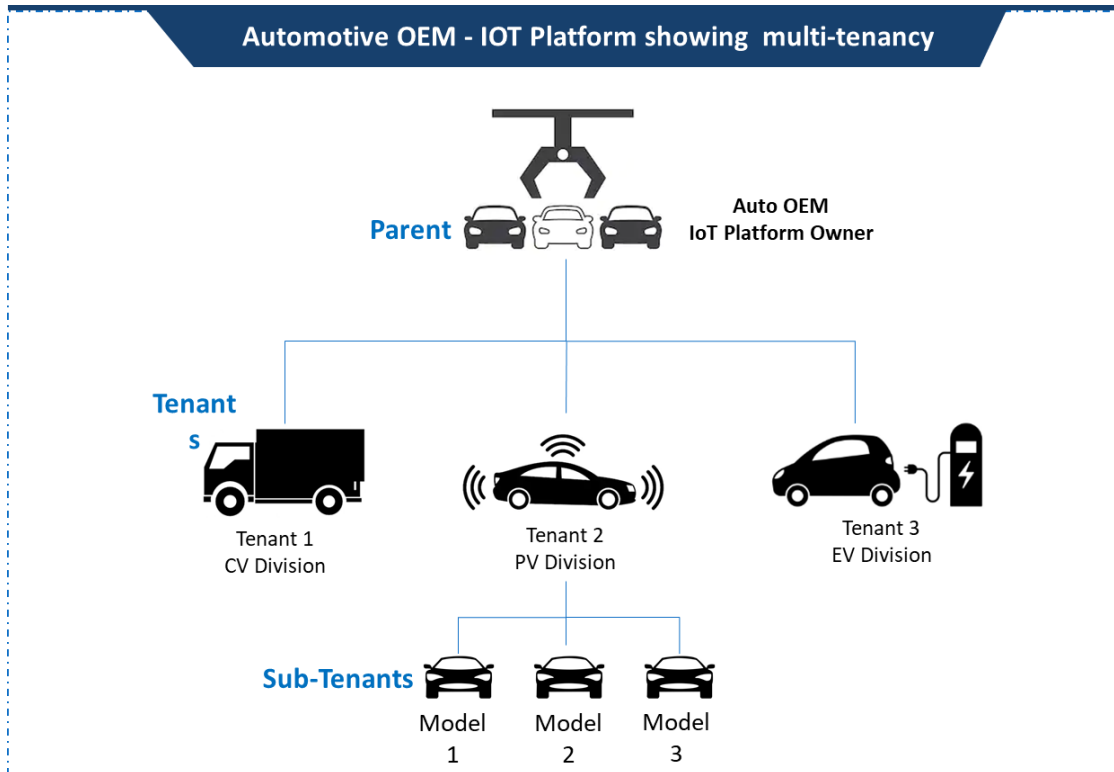
Figure 5: Automotive IoT Platform Showcasing Multi-Tenancy Architecture

In general, examples of tenants:

- IoT platform owner
- Customers of the platform owner
- Reseller of the platform owner
- Customer of reseller of the platform owner

Data Governance

In a multi-tenant setup, along with the software application, each tenant will also share the common secure database. The design has to provide complete isolation of data that is not to be shared among tenants. The following figure shows how data is to be governed in the platform while ensuring security in all aspects.
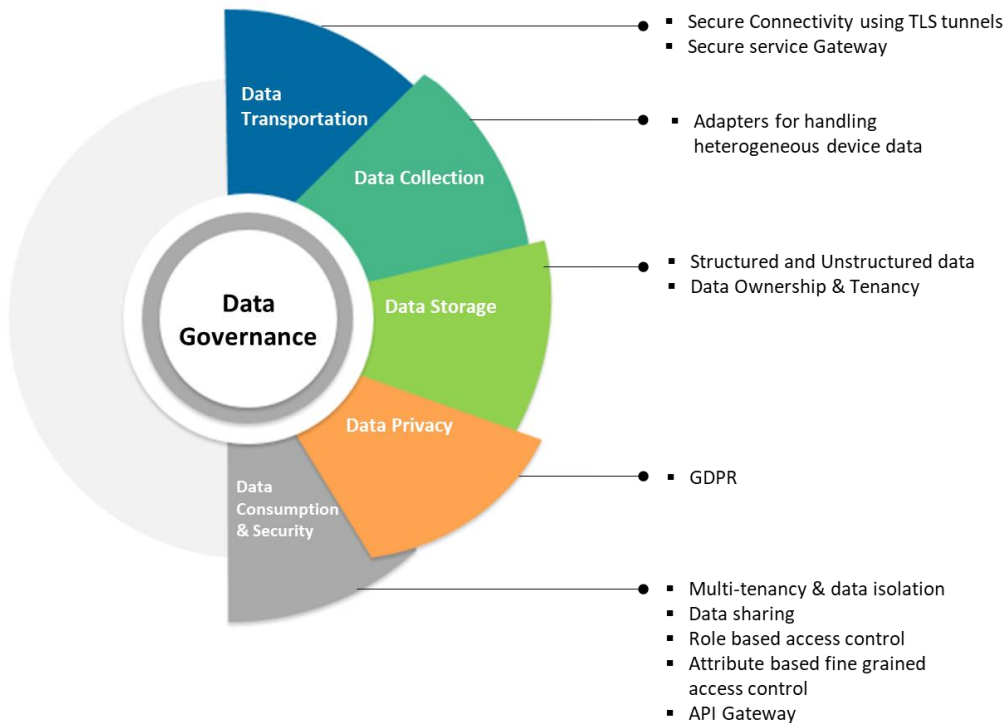

Figure 6: Data Governance in a multi-tenant setup

Open Source Enterprise Integration

The complete value of data collected from sensors is realized when the IoT platform is fully integrated with other enterprise systems such as SAP, Salesforce, etc. Open source solutions such as WSO2 offer readily available connectors that make integrating enterprise systems as well as third-party applications, a breeze and eliminating complex integration effort.

Scalability

One of the most important features of any cloud platform is to be able to handle large volumes of data and scale dynamically. The platform's deployment architecture should be such that independent microservices can scale dynamically based on need.

Security

Security & Identity management solutions should meet industry standards. This enables easy integration of the platform with standard enterprise identity management systems and security solutions and also makes security audits easy. Compliance with international norms such as GDPR, CCPA is pushing enterprises to focus on privacy, security and strong user authentication.

CONCLUSION

The Internet of Things has opened up vast opportunities for traditional businesses by providing them the power of digital technologies. Benefits such as improved process flow, predictive maintenance, data-driven decision-making have helped businesses increase their output, cut costs and foray into newer areas. Now, a service provider can monetize IoT services right from simple B2C use cases such as home automation to massive B2B digital services such as connected Industry 4.0 and Smart City use cases.

Determining the right IoT use cases and arriving at a plan to implement a service model may be a relatively easy target to achieve. Deploying IoT at scale, making the right technology choices, keeping the costs under control and managing the service with a large consumer base is an entirely different challenge.

IoT has multiple layers and each layer comes with its own technology and skill-set requirements. Making the right decisions while setting up the entire IoT as a service ecosystem is crucial and this is where one needs an experienced partner who can bring in years of experience in the field, technical expertise and thought leadership to drive towards success in the digital journey.

ABOUT TATA ELXSI

Tata Elxsi is a leading provider of design and technology services for product engineering and solutions across industries including Broadcast, Communications, Healthcare, Transportation along with emerging technologies such as IoT (Internet of Things), Big Data Analytics, Cloud, Mobility, Virtual Reality, and Artificial Intelligence.

Tata Elxsi's deep digital experience in the IoT space can empower organizations to create value by arriving at the right applications, business features, and product architecture. TATA Elxsi specializes in E2E IoT solutions - from Applications to Platforms to Gateway to the Devices.

Tata Elxsi's Cloud-based IoT platform – TETHER offers fine-grained access control to IoT devices and device data based on roles, domain, and tenancy. The platform is built on microservices architecture, and its components are deployed in a clustered environment that can resiliently be scaled based on the requirements.

How is Tata Elxsi helping enterprises accelerate their IoT as a service offering?

Tata Elxsi is engaged in turnkey deliveries of Smart Home, Smart Office, Automotive & Industry 4.0 use cases (Micro-services based self-orchestrating solutions).

Supported a leading automotive OEM to realize an array of use cases such as connected cars, vehicle diagnostics, driver behavior monitoring, fleet management, electric vehicle eco-system, etc. with a single instance of the platform over cloud taking advantage of its inherent multi-tenancy and scalability features.

Tata Elxsi's IoT offerings focus on providing our customers a powerful generic *cloud-based IoT platform – TETHER* along with rich experience of IoT solution rollout across various industry verticals.

TETHER is a micro-services based platform that is built on industry-leading open-source technology that makes it a comprehensive, robust and ready to handle devices at a large scale.

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