

PREAMBLE

Enterprises, economies and the society are getting connected in today's world at a much faster pace. From Connected Cars, to Connected Consumers, to Connected Things, the world is transforming. The Corner stone to all these is the IOT Platform.

This white paper reviews the current landscape and provides an insight towards from Third Eye perspective.

SOUND BYTES

- The IOT Platform market will attain a size of \$1.1 Billion by 2020
- There will be 24 Billion devices installed by 2020
- By 2025, \$13 Trillion of ROI will be generated with an estimated investment of \$6 Trillion
- By 2018, 60% of the global 1000 companies will integrate IT and Operations with these technologies to fully realize the value of the IOT investments

SCOPE OF THIS DOCUMENT

- Rationale behind the IOT business landscape
- Third Eye's view on THE IOT Platform and its salient components
- Sample Use case

1 Rationale of IOT

The mere existence of the singular World Wide Web has thus far enabled connectivity of networks. The logical next step is to extend that connectivity towards the things being used daily. The rationale behind this is to enable ease of automation and ability to make decisions quickly.

1.1 Impact

\$ 6 Trillion will be invested in IOT Solutions by 2020

While the common topic hovers around the number of devices being connected, the impact is equally high when it comes to IOT solutions. IDC forecasts that between Application Development, Device Hardware, System Integration, Storage, Security and connectivity, the investment will be \$6 Trillion by the year 2020.

Every THING will be connected, says the aspiration. Ability to take smart decisions automatically, is the main driving force behind the IOT phenomenon.

IOT is not just for the home or individual. IDC predicts that Businesses by themselves will have around 11 Billion devices by 2020. This forecast also mandates the necessity of “Monetization of Things”. From smart shelves in the retail fronts, to smart parking, the need for generating newer

business models to create ROI from the IOT Ecosystem is of top priority

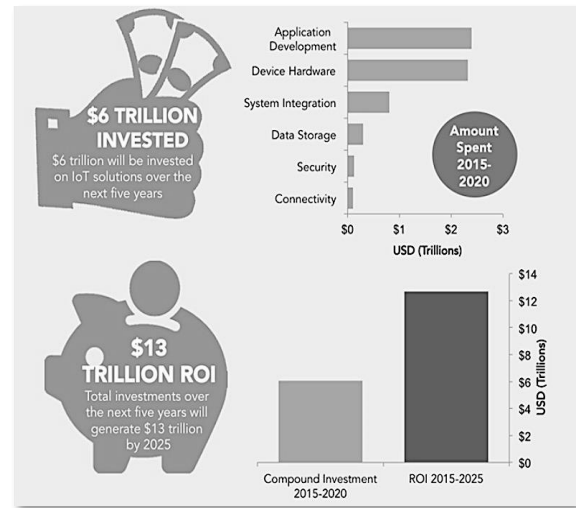


Figure 1: Source IDC, 2016

McKinsey estimates that IOT business will be around 11% of the world economy in the next 10-15 years.

IOT will change our lives; It will be bigger than the Internet we know today!

Analysts, Enterprise & thought leaders are constantly following the journey and explosion of IOT. Gartner, in 2014 and 2015 have predicted IOT in its hype curve. Similarly, Forrester has defined the business value curve of IOT in 2016.

On the flip side, IOT is creating an opportunity for technology incubators to come to the market. As per Gartner, by 2018, 50% of the IOT solutions will be provided by startups which are less than 3 years old.

1.2 Is the Timing right?

There has been the need for IOT even in the past; however, what makes it happen today is the availability of the ecosystem.

- Accessibility: Cost of data and devices has lowered by 90% since 2005. At the same time, the bandwidth has also increased by almost 100 times.
- Devices: Manufacturing costs have gone down significantly, while the time to market has shrunk as well. Thus, devices are rolling out faster and cheaper.
- Engineering Excellence: Access to tools and newer technologies at an affordable price.

1.3 Challenges

While there are opportunities, there are challenges on the flip side. IOT is an ecosystem which breeds some of these issues

- The technologies and the lack of standards further complicate the situation. While there are platforms which can manage these devices, yet the scope is limited to only devices; neither to the network they are connected, nor to their IT.
- “Monetization of IOT” requires the presence of a platform which can enable these businesses to roll out new services in real time, while managing the IOT, IT and Network.
- Platform that helps increase efficiency and speed problem

resolution by consolidating IOT, network and IT operations in a single management solution.

The construction of the current Internet was and is a complex challenge. IOT will introduce an added challenge

- The paramount importance of security has been haunting everyone every day. In IOT, it will be not just securing end devices, but also an end-end security involving existing IT
- The complex mesh of Network, IT and IOT will need Maintenance and upgrades as it grows.

The only way to meet the needs of today and tomorrow is not by predicting the future but by deploying a network of systems flexible enough to evolve and adapt

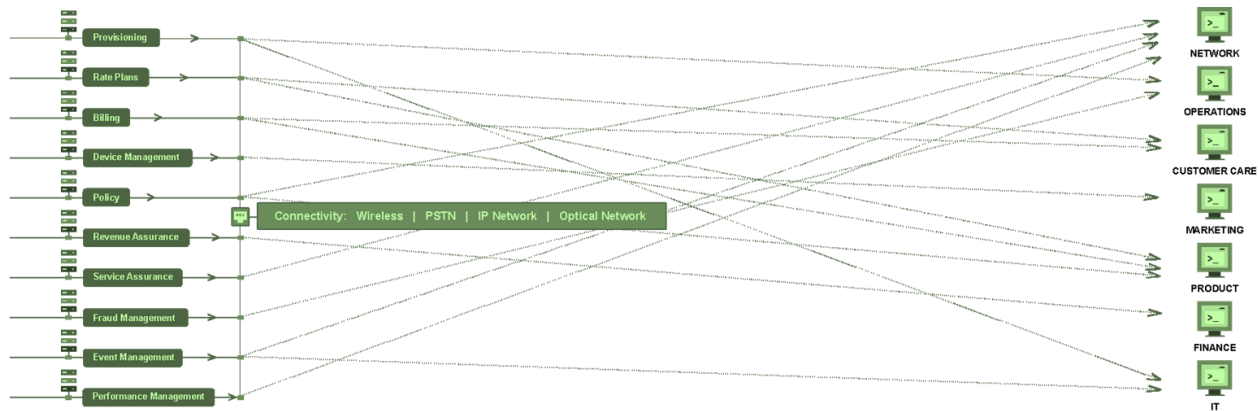


Figure 2: Complexity of IOT

2 The IOT Platform

In a simple language, IOT Platform is a collection of components which will enable application deployment by not only by connecting **devices**, but also by managing them

There will be some pruning of competing IOT networking options but no dominant platforms & standards
- Forbes

The term devices, is loosely used and is often interpreted as IOT devices only. However, the reality is IOT devices do not and will not exist in silos, they will be a part of an existing Network and IT infrastructure. This nuance will mandate the need of a platform which manages everything in that ecosystem.

The folks at IOT Analytics have done an extensive research and have segregated

the IOT platforms into 3 levels of maturity.

Roughly 75% of today's IOT platform focus solely on connectivity - IOT Analytics

Level 1: The Connectivity Platform – The simplest IOT Platforms act as data collectors and provide a simple messaging bus.

Level 2: The Action Platform – Platforms on this level not only manage the connections, but also allow to trigger actions based on specific events. These platforms for example allow to turn on the light when the sensor indicate someone is home.

Level 3: Full Scale Platform – The most advanced platforms go beyond connectivity and action by separating different platform modules, enabling external interfaces seamlessly, and supporting a wide variety of protocols

and standards. These platforms also come with advanced database solutions

that allow for scalability to many devices and truly big data sets.

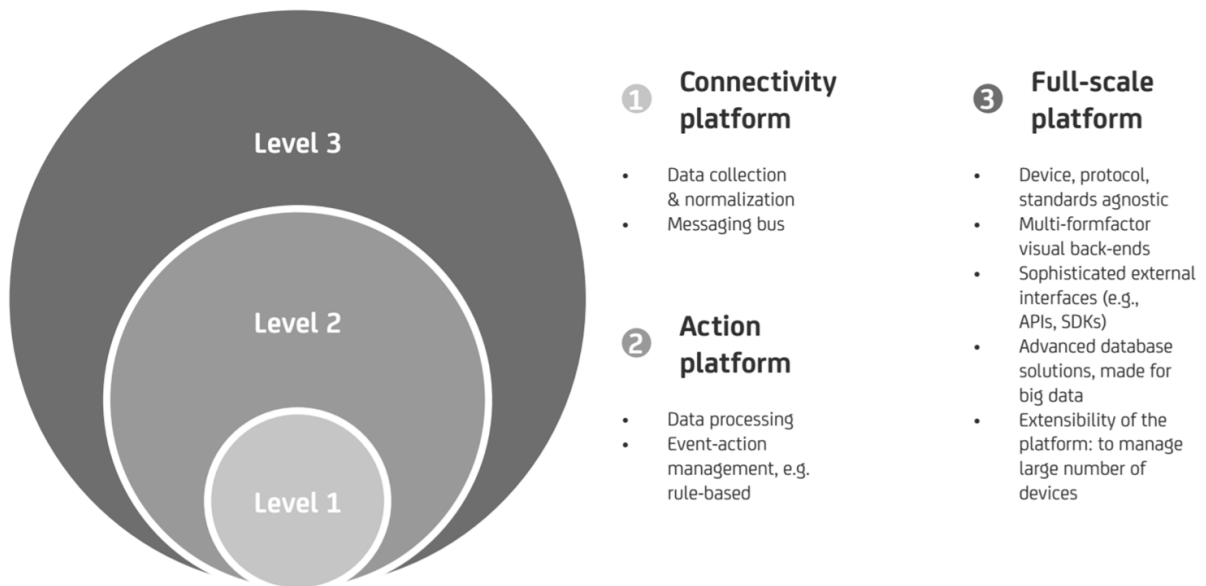


Figure 3: Source IOT Analytics

Unlike the Telecom domain, the technology stack of IOT is not standardized. Every day, there is an insertion of new devices which will be installed in a far more matured and standardized Network

and Network infrastructures along with the newly developed THINGS.

It is not just enabling Interoperability of THINGS, but also functionalities like Alarm Correlation, Event Management, Provisioning etc., for the IOT, Network and IT Infrastructure within a singular platform.

IOT maturity today can be compared to the social media evolution of early 2000, when MySpace had the largest number of users

"How do I know whether the alarm on the IOT device is due to the ill configuration of the router?"

Thus, the pressure comes down to defining that platform which can act as a cornerstone to co-host the mature IT

2.1 ThirdEye Platform

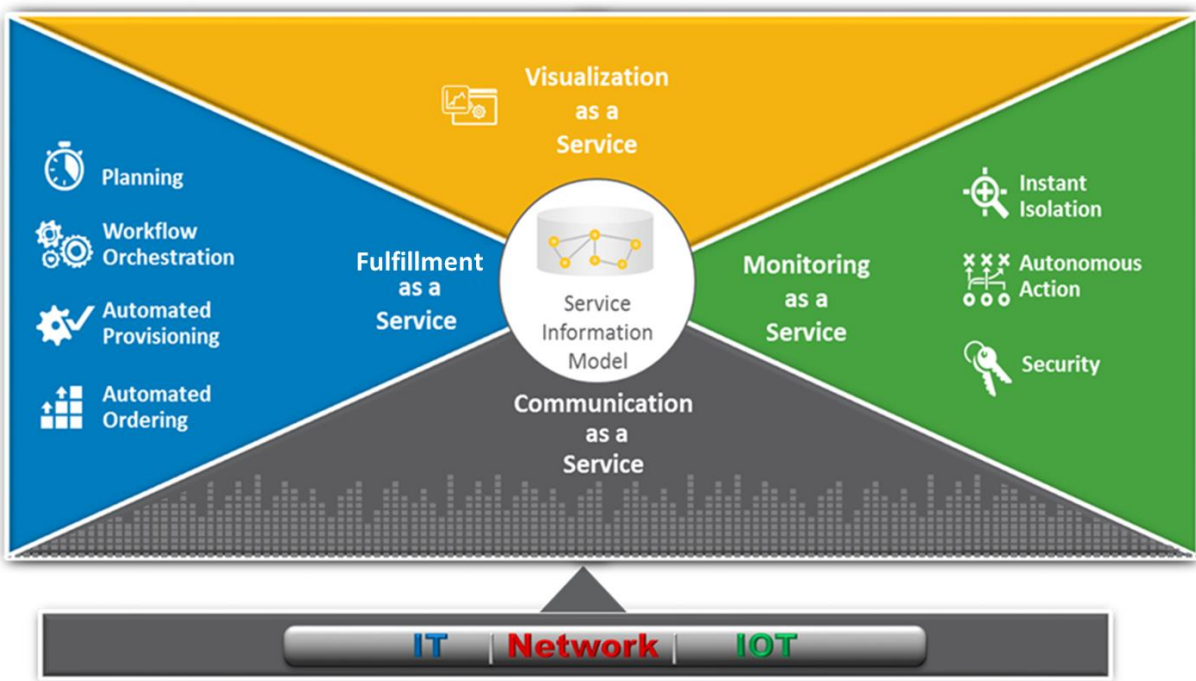


Figure 4: ThirdEye IOT Platform

McKinsey estimates that “40 percent of the total value that can be unlocked with the Internet of Things requires different IOT systems to work together”

The salient components of the ThirdEye platform

2.1.1 Communication-as-a-Service (CaaS)

The connectivity layer which “listens” to THINGS, Network and IT Infrastructure.

CaaS technology is designed to bridge the components in any type of network architecture and provide comprehensive functionality that lets systems easily communicate with each other. These may be THINGS, software applications or network elements, installed legacy IT or Cloud-based services. In the process

of bridging these systems, raw data is turned into usable information the destinations of which can be any number of THINGS, network elements and/or systems.

In simplistic form:

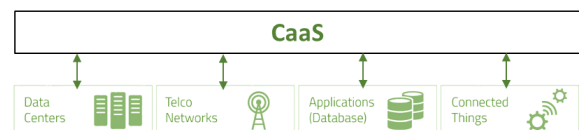


Figure 5: ThirdEye CaaS

CaaS comes out with libraries not only to communicate and manage THINGS, but also the Telecom and IT Network elements/devices. Integration with external systems for data exchange is achieved through plug-ins, which implement the protocols to be used when communicating with other systems. A large number of protocols are

supported off-the-shelf, both for interfacing as well as for secure and consistent operation.

2.1.2 Monitoring-as-a-Service (MaaS)

ThirdEye's view on monitoring is not restricted to only the IOT devices, but expanding it to smart monitoring. For Businesses to generate ROI, they must ensure the continuous uptime of IOT, business, IT and network services. **MaaS** enables management of up to hundreds of thousands of IOT Devices, physical or logical network elements (servers, routers, switches, cards, ports, etc.) in a single instance.

Monitoring should help with accelerated restoration of service outages and not merely IOT devices

A simple way to analyze the situation is via the example of Alarm Correlation. The IOT devices will be a part of the existing Network Infrastructure. A failure in the Network device can cause an event or an alarm in the connected IOT device. Not understanding this Root Cause will deviate the troubleshooting in an incorrect direction resulting in higher Outage time and loss of revenue.

MaaS's topology-based event correlation capabilities will focus time and attention on events known to cause problems and their associated symptom events, which can then be filtered into a separate view.

During a typical service outage, users can leverage their improved visibility and understanding of the network to help considerably lower MTTR (Mean Time to Resolve).

In essence, **MaaS** is designed to provide:

- Monitor IOT devices, virtualized servers, network devices and protocols, Internet protocols, and security and storage devices.
- Provide strong event correlation and analysis functionality.
- Enable continuous monitoring of defined compliance policies through tight coupling between configuration and compliance.
- Combines scalability with a flexible architecture to help scale from small to large environments, with more than 100 million events per day across multiple networks, IT/IOT silos and geographies.
- Automation of previously time-consuming, multi-step tasks of troubleshooting multiple devices simultaneously, avoid the need to remember the vendor specific commands, and reduce the time to problem resolution.

2.1.3 Fulfillment-as-a-Service (FaaS)

In IOT environment, businesses will need to define, manage, and deliver newer business models & variations to the market in the most effective way to differentiate themselves, by using their IOT ecosystem.

In most basic terms, **FaaS** will involve a series of activities responsible for

assembling and making services available to subscribers. These activities delineate an operational infrastructure whose efficiency relies upon its ability to allow a business to match the supply of services with demand in an economical way and with consistently high levels of quality and reliability.

How to ensure that all the assets in IOT, IT and Network are provisioned efficiently?

While newer business models will be defined, it is imperative that the IOT ecosystem is robust enough for faster Time to Market.

FaaS will enable:

- Provisioning of IOT, IT and Network assets as required for a dynamic use case/offering.
- Workflow orchestration
- Offering & Customer validation within predefined business rules

Besides integrating with the Network and IOT assets, **FaaS** will integrate with specific business services like CRM software, Point of Sale software, business inventory software etc.

2.1.4 Visualization-as-a-Service (VaaS)

VaaS provides a single actionable view of the IOT, IT and Network assets.

Businesses will need clear visibility of the entire network topology to help

identify and resolve the root-cause of networking issues.



Figure 6: ThirdEye VaaS

VaaS is simply not a reflection of the assets, but a contextual view of the end-end system. It also is a portal for the business users to define and enter new product/service offerings for their customers.

VaaS provides:

- Ability to eliminate dozens of windows and applications to simplify and speed orchestration with rich, intuitive, and comprehensive visualization.
- Glance of the contextual network across geographies, path views, as well as details of IOT, Network inventories, business assets and ordering.
- Ability to visualize data services and then drill down to a specific location, IOT device, Network device/circuit, and vendor to isolate and sectionalize faults in minutes.

2.1.5 Service Information Model (SIM)

The **SIM** is the heart of the ThirdEye Platform which hosts the functions within the core components of the platform.

At one hand, it exposes the platform capabilities to the **VaaS** module to absorb new products/offerings, while at the other hand it helps the **FaaS** to effectively perform service orchestration, provisioning, and automated ordering functions.

This **MaaS** helps this specific Information Model to get continuously updated by auditing and reconciling the plethora of IOT devices, Network Elements, IT systems, Gateways, and any other data sources within the IOT Ecosystem.

IOT PLATFORMS

The necessity of IOT platforms is ever growing. 24 Billion IOT devices will be connected to the ever growing existing Infrastructure of the enterprises, government and consumers. For these to be enabled to drive newer business models, the platform infrastructure must be put in place.

ThirdEye provides the comprehensive platform which is modular in nature to address the needs of every enterprise. While all the salient modules enable the user to realize end-end business models, individual modules can also be deployed in a stand-alone mode for selective business users based on their existing infrastructure and future roadmaps.

The excitement and the benefits of IOT are real, however the challenges in putting an efficient IOT Ecosystem is quite at large. ThirdEye Platform combines the expertise of traditional IT & Network with the upcoming IOT devices to ease the deployment and realization of business needs. The platform provides an intuitive UI for the IT departments of enterprises and governments. This minimizes complex training needs, Time to Market and deployment costs.

3 ThirdEye Platform in action

Sample Use Case

A pharmacy Retail business is aspiring for “Connected Consumers” to drive new revenue models & enhance their CSAT.

In this use case, the business has created an IOT Ecosystem with IOT devices connected to its own internal IT and infrastructure managed by the ThirdEye Platform.

Objective for the Retail business is to reward its customers for healthy living.

The following salient actions via the platform enables the realization of the use case:

- The business user uses the **VaaS** to define the complete business case which includes
 - Types of Data to be collected from devices
 - Rules around those data which mandate any automatic action(s) within the platform
 - The reward(s) which must be generated upon certain action(s) from the customer
- The **VaaS** internally creates an information model within the **SIM**
- Based on that information model, the **MaaS** starts monitoring the relevant IOT device (wearable device of the customer) via the **CaaS**
- The **MaaS** registers that data from the wearable device indicates “strong” physical activity by the customer and generates TCA (Threshold Crossing Alert) and sends that to the **FaaS**
- Assuming that the geo location is enabled on the customer, the **FaaS** (via the **CaaS**) interacts with the nearest retail location’s local inventory to check availability of protein milk
- Upon receipt of the confirmation of inventory, **FaaS** interacts with the existing IT of the business to send a push coupon to the customer to award a specific discount on the protein milk for the next 60 minutes
- The coupon is generated and sent to the customer via the **CaaS**. A hold on the protein milk is generated by **FaaS** and sent to the local inventory system of the store
- At the same time, **FaaS** provisions the store’s beaconing system and instructs the **MaaS** to notify the customer’s arrival in the store
- The **MaaS** registers that data from the wearable device indicates “arrival” of the customer and generates TCA and sends that to the **FaaS**
- The **FaaS** send a notification to the checkout register of the store
- Customer arrives, completes sale and is congratulated for maintaining a healthy life by the checkout personnel

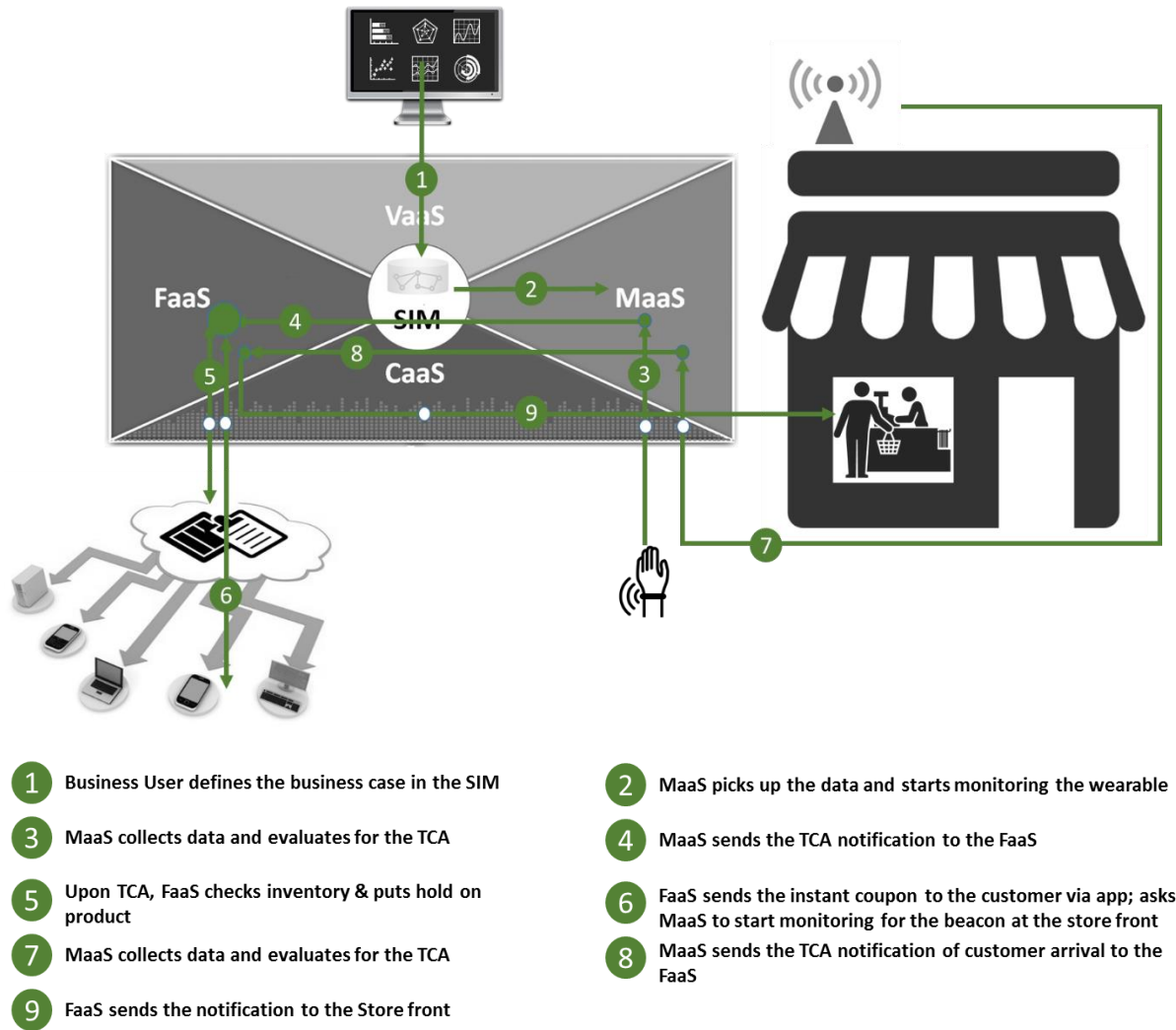


Figure 7: ThirdEye Platform Sample Case Study – Rewarding a Customer for maintaining healthy Life

Notes:

- The IOT platform and the storefront systems are shown outside of the IT network for simplifying the diagram
- Continuous Actions like monitoring the IOT devices, Network devices and applications for health checks are not shown here
- There will be more flows regarding Events and associated correlations, Fault Management (like masking of alarms), etc. which will be executed by the platform in parallel to monitor the overall health and perform triage as necessary

3.1 Use Case Adaptability

The Retail front example used above has a specific need and a business case. These situations will evolve from time to time and from one domain to other. The

ThirdEye Platform with its modularity also provides an exhaustive integration and customization option to cater for various types of industries. This is of extreme importance as it enables the businesses to customize the platform while minimizing their investments to replace their existing IT and Network, to accommodate IOT. They can keep their focus only on the use case development while the ThirdEye platform can keep the technology seamless.

Modularity of the platform plays an important role in the customers' "Buy versus Build" debates. Often there will be scenarios where businesses would have made "some" investments towards their IOT journey and may not want to procure the complete platform. The availability of modules as standalone components will help and accelerating their availability.

Security is the cause of concern for everyone in today's environment. While there are many solutions which enable businesses to secure the IOT devices only, yet it is imperative to provide a comprehensive security umbrella. For a business with multiple users and types of users in multiple regions, it is important to control the rights that each user has to view and modify the ecosystem along with the underlying information. ThirdEye Platform provides such end-end security for the IOT, Network and IT assets.

In summary, the platform attributes:

Security

End-End Encryption.

Multi-Level Authentication.

Flexibility

Plug-n-Play integration.

Open APIs, Libraries.

Modularized Platform.

Integrability & Ease

Integrates (prebuilt support) with IOT and Network devices.

Easily integrates with IT systems from IBM, Oracle & hp.

Manageability

User friendly, multi form factor

VaaS.

Can manage and be managed within existing IT and Networks.

Support

Detailed manuals, solution papers around the platform. Experienced Technical support team.

Dedicated solutions team to customize specific solutions and use cases.

Dedicated integration team which understands IOT, Network and IT to fast track design & deployment the complete IOT Ecosystem.

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About



ThirdEye is the solutions and thought leader in the arena of Network and Internet of Things (IOT). The Company provides technology, solutions and consulting with its products, processes and people.

The company is headquartered in Dallas, TX and has been delivering solutions to Fortune 500 companies globally over the last 2 years.

For more information, please visit <http://thirdeyeinc.com/>