



# INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 5, Issue 2)

Available online at: [www.ijariit.com](http://www.ijariit.com)

## A comparative analysis of IoT features between AWS and Azure

Prashant Dutta

[prashantdutta786@gmail.com](mailto:prashantdutta786@gmail.com)

Madhya Pradesh Poorv Kshetra Vidyut Vitaran  
Company Ltd., Jabalpur, Madhya Pradesh

Pranay Dutta

[pranaydutta89@gmail.com](mailto:pranaydutta89@gmail.com)

Xoriant, Pune, Maharashtra

### ABSTRACT

*The technological advancements in the area of “Internet of Things” (IoT) have taken a big leap in the last few years. IoT has changed our surrounding in many ways, some of which is noticeable and some are unnoticeable. These days Organizations are investing huge funds in the field of IoT. Internet of Things (IoT) is basically the identification of objects in the LAN or WAN by providing the objects with a unique IP address. Objects, pets or humans are equipped with embedded sensors, which helps them to routinely transfer data over the LAN/WAN without any human intervention. IoT is a swiftly growing technology which is making customers life more prolific and enjoyable. In this paper, we will try to compare the features of services offered by AWS and Azure with respect to the IoT Platform. Both Azure and AWS are market leaders in cloud-based IoT and offers numerous services for users to work on the IoT platform.*

**Keywords**— *Internet of Things (IoT), Azure, Amazon Web Service (AWS), MQTT (Message Queuing Telemetry Transport)*

### 1. INTRODUCTION

The Internet of Things(IoT) denotes the kind of network which connects to electronic devices, humans, automobiles and other equipment's implanted with necessary software's and sensors and transmits data over the network. In our day-to-day routine, we are getting more dependent on IoT devices. A 'thing' in the IoT can be a human with a Blood Pressure monitor embed, a pet with a biochip transponder, a car that has built-in sensors to alert the car-driver when tire-pressure is low. IoT platforms can benefit companies to cut cost through better process-efficiency, asset-utilization and throughput. With better tracking of objects using sensors and connectivity, companies can profit from real-time-insights & analytical data, which would assist them to make better decisions. The advancement in the collation of data, processes and things on the web would enable those networks more appropriate and significant, making more avenues for individuals and industries. As per MarketsandMarkets.com, the IoT market is apprehended to grow at a CAGR of 25% during the period of 2017-2022, to reach \$640 Billion by 2022 from \$176.00 Billion. IoT is a "hotcake" these days. This has lured the two leading cloud service providers to bring their own IoT-platforms and IoT-solutions. The core purpose of this paper is to distinguish the recent solutions from the angle of features and competencies.

### 2. AWS IOT AND ITS WORKING

With the help of AWS IoT, the programs in the AWS Cloud can communicate with the devices connected to the internet and eventually can remotely control them. Each device informs their status by publishing messages on M.Q.T.T (Message Queuing Telemetry Transport) topics in JSON (JavaScript Object Notation) format. Every M.Q.T.T topic has a categorized name which helps in identification of the device whose status has changed. Every time a message is published on an M.Q.T.T topic, it is sent to the message broker. It is the duty of the message-broker to send all messages published on M.Q.T.T topic to all devices subscribed/registered to that M.Q.T.T topic.

The communication between a device/equipment and AWS IoT-Platform is secured by X.509 certificates. Before commencing any communication every device needs to get its certificate verified by the AWS IoT. The end user needs to create rules and each rule has its own definitions perform actions according to the message published. IAM roles are also defined inside the rules which grant permissions to IoT. To retrieve the information about the state of any device a Shadow is used. AWS IoT package constitutes device-software, control services, and data services.

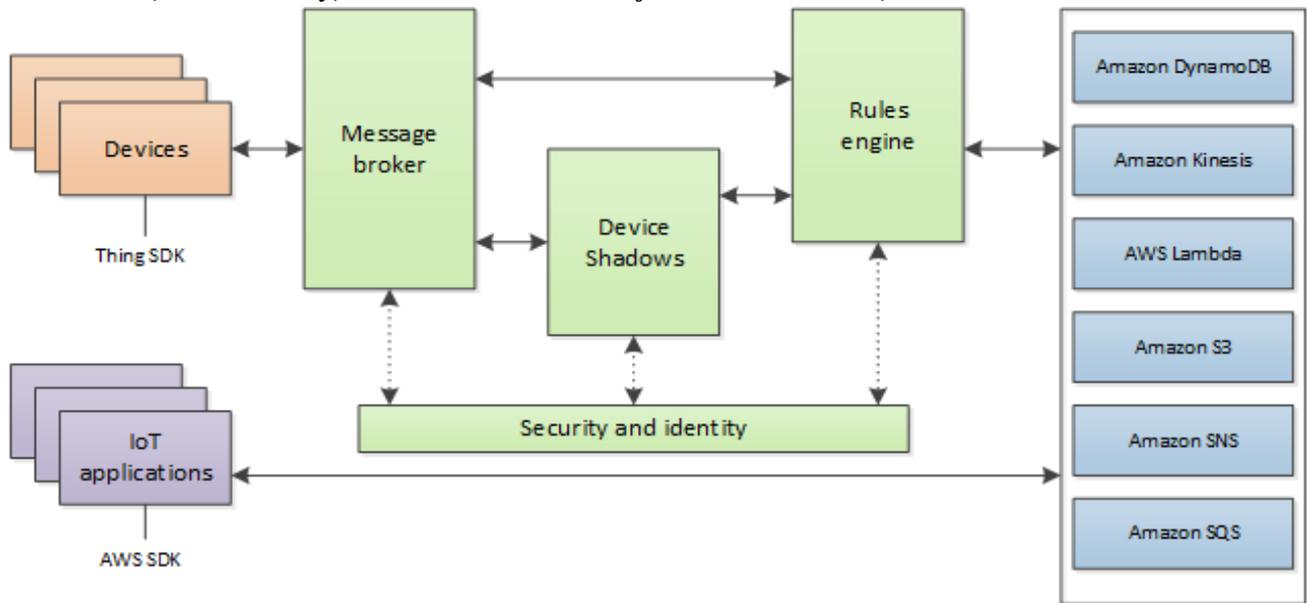


Fig. 1: AWS IoT platform architecture

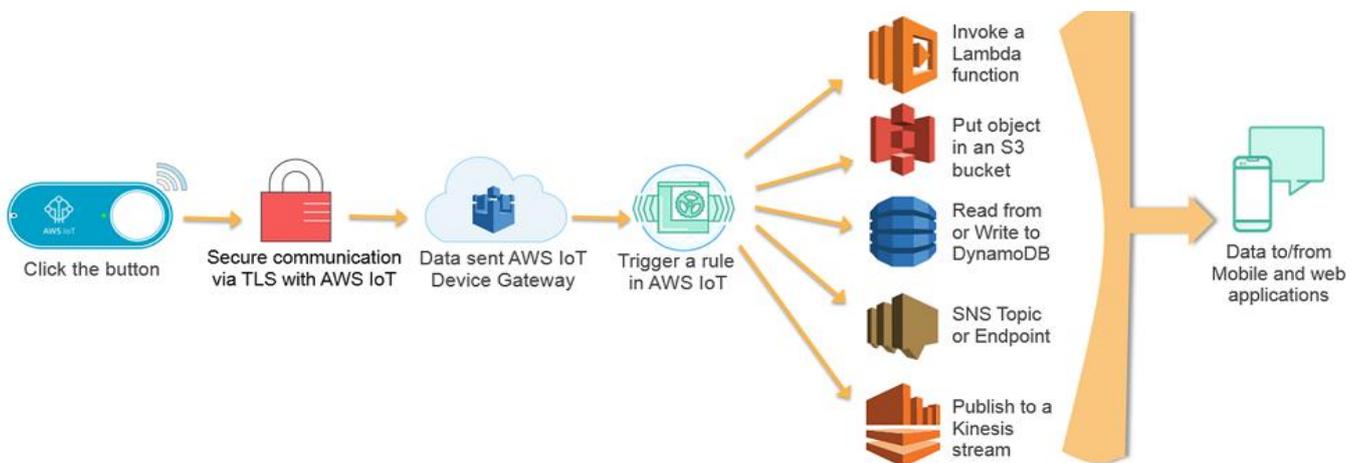


Fig. 2: AWS IoT

### 3. AZURE IOT AND ITS WORKING

Azure-IoT is a pool of various cloud-based services rendered by Microsoft that controls and manages devices connected to the Azure-IoT. The Azure-IoT constitutes devices/equipment's, cloud-based services and the communication channel. An IoT-Devices is connected to the internet through sensors and contains SDKs that support the Applications we build. Further, Azure-IoT has services which run the back end and their responsibility is to monitor the current status of the device and its activity. The communication in Azure-IoT is bidirectional. A simple example is an Air-conditioner having an IP address and sensor and connected to the Azure-IoT cloud-based services. The end user can increase and decrease the temperature of the AC with the help of his Mobile Phone. Basically, in Azure-IoT devices send data/status/events which create Insights, and these Insights create Actions.

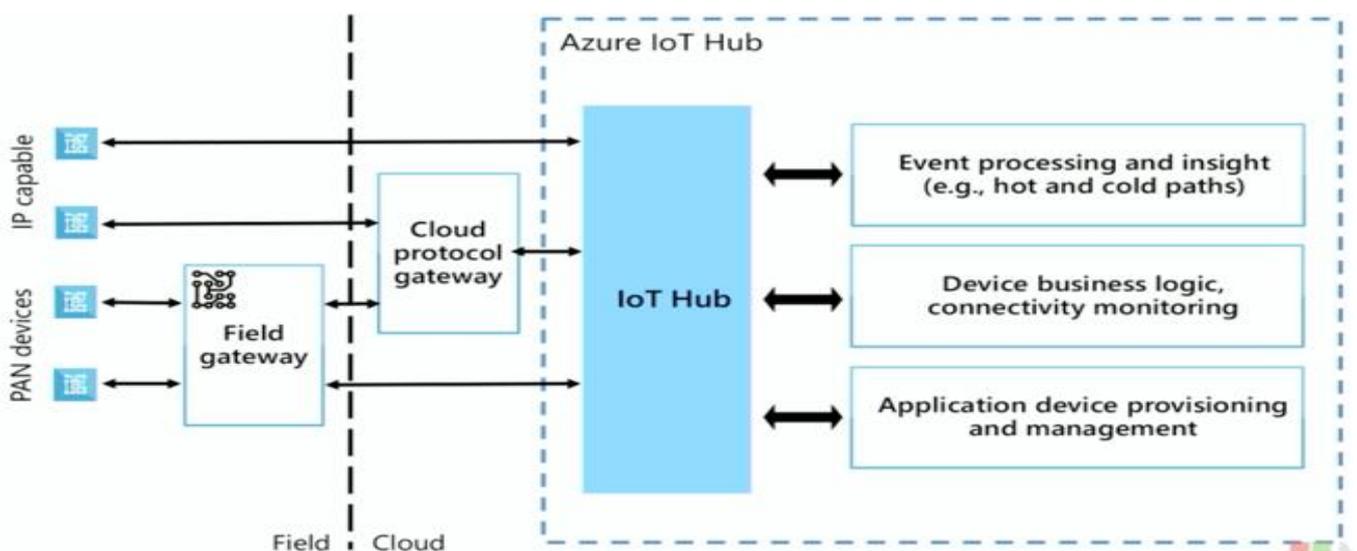
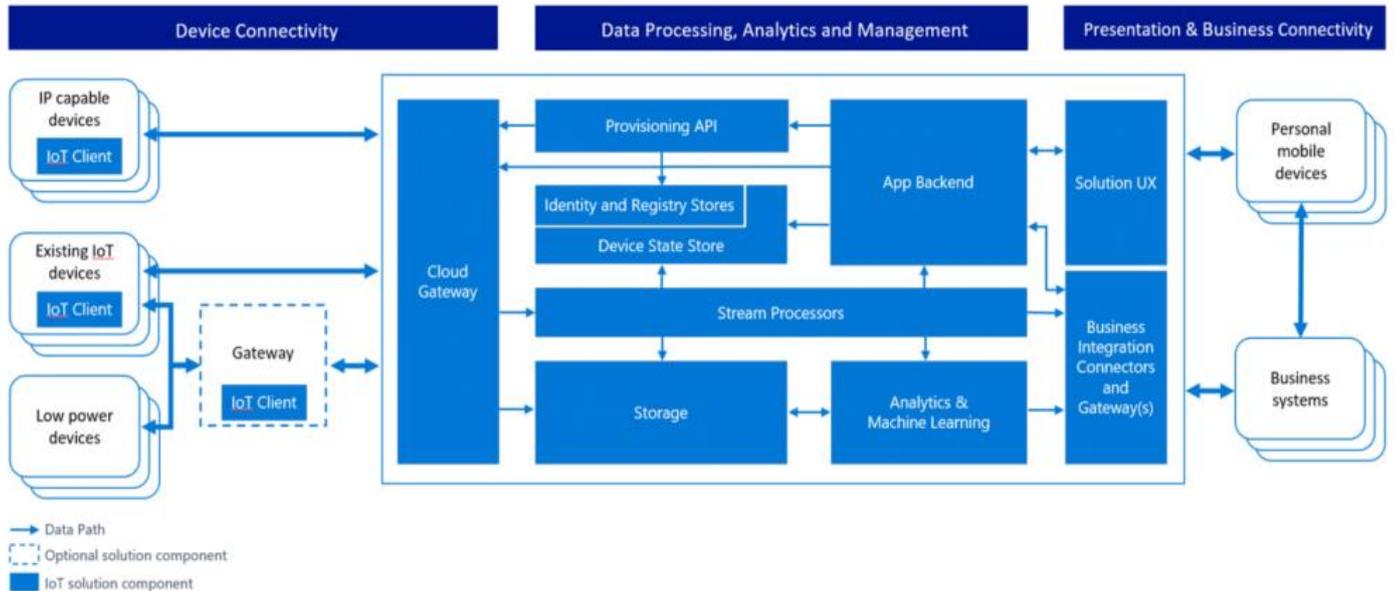


Fig. 3: Azure device provisioning service



**Fig. 4: Azure IoT reference architecture**

**4. AWS IOT SERVICES**

The various services offered by AWS IoT are as under:

- (a) **Amazon Free RTOS** is an OS (Operating-System) that can be installed inside micro-controllers which ultimately will help to manage and control small devices.
- (b) **AWS IoT Greengrass** helps to exploit the machine-learning features on a device/equipment in a protected manner.
- (c) **AWS IoT Core** enables devices to interact with other devices and cloud-based application/programs in a protected manner.
- (d) **AWS IoT Device Management** helps to remotely control/manage the devices in a secure manner.
- (e) **AWS IoT Device Defender** serves like any antivirus scanner or firewall and it ensures that all IoT space is well protected.
- (f) **AWS IoT Things Graph** helps to diagrammatically connect devices/equipment and cloud-based services to build IoT Programs.
- (g) **AWS IoT Analytics** helps to make Analytics on Mammoth data received from IoT devices.
- (h) **AWS IoT SiteWise** is used to analyze data collected from Industrial devices/equipment.
- (i) **AWS IoT Events** is used to sense and to events generated from multiple devices and programs.

**5. AZURE IOT SERVICES**

The various services offered by Azure IoT are as under:

- (a) **Azure IoT Central** is a completely managed universal IoT “software-as-a-service” solution which enables it simpler to link/monitor/manage the IoT devices.
- (b) **Azure IoT solution accelerators** contain predefined 'templates' to build completely customizable solutions for usual IoT situations.
- (c) **Azure IoT Edge** helps to exploit the capabilities of cloud-intelligence by rendering the AI services to the end devices.
- (d) **Azure IoT Hub** is a PaaS (Platform as a Service) that helps to connect to a large number of devices having different SDK's and protocols.
- (e) **Azure Digital Twins** abridges IoT concepts by rendering a broad digital-model to link devices/equipment with respect to the real world.
- (f) **Azure Time Series Insights** is completely realized, ‘end-to-end’ service for IoT discernments. It helps to store & retrieve intricate queries for Time-Series data. It also helps in strong data-visualization.
- (g) **Azure Sphere** is a platform for devising a highly-safe, interconnected Micro-controller device.

**6. A BRIEF COMPARISON REPORT**

**Table 1: Comparison report**

S no.	Area	AWS IoT	Azure IoT
1	Launch Date	Oct-15	Sep-15
2	Certified Platforms	Broadcom, Marvell, Renesas, Intel, Texas Instruments, Microchip, MediaTek, Qual Comm, Seed, Beagle Board, Raspberry Pi2	Intel, Raspberry Pi2, Freescale, Texas Instruments, MinnowBoard, BeagleBoard, Seed, resin.io
3	Security	TLS (Mutual Authentication)	TLS(Only Server Authentication)
4	Authentication	X.509 Client Authentication, IAM Service, Cognito Service, SigV4	Token base(SAS) per device, X.509 device certificate
5	Communication	Command based (state), telemetry	Command based, telemetry
6	Protocols	HTTPS, MQTT,CUSTOM	HTTPS 1.1, AMQP1.0, MQTTV3.11, CUSTOM
7	SDK	C, Node.JS, Java, Python, iOS	.NET, UWP,Java, C, Node.JS, Python

## **7. CONCLUSION**

Both Azure and AWS have created their IoT solutions with their own selections of Protocols, SDK, Security feature, etc. As far as protocols are considered Azure provides almost all the protocols supported by AWS, also additionally it supports AMQP. Similarly, AWS supports almost all SDKs which Azure supports, also additionally it supports iOS. Both AWS and Azure support TLS protocol for security, however, Azure has only server authentication and AWS has mutual authentication. Azure provide IoT SaaS by Azure IoT Central and AWS provide through Marketplace sensor.live. Azure provide IoT Paas by IoT Solution Accelerators and AWS provide by AWS IoT Core.

## **8. RECOMMENDATIONS**

At present, the leading cloud-service providers for IoT are Amazon-AWS and Microsoft-Azure. AWS-IoT has more options to choose from and configurations and it tenders a lot of elasticity, control, and customization-support for various third-party-tools. On the other side, Azure shall be simpler to use if we are acquainted with Microsoft-Windows as it is an MS-Windows Cloud-Platform and it's simpler to integrate on-premises windows-servers with cloud VM-instances to make a hybrid-environment. The user has multiple options to select from a variety of IoT Platforms. But if the user wants to support and scalability then he should choose from AWS & Azure. But if the user wants self-control on his IoT solutions then he should go for Open Source Platforms.

## **9. REFERENCES**

- [1] AWS IoT Console <https://aws.amazon.com/iot>
- [2] Azure IoT Console <https://azure.microsoft.com/en-in/overview/iot/>
- [3] Azure IoT Accelerators <https://azure.microsoft.com/en-in/features/iot-accelerators/>
- [4] Azure IoT Documentation <https://docs.microsoft.com/en-us/azure/iot-fundamentals/iot-introduction>
- [5] AWS IoT Documentation <https://docs.aws.amazon.com/aws-technical-content/latest/aws-overview/internet-of-things-services.html>
- [6] AWS Greengrass <https://aws.amazon.com/greengrass/>
- [7] Sameer Shrivastava, Comparing Cloud Platforms for IoT Development <https://www.leverage.com/blogpost/cloud-comparison-for-iot-development>
- [8] Benjamin Cabé, IOT developer survey 2018 <https://blog.benjamin-cabe.com/2018/04/17/key-trends-iot-developer-survey-2018>
- [9] Jess Panni, AWS vs Azure vs Google Cloud Platform – Internet of Things <https://blogs.endjin.com/2016/08/aws-vs-azure-vs-google-cloud-platform-internet-of-things/>
- [10] Michael Lagally, Comparison of AWS, Azure and Oracle Device Models <https://www.w3.org/2018/03/wot-f2f/slides/Comparison-AWS+Azure+Oracle-Lagally.pdf>