SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107
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Department of Information Technology

Course Name – Internet of Things

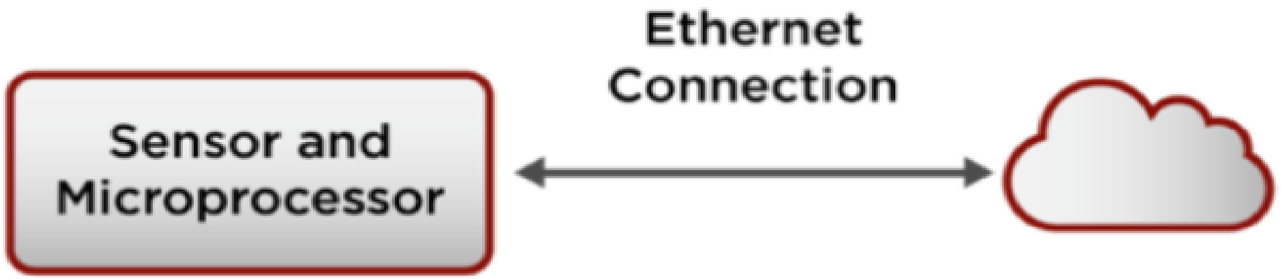
III Year / V Semester

Unit 3- INTERNET OF THINGS CHALLENGES

Cloud-to-Device Connectivity

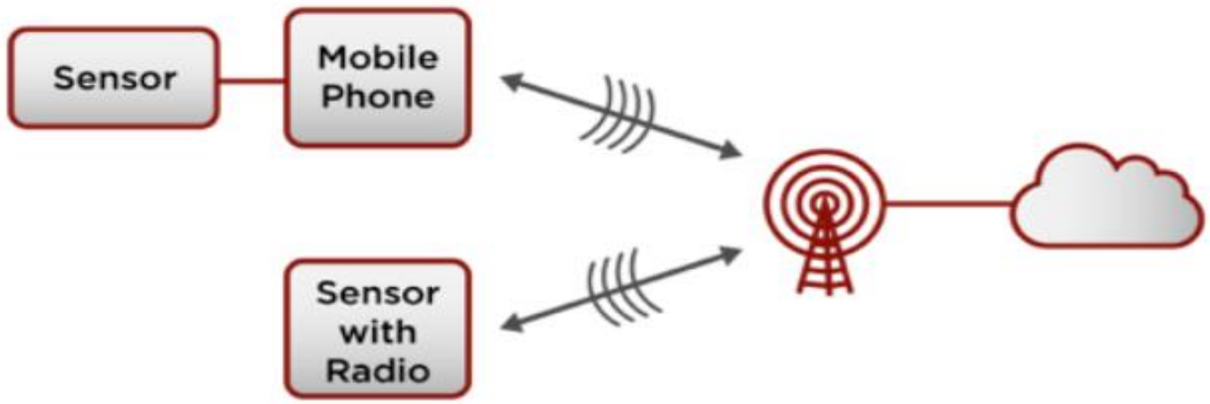
- Devices are connected to the cloud through many different methods depending on the device connectivity capabilities. These methods include **cellular, satellite, Wi-Fi, Low Power Wide Area Networks (LPWAN) (e.g. NB-IoT), and direct connection to the Internet via Ethernet**.
- In the device-to-cloud communication model, **devices connect directly to an Internet cloud service with existing Wi-Fi connections and the IP network to exchange data and control message traffic**.
- The cloud enables the user to obtain remote access to their devices, for example, via a smart phone or Web interface.
- There are several ways to connect devices(any sensor or mobile) to the cloud. The evolution of various ways of sending data from a device to cloud started from 1970’s. The evolution is still in process and we are approaching better ways of sending data from device to cloud.

Sensor To Cloud Over Ethernet

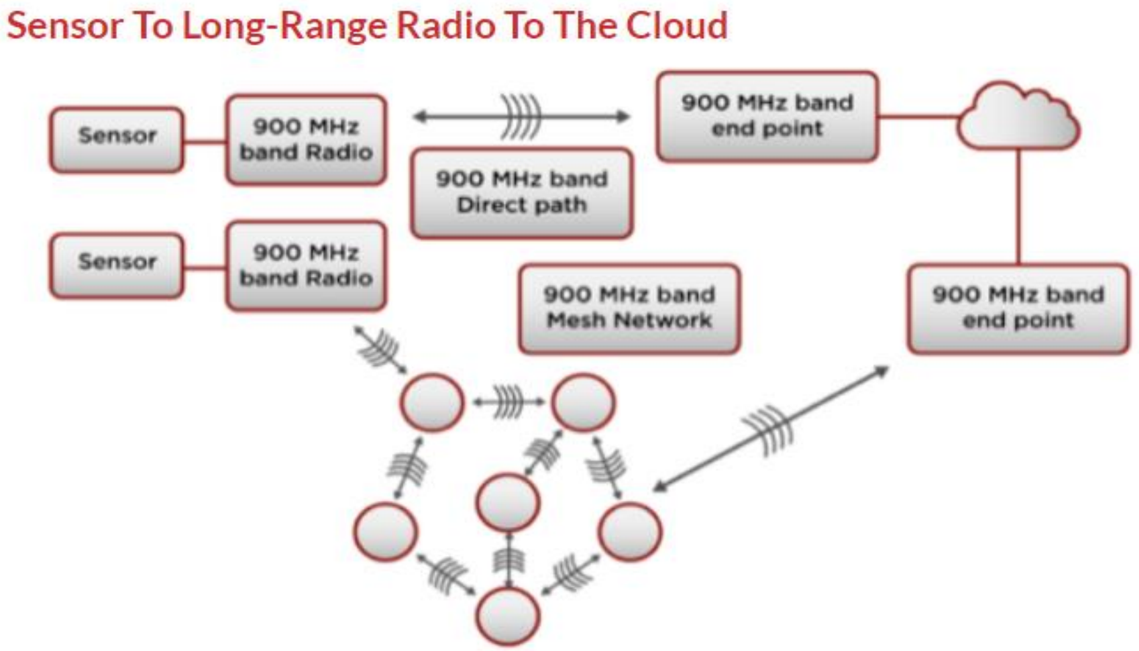


- The Sensor includes a processor which is tough enough to configure the data uploading to cloud.
- The Ethernet connection would connect to wired Internet service. The problem: Some places don’t have wired Internet.
- The processor could also have the ability to update or modify the functions of the sensor.
- There is no involvement of radio link.

Sensor To Mobile-Phone Network To Cloud

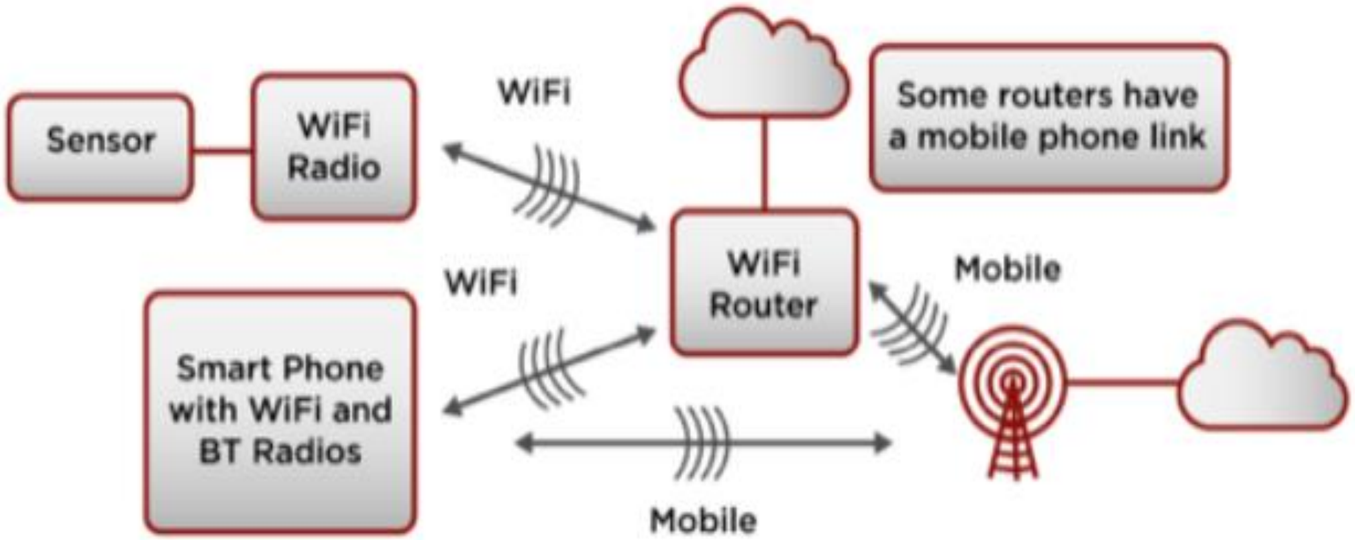


- The sensor still needs a wired connection to a mobile phone or needs an expensive custom radio in the mobile-phone band to connect to the phone tower.
- The uplink (sensor to the phone tower) radio transmitter needs a fair amount of power to reach the tower
- The user needs to pay the mobile network provider for usage.



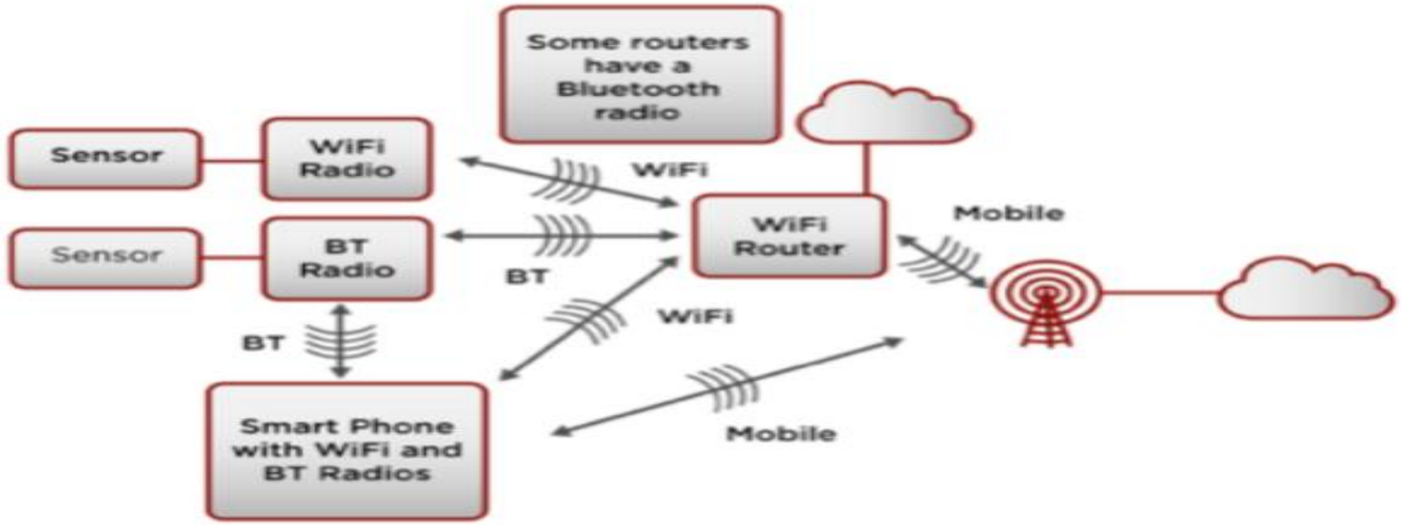
- One configuration that uses these bands is a mesh network.
- It consists of many small, low-power radios connected to each other to relay data from remote sensors at the outer edges of an area to radios at a collection point.
- Each collection point has access to the cloud.
- This allows for wide-area usage by deploying sensors connected to very low-power radios.

Sensor To Wi-Fi Router To Cloud



- Industry and infrastructure used a small number of more specialized routers. This is the most widely-used way today to connect mobile devices (laptops, tablets, smart phones) to the cloud.
- In fact, most applications in smartphones connect to the cloud primarily through a Wi-Fi router.
- Shortly after Wi-Fi-capable smartphones became available, remote sensors that could connect directly to a Wi-Fi router also began to appear.
- Small sensors with low power Wi-Fi radio are placed within the range of wifi routor. Internet connection is provided later.

Sensor To Mobile Phone To Cloud



- The sensor just needs to connect to a mobile phone instead of connecting directly to a Wi-Fi router. The main reason for this is to allow the mobile-phone user to interact directly with the sensor before sending the information up to the cloud.
- Recently, a version of Bluetooth called Bluetooth Low Energy (BLE) was introduced that draws very little power and is well-suited to simple sensors with low data rates or low on-off duty cycles.
- This has led to a rapid increase in small sensors (like Fitbit fitness trackers and others like it) that connect to mobile phones, which in turn connect to a Wi-Fi router or a mobile network.
- Another recent development is Wi-Fi routers that contain a Bluetooth radio as well as Wi-Fi. With these, BLE sensors can connect directly to the router and on to the cloud without passing through a mobile phone.

Infrastructure as a Service (IaaS)

IaaS is the delivery of technology infrastructure as an on demand scalable service. IaaS provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc.

- Usually billed based on usage
- Usually multi tenant virtualized environment
- Can be coupled with Managed Services for OS and application support

Best IaaS providers of 2019

amazon web services

Microsoft Azure

Google Cloud Platform

IBM Cloud

Platform as a Service (PaaS)

PaaS provides the runtime environment for applications, development & deployment tools, etc. PaaS provides all of the facilities required to support the complete life cycle of building and delivering web applications and services entirely from the Internet.

Typically applications must be developed with a particular platform in mind.

- Multi tenant environments
- Highly scalable multi tier architecture

Top Paas Provider 2019

AWS Lambda

Morpheus

Software as a Service (SaaS)

SaaS model allows to use software applications as a service to end users. SaaS is a software delivery methodology that provides licensed multi-tenant access to software and its functions remotely as a Web-based service.

- Usually billed based on usage
- Usually multi tenant environment
- Highly scalable architecture

Top Saas for Company

Microsoft Office 365

salesforce

Google Apps