

IoT App Development



IoT Network Vs Other Networks

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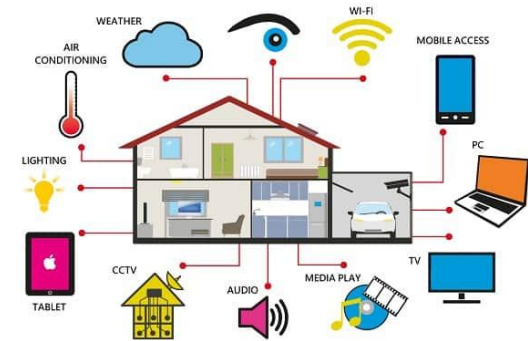
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"I have no special talent. I am only passionately curious." – **Albert Einstein**

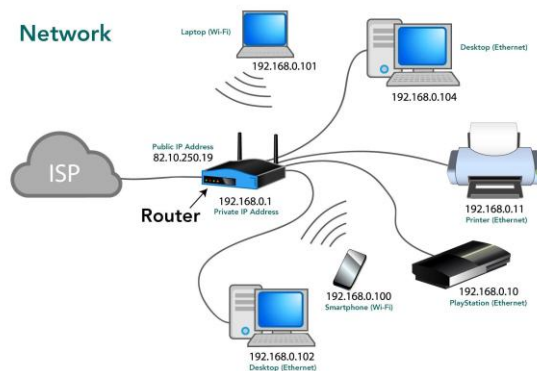
IoT vs Computer Networks

The **Internet of Things (IoT)** refers to a network of physical devices, vehicles, appliances, and other physical objects that are embedded with sensors, software, and network connectivity, allowing them to collect and share data.



IoT Network

A **computer network** is a system of interconnected computing devices—ranging from traditional devices to cloud-based environments—that communicate and share resources with one another.



Computer Network

IoT vs Computer Networks



Aspect	IoT Networks	Traditional Computer Networks
Purpose	Connect physical objects (sensors, actuators, smart devices) to collect and exchange data	Connect computers, servers, and users for communication and resource sharing
Devices Connected	Sensors, smart meters, wearable devices, smart appliances, industrial machines, etc.	PCs, laptops, servers, printers, smartphones
Processing Capability	Devices have limited memory and processing power	Devices have higher computing resources
Data Type	Small, frequent packets of sensor and control data	Large files, multimedia, emails, web traffic

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Power Consumption	Very low power; many devices run on batteries	Generally higher power consumption
Bandwidth Requirement	Low bandwidth in most applications	Medium to high bandwidth
Communication Protocols	MQTT, CoAP, Zigbee, LoRaWAN, NB-IoT, 6LoWPAN, 6TiSCH	TCP/IP, HTTP, FTP, SMTP, Ethernet, Wi-Fi

IoT vs Computer Networks

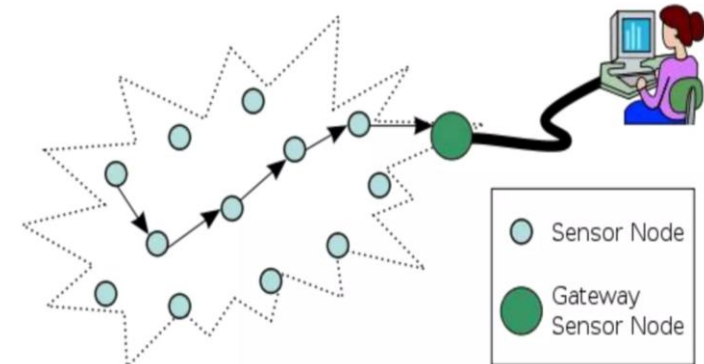


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Mobility	Often deployed in remote or dynamic environments	Usually deployed in offices, homes, and data centers
Network Scale	Can support millions of devices	Usually supports users and computing devices
Security Challenges	Lightweight encryption, physical device security, lightweight user authentication	User authentication, firewall protection, data security, intrusion detection

Wireless Sensor Network (WSN)

- Wireless Sensor Network (WSN):

- ❖ WSN refers to a group of specialized dedicated **sensors** with a communications infrastructure.
 - ❖ WSN is primarily used for **monitoring** and **recording** the physical environment conditions like temperature, sound, pollution levels, humidity, wind, and so on.
 - ❖ It is **designed to** acquire, process, transfer, and provide data/information extracted from the physical world.
 - ❖ In a WSN, there is **no direct connection** to the **Internet**. Instead, the various sensors connect to a kind of router or central node.
- **WSN**: Resource constraint sensor nodes + wireless network to connect the nodes + gather some data by sensing the environment + act as per sensed data
 - **IoT**: WSN + Internet + Cloud + Data Analytics + ...



All WSNs are not IoT systems, but many IoT systems use WSNs for data acquisition.

IoT vs WSN



Aspect	IoT	WSN
Scope	Broad concept including sensors, actuators, cloud, analytics, and Internet connectivity.	Narrow concept focused mainly on sensing and data collection.
Internet	Usually connected to the Internet.	May or may not be connected to the Internet.
Components	Sensors, actuators, gateways, cloud platforms, applications, data analytics.	Sensor nodes, sink node (base station), communication links.

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Components	Sensors, actuators, gateways, cloud platforms, applications, data analytics.	Sensor nodes, sink node (base station), communication links.
Communication	Device-to-device, device-to-cloud, cloud-to-user.	Primarily sensor-to-sink communication.
Scale	Can connect billions of devices globally.	Usually limited to a specific area or application.
Few Applications	Smart homes, smart cities, healthcare, Industry 4.0, connected vehicles.	Environmental monitoring, battlefield surveillance, habitat monitoring, agriculture sensing.

IoT vs M2M

- **Machine-to-Machine (M2M)**: It is a concept where two or more than two machines communicate with each other **without human interaction** using a wired or wireless mechanism for performing a specific task.

Basis of	IoT	M2M
Connection type	Via (IP) Network and using various communication technology.	Mainly point-to-point using cellular, wired, or proprietary network
Internet	Internet connection is required	Not dependent on the Internet
Data Sharing	Data is shared with other applications and platforms, if required	Data is usually confined to a specific system or party.
Open API	Supports Open API integrations.	There is no support for Open API's

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Open API	Supports Open API integrations.	There is no support for Open API's
Scalability	Highly scalable due to cloud based architecture	Limited scalability
Architecture	Device -> Gateway -> Cloud -> User/Application	Machine -> Machine
Application Example	Smart home, Smart city, Industry 4.0	ATM networks in Bank, Vending machines, Industrial control system

Lessons Learned



- ✓ Difference between IoT and Traditional Computer Networks
- ✓ Difference between IoT and WSN
- ✓ Difference between IoT and M2M

Thanks!

