# Internet of Things

## L3: Physical Design

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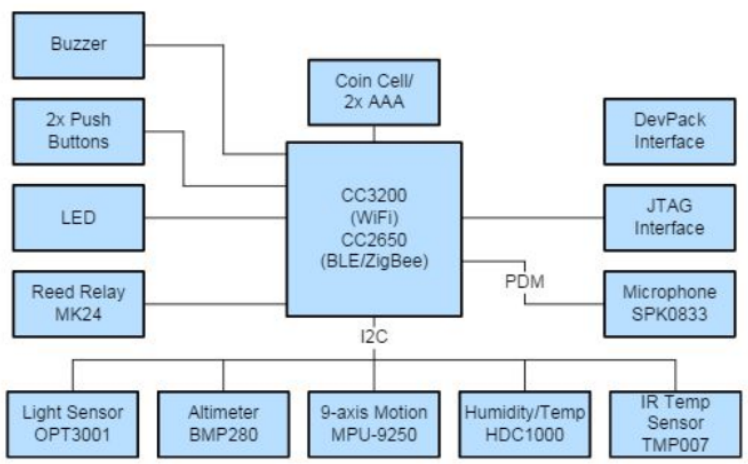
- IoT devices can also be of varied types, for instance, wearable sensors, smart watches, LED lights, automobiles and industrial machines.

# IoT End Node Example



Link layer protocols determine how the data is physically sent over the network's physical layer or medium (e.g., copper wire, coaxial cable, or a radio wave). Link layer determines how the packets are coded and signaled by the hardware device over the medium to which the host is attached (such as a coaxial cable).

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- **802.3 - Ethernet** : IEEE 802.3 is a collection of wired Ethernet standards for the link layer. These standards provide data rates from 10 Mb/s to 40 Gb/s and higher. The shared medium (i.e., broadcast medium) carries the communication for all the devices on the network, thus data sent by one device can received by all devices subject to propagation conditions and transceiver capabilities.

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- **802.11 - WiFi :** IEEE 802.11 is a collection of wireless local area network (WLAN) communication standards. These standards provide data rates from 1 Mb/s to upto 6.75 Gb/s.

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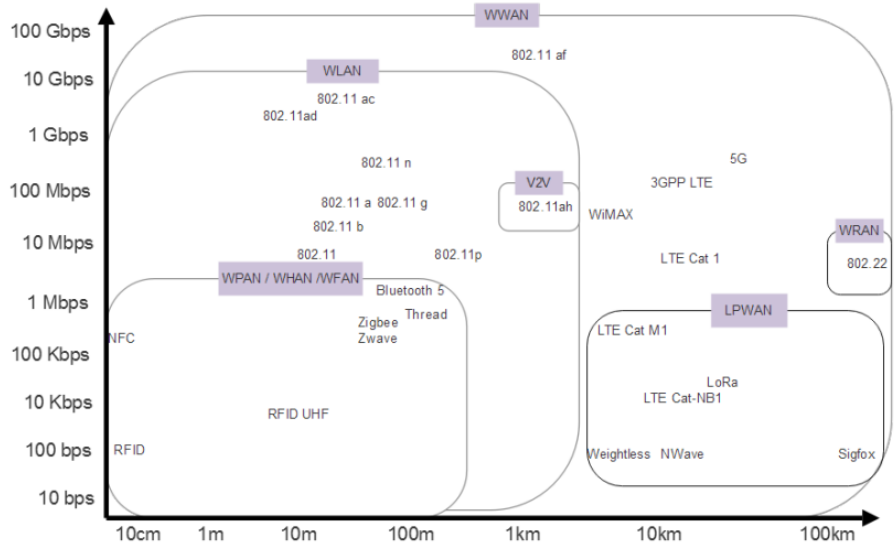
- **2G/ 3G/ 4G - Mobile Communication :** IoT devices based on these standards can communicate over cellular networks. Data rates for these standards range from 9.6 Kb/s (for 2G) to upto 100 Mb/s (for 4G)

# Communication Mode for IoT



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The network layers are responsible for sending of IP datagrams from the source network to the destination network. This layer performs the host addressing and packet routing. The datagrams contain the source and destination addresses which are used to route them from the source to destination across multiple networks.

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- **6LoOWPAN** : 6LoWPAN (IPv6 over Low power Wireless Personal Area Networks) brings IP protocol to the low-power devices which have limited processing capability. 6LoWPAN operates in the 2.4 GHz frequency range and provides data transfer rates of 250 Kb/s. 6LoWPAN works with the 802.15.4 link layer protocol and defines compression mechanisms for IPv6 datagrams over IEEE 802.15.4-based networks.