

Lesson 10

Circuit Boards and Devices Ethernet and Wi-Fi Connectivity with the Internet

Connecting Arduino USB to Internet

- Arduino board IDE supports USB. USB port connects to a mobile or computer or tablet with Internet connection using IDE USB port function
- Computer then connects to the Internet using network interface cards

Connecting Arduino to Internet using Ethernet

- Arduino IDE supports Ethernet protocol Library.
- Set of codes which enable use of functions of the library for specific purposes
- Ethernet LAN connects to the network

Ethernet shield

- Shield is the term used in Arduino hardware for the supporting circuits
- Enables wired connection of a platform to the Ethernet controller
- Through an external standard LAN socket enables connectivity to a wired or Wi-Fi modem for the Internet

Devices 6LowPAN, Bluetooth (Low energy), ZigBee Wireless or wired Technologies

Things/
Sensors/
Actuators
/.....

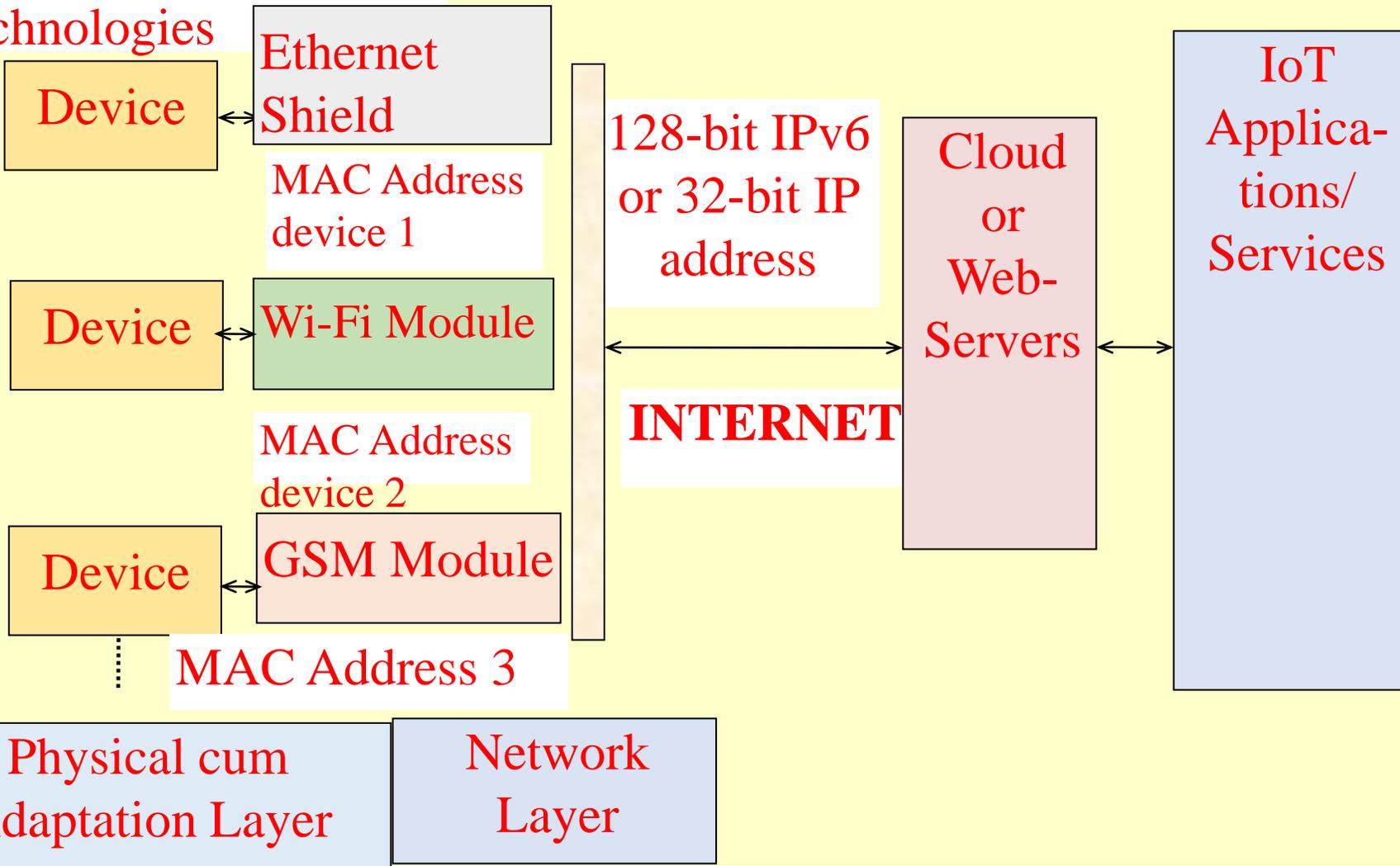


Fig. 8.4 'Things', sensors/actuators/devices/circuit boards connected to Internet and cloud or web-Servers for Applications and Services

Device communication

- Using 6LowPAN, Bluetooth (low energy), ZigBee
- wireless or other wired technologies
- Internet, 32-bit IP address or 128-bit IPv6 address.
- ARP translates an IP address to MAC
- RARP translates a MAC address to IP address.
- Use a domain name, which translates DNS to IP address

Web connectivity of server or client ends

- Use connected-device network protocol, gateway protocol or SOAP, REST, HTTP RESTful and WebSockets
- Applications and services access the cloud or web-server, using a protocol, such as HTTP, HTTPS, SOAP or web-socket

Header files in for Arduino Ethernet Library

- Example 8.5 list files which are included as preprocessor statements in C codes
- Provides the functions for Ethernet LAN

Connecting Arduino to WiFi

- Arduino IDE supports WiShield Library.
- WiShield connects to a network router without wires. However, sufficient energy for Wi-Fi communication is required from the power Supply

Connecting Arduino to WiFi

- Example 8.6 gives the header files in the WiShield Library.
- Use of WiShield needs that the program predefines (i) network type, infrastructure fixed network or ad hoc network,

Connecting Arduino to WiFi

- (ii) security type, 1 (WEP), 2 (WPA) or 3 (WPA2),
- (iii) WEP key (wired equivalent security key or 128-bit when security type = 1 (means WEP) and

Connecting Arduino to WiFi

(iv) SSID (Service Set identifier), a unique ID of 32 characters and is used for naming wireless networks. Service set means a set of networked interconnected devices which communicate using SSID of the set.

Summary

We learnt

- Things, devices and circuit boards connect to Internet and cloud or web-servers for applications and services.
- A MAC address assigns to an Ethernet shield or computer.
- A subnet mask used for resolution between IP address and MAC address

Summary

We learnt

- Gateway protocol used, SOAP, REST, HTTP RESTful and WebSockets.
- Web connectivity of client ends with the server or cloud uses the connected-device network protocol

Summary

We learnt

- Arduino Ethernet and WiShield libraries have preinstalled functions with IDE for the Internet accesses to a remote IP address, means cloud or web-server

End of Lesson 10 on
Circuit Boards and Devices Ethernet and Wi-Fi
Connectivity with the Internet