EDDY WIRELESS®

M2M WIRELESS, VIDEO & BROADCOM SOLUTIONS

TCP / IP

Isidro Martinez
Director, Latin Amèrica

Summary

- TCP/IP introduction
- IP addressing
- LAN, PSTN
- Services:
  - Ping
  - TCP, UDP
  - DNS
  - FTP, HTTP, Telnet
  - SMTP, POP3

TCP / IP protocol suite

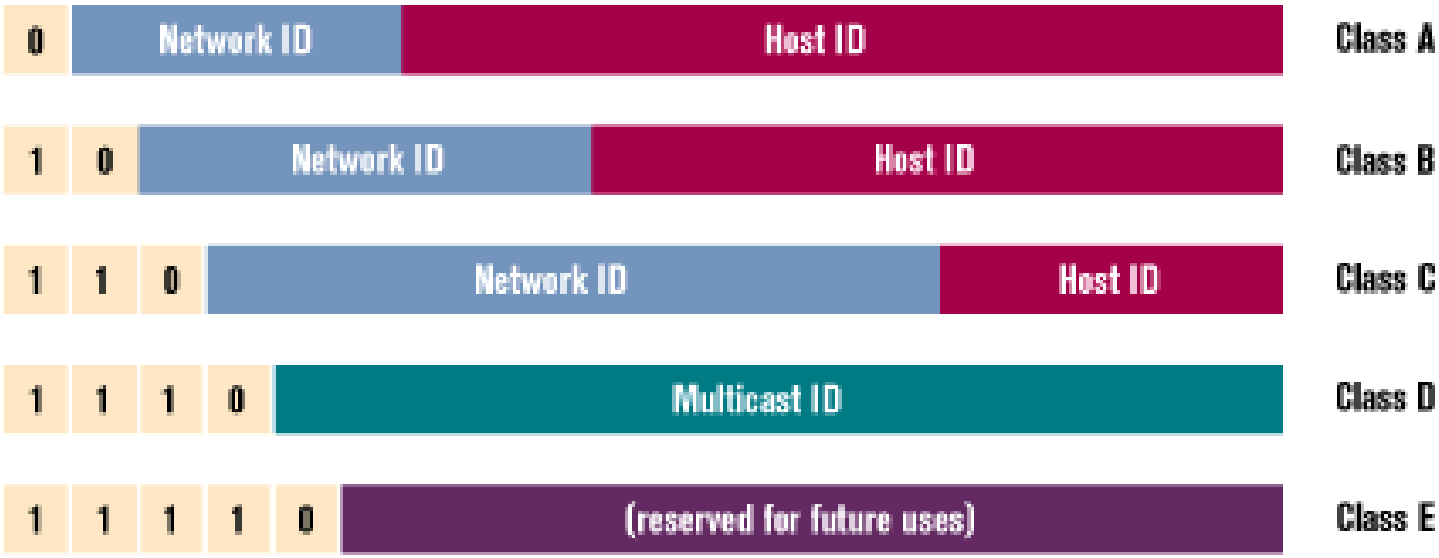
- Defines a set of protocols allowing computers to exchange information through a global Internet, regardless of platform
- Internet: a global distributed communication network– a network of networks
- Suite of protocols for different services: TCP, FTP, SMTP…

IP addressing

- Each entity is (usually) identified by a single, unique IP address (similar to a phone number)
- The number of available IP addresses is finite on the Internet: 2^{32}
- The pool of IP addresses is divided in several networks of varying sizes
- An IP address aaa.bbb.ccc.ddd includes a networkID and a hostID

IP addressing

- 126 class A networks, 16,777,214 hosts each
- 16,384 class B networks, 65,534 hosts each
- 2,097,152 class C networks, 254 hosts each



IP addressing

- Only globally unique IP addresses are valid on the Internet; these are sometimes called public addresses
- generally attributed by an ISP

IP addressing

- Some addresses (10.x.x.x, 172.16.x.x, 192.168.x.x) have been set aside for use on private networks and should never appear on the Internet.
- This is a way to increase the total of hosts connected to the Internet

IP addresses

- One host can communicate directly with others hosts on the same network
- A router/gateway is necessary to reach a host located on other IP networks
- A host will forward any messages to machines on other IP networks through the default gateway
- The default gateway must be located on the same IP network– it is an “exit point” to other networks

IP / LAN

- 802.3 MAC Layer used to access the physical network
- Typically, a LAN is assigned 1 public IP address and uses private addresses internally
- ARP protocol takes IP address and returns a MAC address.
- DHCP protocol assigns IP addresses to hosts automatically: a DHCP client asks a DHCP server for an IP address
- DHCP works only within a single IP network

IP / PSTN

- Modem modulation used to access the physical network
- PPP used for authentication and IP address attribution
- A PPP client asks a PPP server (the ISP) for a public IP address
- The client must supply a login/password
- A default gateway, a DNS server can also be attributed
- The Windows dialer is a PPP client

Basic IP protocols & services

- ICMP/Ping
- TCP/UDP
- DNS
- FTP
- HTTP

ICMP / ping

- ICMP protocol on top of IP
- In SmartStack, it is used only with ping program
- Ping 1.2.3.4 issues a frame to the host at IP address 1.2.3.4
- When receiving this frame, the remote host will send a response message
- Confirms that a station is reachable

TCP

- Transmission Control Protocol
- Connection oriented protocol used for data transmission
- Guaranteed transmission with data acknowledged

TCP

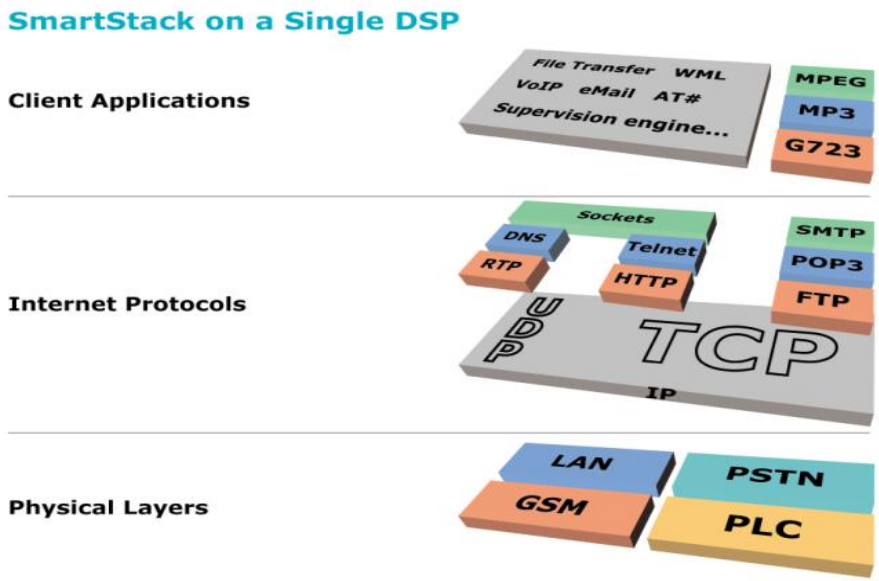
- TCP port number: a port is related to a specific service or application
- Applications running on a single host may use the same IP address, but have unique port numbers
- Some applications layered above TCP use well-known ports.
- HTTP -> port #80, FTP -> port #20,21, Telnet -> port # 23
- A “socket” is an IP address and port number pair

UDP

- User Datagram Protocol
- Connectionless service
- Unreliable:
  - frames are not acknowledged -> possible loss
  - frames are not numbered -> wrong sequencing on arrival
- UDP port number
- DNS -> port#53, SNMP -> port#161

TCP / UDP

- Almost all the TCP/IP applications are based on TCP or UDP protocols
- ICMP/Ping is the exception



DNS

- Domain Name Service (UDP/53)
- A DNS server resolves a host name to an IP address
  - edevice.com <-> 66.40.229.43
- DNS is a distributed database reachable on the Internet
- A browser uses DNS to resolve www.edevice.com to 66.40.229.43. Then, a TCP socket can be opened to 66.40.229.43, port 80

FTP

- File Transfer Protocol (TCP/20,21)
- Protocol designed to exchange files between hosts
- Uses 2 TCP ports, one for control and the other one for data transfer
- A FTP client may be required to authenticate itself to a FTP server before accessing files
- The FTP server administrator may give different users different permissions

HTTP

- Hyper Text Transfer Protocol (TCP/80)
- Originally designed to transport HTML pages, can also be used for XML, SOAP, etc.
- Internet Explorer, Netscape Navigator are HTTP clients
- MS IIS and Apache are HTTP servers

Telnet

- Telnet Protocol (TCP/23)
- Simple terminal emulation on TCP
- Similar to HyperTerminal but above IP
- Allows for the exchange of ASCII characters between 2 hosts

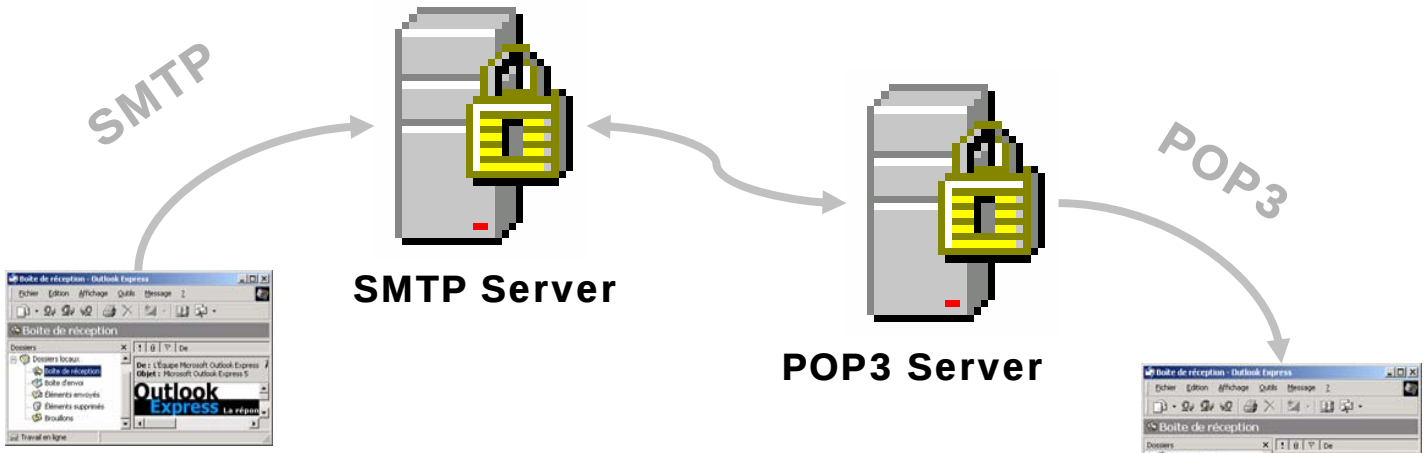
SMTP

- Simple Mail Transport Protocol (TCP/25)
- Related only to mail transport (not storage)
- Defines the dialog between a client wanting to send an email and a mail server
- An authentication can be required
- The message is MIME formatted (email @, subject, body…)

POP3

- Post Office Protocol Version 3
- Used to access email stored on a remote host
- Defines the dialog between a client wanting to retrieve email and a mail server
- Authentication is required

eMail process



Outlook as a SMTP client

Outlook as a POP3 client