Embedded Web Server for Equipments

Presented By:
Vikram Singh Gill
#800700608

Introduction

Server:

- Computer Program
- Physical computer
- Software/Hardware System

Web Server :

Software/Hardware system having a dedicated functionality

What is an Embedded Web Server ?

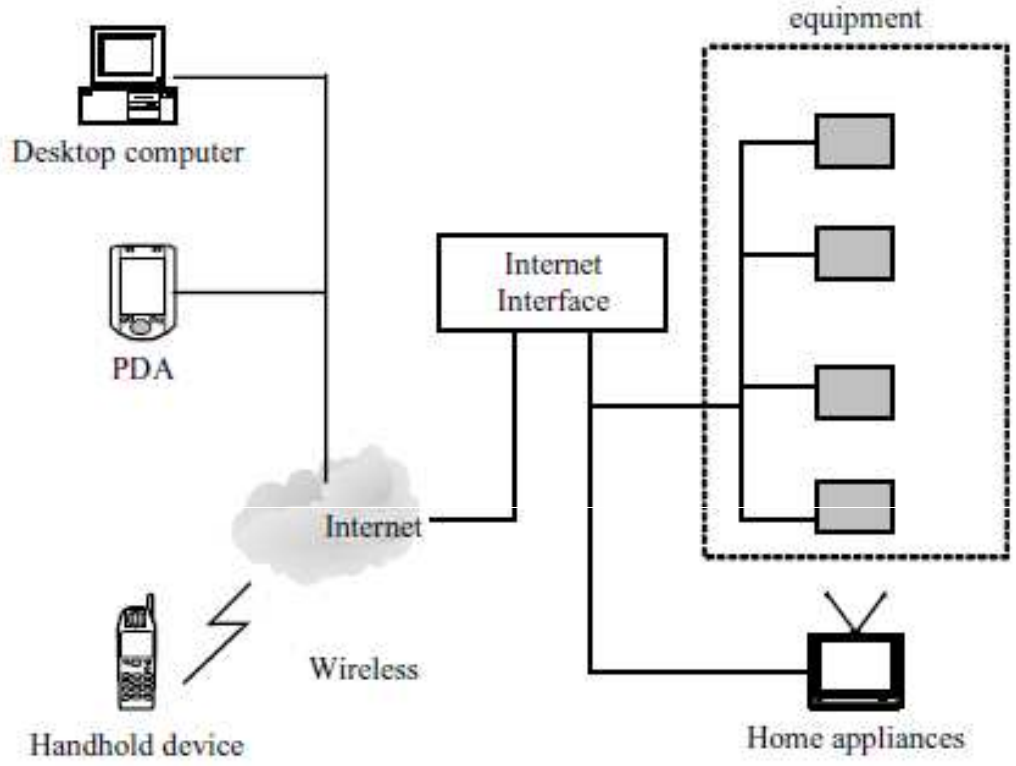
Embedded Web Server

- Embedded systems are generally located remotely
- Monitoring operation, Checking performance, collecting data, or upgrading the application software can be a costly and time-consuming process
- EWS can host web site on your embedded devices
- Benefits: Remotely report status, Get remote data to process, or even send remote messages to have their administrator informed about some incidents.

Tiny Embedded Web Server, the OMEGA iServer

EMBEDDED INTERNET

- Many applications require huge memory and processing power
- Embedded systems: Limited resources
- Solution: Provide internet-connectivity Embedded systems
- EI solves TCP/IP and browser
- Adoption rate in market is High: Solves Disparity of Networking Standards and Inconsistency of User Interfaces.
- Software :Making Standard(TCP/IP)
- Hardware: Ethernet or Bluetooth



Structure of EI model

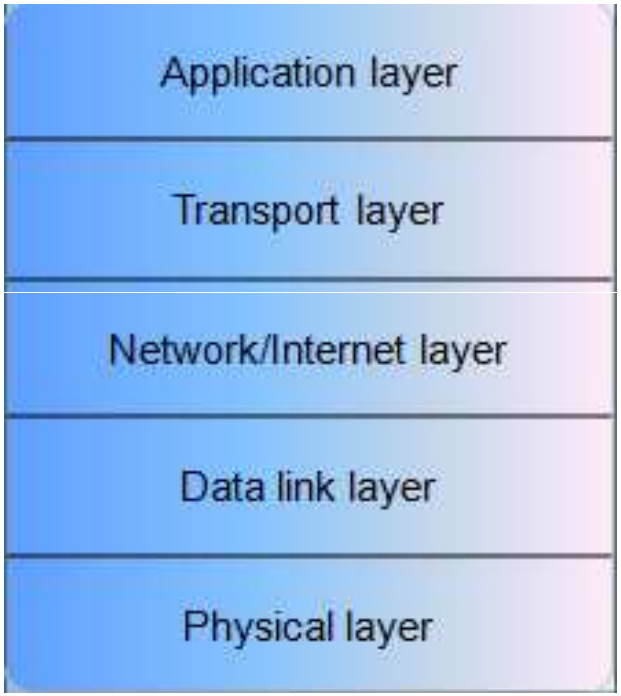
Mini Embedded Web Server : “Webit”

Hardware Platform

- How the platform is different ?
- Focus on application
- Why to choose 8-bit and limited resource chip?
- Size
- Cost
- Power consumption
- What they chose?
- 3k-byte Flash Rom for kernel code and 512 bytes SRAM.
- 8MHz
- 32 Kbyte EEPROM

TCP/IP PROTOCOL SUITE

TCP/IP defines a set of rules to enable computers to communicate over a network. specifying how data should be packaged, addressed, shipped, routed and delivered to the right destination



TCP/IP PROTOCOL SUITE REDUCTION

Connecting in the network:

- RS232, RS485, CAN etc.
- *Can we do Remote Monitoring?*

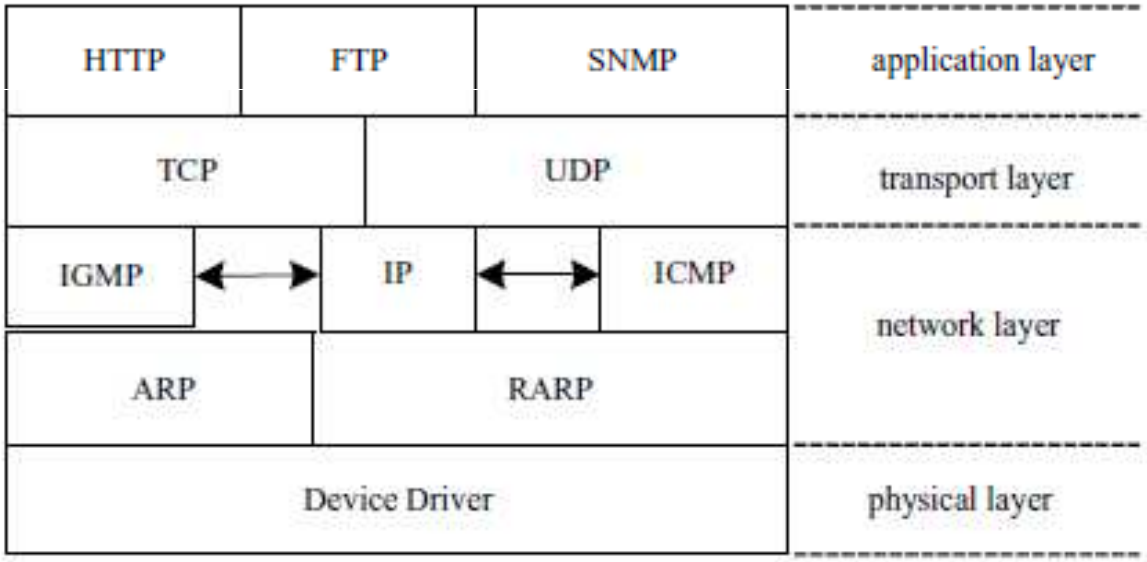
How to connect embedded system with Internet?

- Connect it with PC
- Realize N/W protocols in the chip

EWS: A microcontroller with an embedded TCP/IP stack is called as an Embedded web server

TCP/IP PROTOCOL SUITE(Contd..)

- Not all protocols are necessary for EI
- HTTP ,TCP ARP,RARP,ICMP : Basic need
- UDP :may prefer
- Seldom used: SNMP and FTP



TCP/IP PROTOCOL SUITE REDUCTION (Contd..)

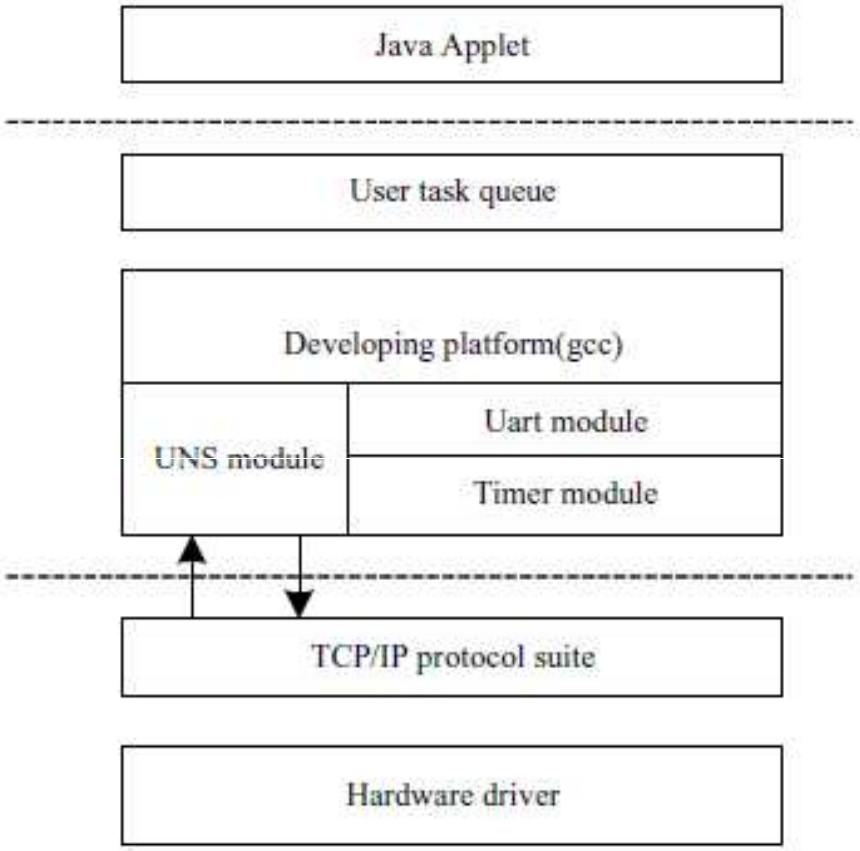
- UDP and TCP: What is the Difference?
- Connection establishment and disconnection
- Three handshake protocol
- Connection Maintenance and data transfer
- Reduction method and Stop-and-wait Protocol
- For simplicity, one client and one server taken
- In case of multiple clients and servers, multiple connections must be supported in kernel
- For maintenance, multiple connections states have to be recorded in the web server.
- TCB is designed to handle this task.

TCP/IP PROTOCOL SUITE REDUCTION(Contd..)

- Several timers maintained for reliability. For example Time-out timer
- Time-out timer:
- Once the data is sent, Timer is started
- If ACK does not come back within the time frame, data is sent again
- Finally six seconds timer selected to utilize SRAM resource fully
- Keep-alive timer:
- For idle connections which waste resources
- Timer too long; Limited resources of MCU, Can't Implement
- Timer reduced at kernel level

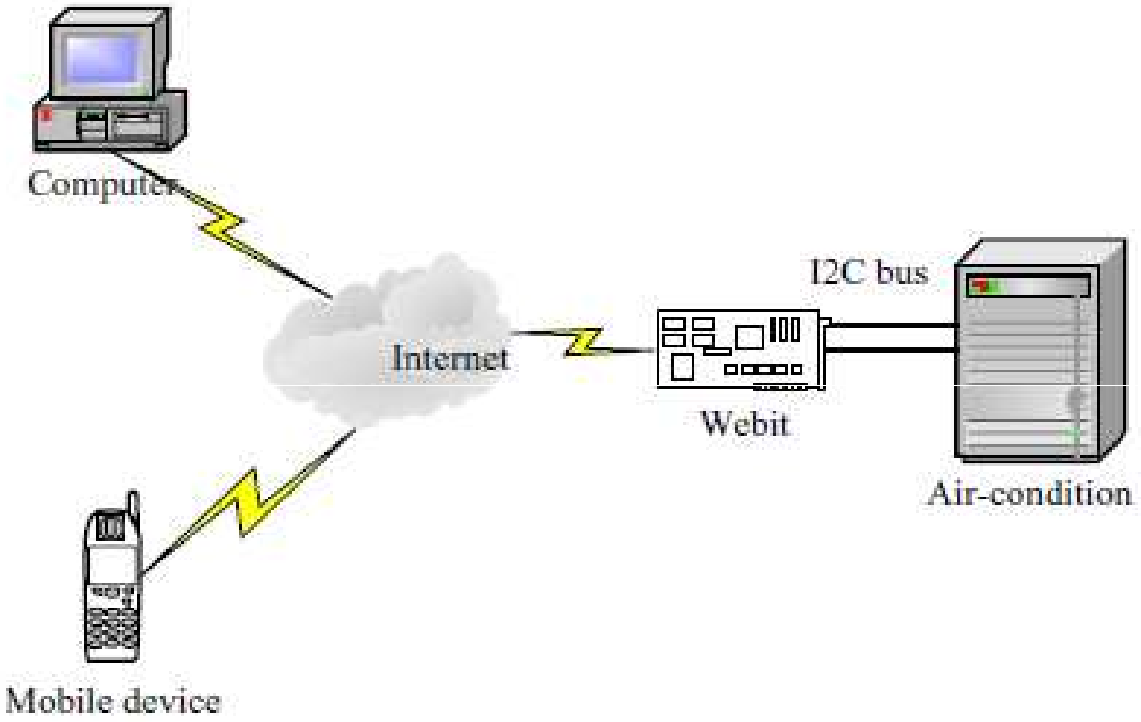
USER DEVELOPING PLATFORM

- •Kernel : Internet Interface only, Usage determined by user
- • Includes Debugger, binary utilities and other tools
- •Data Received: Headers removed layer by layer
- • Based on Socket and port number :UNS Function called
- •Data Transmit: Headers added layer by layer
- •UDP/TCP_SEND function used



CASE STUDY

The Mini Web Server applied to Air condition:



CASE STUDY(Contd..)

- Webit Connection
- AC with I2C bus
- Internet with RJ45 Interface
- Homepage Size: 28KByte that includes HTML, Pictures, other files
- Button press on homepage: Command sent to Webit
- Commands :Decrease/Increase the temperature
- Take appropriate action via I2C
- After completion of action, Webit sends back response.

CASE STUDY(Contd..)

Evaluation of Performance:

- Three kinds of Web pages: txt, HTML,HTML+Java Applet
- Through Data from the table: Speed is acceptable.
- Stability: When more than one user access Webit !!

Table 1 SPEED TEST RESULT OF Webit

File category	File size	File number	Time	Speed
TXT	30	1	18.29	13.12
HTML&jpg	28.4	6	17.91	12.64
HTML&Java Applet	28	4	25.45	8.8

Table 2 REALIBILITY PERFORMANCE OF Webit

ICMP	TCP	ICMP LOST	TCP LOST
86400	207360	0	0

CONCLUSION

- Introduced general design concept of EWS
- Introduced policy of TCP/IP reduction whose goal is to allow easy access to and exploitation of remote equipment
- The mini EWS provides common devices an internet interface and gains a good performance

Thank Y'll For Your Cooperation!!!

Queries?