

1. Introduction
2. Network
3. Security
4. Q&A

System Programming

Network / Protocol

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Outline

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1. Introduction

Questions

- HTTP → HyperText Transfer Protocol
- HTTPS
- Cookie

- SMTP → Simple Mail Transfer Protocol (User's mail → mail server)
- POP → Post Office Protocol (mail server → user)

Encoding/Decoding

- MIME : Multipurpose Internet Mail Extension
(e.g. US-ASCII \leftrightarrow EUC-KR)

Another Question

- Router : Network
- Hub : Data Link
- Switch
- Bridge
- Gateway : device or software for "different communication specification"
(e.g. mobile phone ↔ labtop computer)

1. Introduction
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3. Security
4. Q&A

2.1. TCP/IP

2.2. Transport Layer

2.3. Network Layer

2.4. Data Link Layer and Physical Layer

2. Network

OSI, again (7 layers)

Open System Interconnection, Late 1970's, ISO

- Application
- Presentation
- Session

- Transport
- Network
- Data Link

- Physical

Simplified Version

OSI - Simplified Version (Protocol Family)

- Application : HTTP, SMTP, POP3, FTP, Telnet, NNTP, RCP,...
- Transport : TCP, UDP
- Network : IP
- Data Link : Ethernet, FDDI, ATM, PPP, PPPoE,...
- Physical : Data ↔ Signal

TCP/UDP

TCP/UDP

- TCP : Transmission Control Protocol
(Securely and Surely / Reliable)
- UDP : User Datagram Protocol (Fast)

Port (I)

Port : Communication channel with other device (0-65535)
(0-1023: reserved)

Service	Application Protocol	Port No	Transport Layer, Pr
WWW	HTTP	80	TCP/UDP
WWW	HTTPS	443	TCP/UDP
Mail(Sending)	SMTP	25	TCP/UDP
Mail(Receiving)	POP3	110	TCP/UDP
File	FTP	20, 21	TCP/UDP

Port (II)

Service	Application Protocol	Port No	Transport L
Remote Log in	Telnet	23	TCP/UD
Secured Remote Control	SSH	22	TCP/UD
Network DNS	DNS	53	TCP/UD
Network DHCP	DHCP	546,547	UDP
Network SNMP	SNMP	161,162	UDP

Homework

in CMD mode

- netstart
- netstart -a

Basic Principle

In general "IP" is non-connected thing.

IPv4 : 32 bit (4 × 8 bit)

000.000.000.000 → decimal transformation
(e.g. 192.168.15.10)

IPv6

Router

- route : way from user to "IP address"
- hop : number of routes
- Segmentation of network : one IP has 254 (0 and 255 reserved)
so, one IP can be segmented → **subnet mask**

Homework

in CMD mode

- ipconfig
- ping

- tracert www.xxx.com

Summary, currently

from OSI hierarchy, 5 layers can be briefly extracted.

- Application : execute "Service"
- Transport : segmenting "data"
- Network : designate "address"
- Data Link
- Physical

Terms and Concept for Data Link

- NIC : network interface card (MAC no)
- MAC : Media Access Control, unique number for NIC (physical address)
- Hub
- Switching hub

Data Link

- Node : Computer or Router
- Communication type : Cable, Photocable, Wireless
- Network Interface : NIC, Modem

Wireless Datalink

Wireless

- Zigbee
- Bluetooth : 2.4GHz
- Wi-fi : IEEE802.11a, IEEE802.11b, IEEE 802.11g

- UWB

Homework

in CMD mode,

- `arp -a`
- `ipconfig /all` (`ifconfig` in UNIX/Linux)

3. Security

Types of network security

- DoS : Denial of Service
- Packet change
- Computer Virus
- Unauthorized access

And then, we have to prevent them, with respect to "OSI
/Embedded Architecture"

Homework

in CMD mode

- telnet

- ping
- ipconfig
- tracert
- arp

- netstart
- nslookup (name server look up)
- route

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Q & A