

NETWORKING AND COMMUNICATION BASICS

THERE AND BACK AGAIN

Overview

Basic concepts

- Communication

- Message

- Communication loop

Networking

- Premise

- Outbound

- Inbound

- OSI model

- Headers

- Real life packet

- TCP/IP model

- Sockets

Homework

Conclusion

Communication

Basic concepts

Definition

Communication is the act of developing meaning among entities or groups through the use of sufficiently mutually understood signs, symbols, and semiotic conventions.

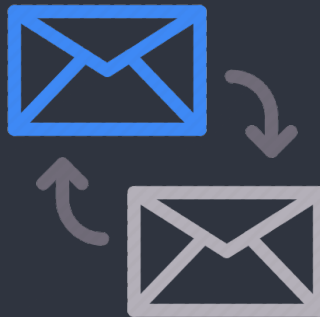


Message

Basic concepts

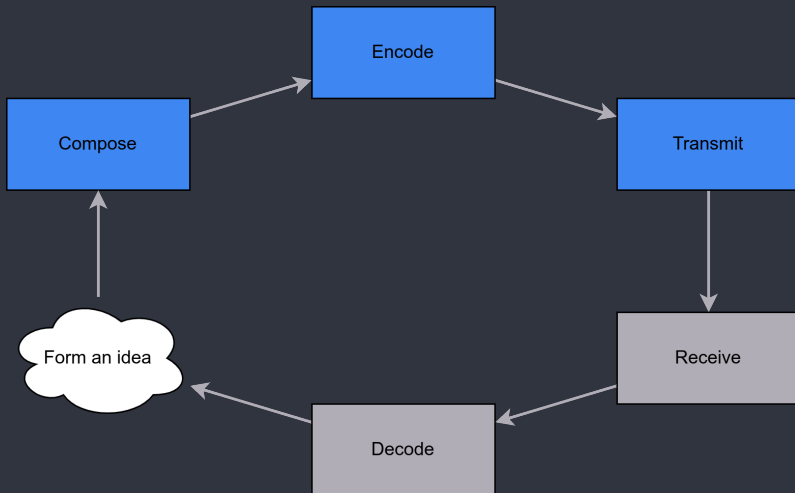
Definition

Message is a discrete unit of communication intended by the source for consumption by some recipient or group of recipients.



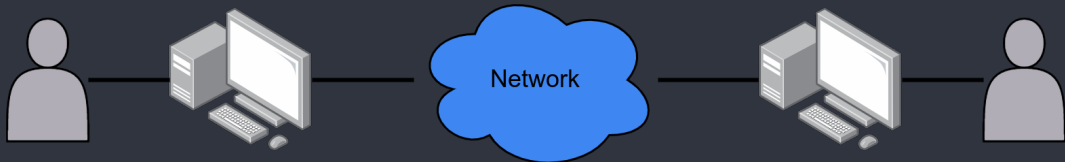
Communication loop

Basic concepts



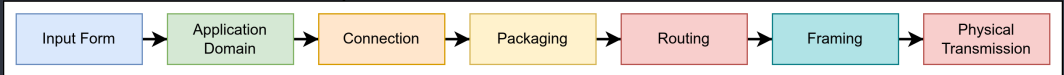
Premise

Networking

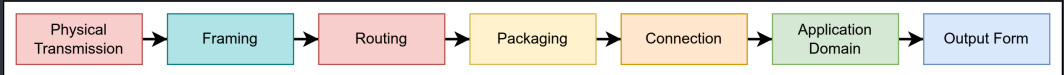


Outbound

Networking

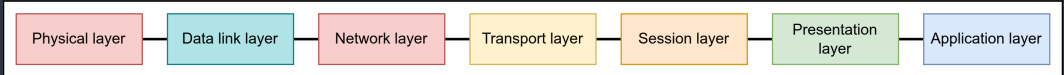


Inbound Networking



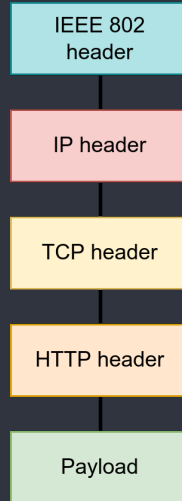
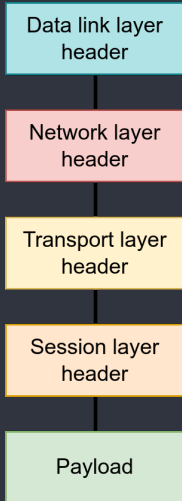
OSI model

Networking



Headers

Networking



Real life packet

Networking

```

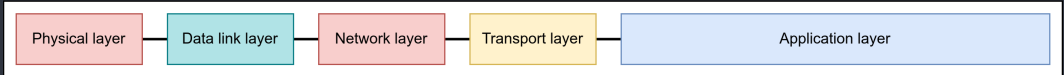
> Frame 1530: 1506 bytes on wire (12048 bits), 1506 bytes captured (12048 bits) on interface enp4s0, id 0
> Ethernet II, Src: Giga-Byt_f5:ba:6c (b4:2e:99:f5:ba:6c), Dst: Tp-LinkT_26:be:6e (84:16:f9:26:be:6e)
> Internet Protocol Version 4, Src: 192.168.0.117, Dst: 39.50.241.244
> Transmission Control Protocol, Src Port: 51413, Dst Port: 48872, Seq: 921601, Ack: 953, Len: 1440
> Data (1440 bytes)

0000  84 16 f9 26 be 6e b4 2e 99 f5 ba 6c 08 00 45 00  ...&n...l..E
0010  05 d4 0f 46 40 00 40 06 4b 9a c0 a8 00 75 27 32  ...F0.0. K...u'2
0020  f1 f4 c8 d5 be e8 a7 31 01 68 e6 2a 7c 57 80 18  .....1..h.*|W..
0030  01 fc e0 0a 00 00 01 01 08 0a fb 93 fd a4 00 3c  .....<
0040  8a d6 02 d9 e7 67 df 41 35 5f a5 0d 15 92 56 c8  ....g.A 5...V.
0050  e7 fe 01 ca 85 46 4c b5 25 6d d6 81 a5 41 0f 28  ....FL.%m...A(
0060  02 da 9f b8 40 82 18 a2 eb fe 80 3e 5f c1 35 b6  ...@...>..5-
0070  ee e7 b7 57 7a e1 16 12 4f 97 53 6a 25 7a ff 69  ...Wz...0.Sj%z.i
0080  c5 ae 9e ea 0f d3 8a 6b 43 d6 61 94 c0 6b 46 d4  .....k C.a.kF-
0090  90 9a fe 3d 15 cd 32 6f 28 47 ce 24 90 7c 1b e7  ...=-2o (G.$|..-
00a0  ac 31 95 b8 a7 81 ff b4 c1 1e 62 09 de 1b 51 37  .1.....b...Q7
00b0  fa 62 d6 a8 ea aa 46 32 e4 aa ce 74 ad f3 da 49  .b...F2...t...I
00c0  77 9c 4f af 03 ca b3 00 e1 7e 74 ba 60 dd 6b 21  w.0.....-t..k!
00d0  b5 69 91 90 aa ff 82 39 8a 44 b1 96 50 2e d3 b9  .i...9..D..P...
00e0  85 70 47 32 f7 58 bb 01 8b d9 c1 47 81 df 5f 4b  .pG2.X...G...K
00f0  41 94 b9 e9 05 cd 32 8c 01 f9 0a 06 54 72 f0 48  A...2...Tr.H
0100  94 8d 04 f1 34 e1 ff b6 e4 06 da 4e b3 ed bf 55  ...4...N...U
0110  de 0d c8 5a 6a 88 d0 d6 8d 35 84 ae 68 0d da 97  ...Zj...5..h...
0120  cf b3 74 c8 bd 29 e9 53 96 7b a5 cd 41 3f 27 13  ...t...)S...A?..
0130  99 c8 fa 65 a8 57 af a5 b6 83 10 69 9e 49 ba e2  ...e.W...i..I..
0140  4e a3 59 f1 cf e7 3a 5e 5e 98 8c 95 ef b1 04 18  N.Y...^..^...
0150  02 f1 79 1d 8d 81 41 7d 31 c3 e8 2a 14 36 a7 e0  ..y...A} 1...6..

wireshark_enp4s0_20211221145021_jGg2lz.pcapng
```

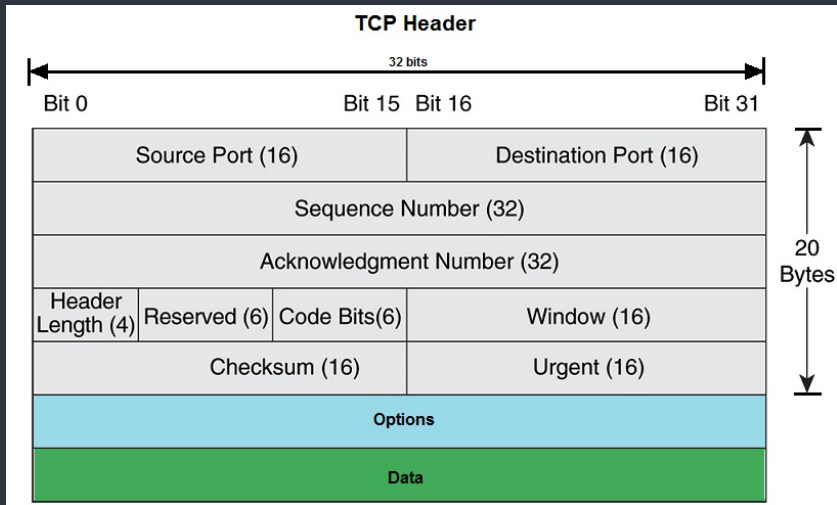
TCP/IP model

Networking



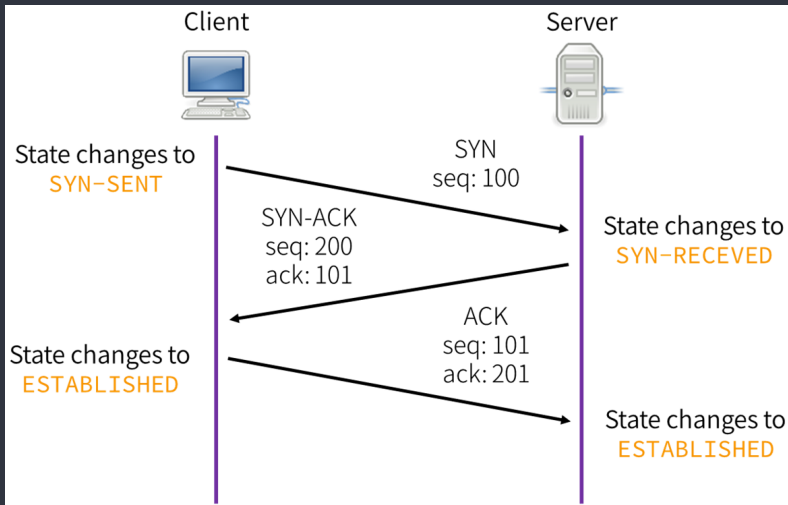
Transmission Control Protocol

Networking



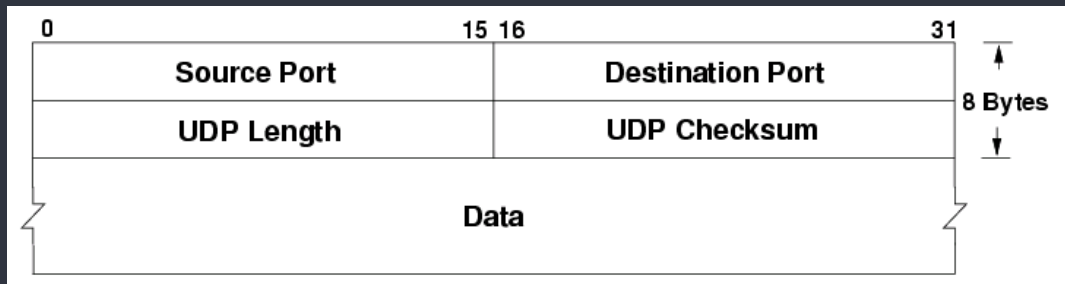
Transmission Control Protocol

Networking



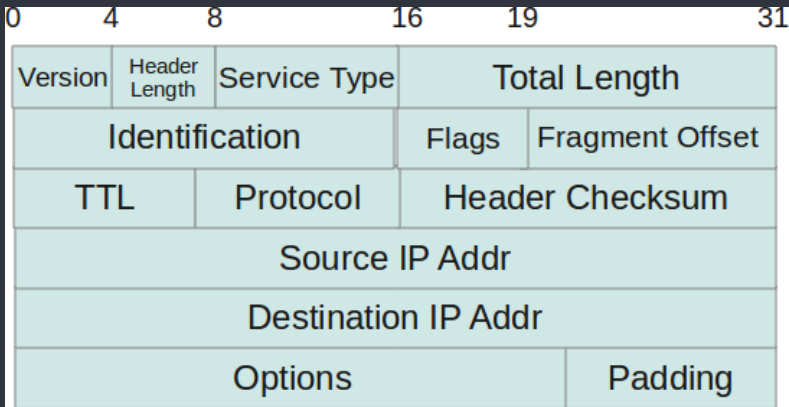
User Datagram Protocol

Networking



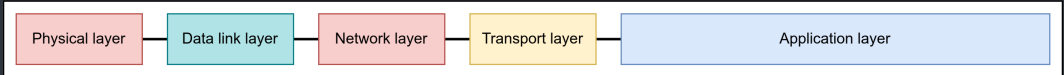
Internet protocol

Networking



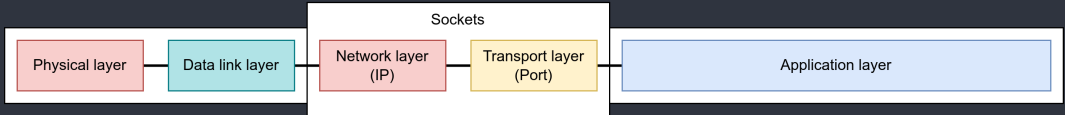
TCP/IP model

Networking



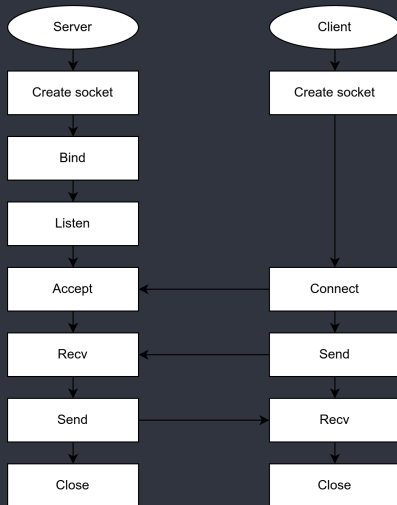
Sockets

Networking



Sockets

Networking



Sockets

Networking

```
#include <sys/socket.h>
int socket(int domain, int type, int protocol);
```

- ▶ Domain
 - ▶ AF_INET
 - ▶ AF_INET6
 - ▶ AF_UNIX
- ▶ Type
 - ▶ SOCK_STREAM
 - ▶ SOCK_DGRAM
 - ▶ SOCK_RAW
- ▶ Protocol
 - ▶ 0

Sockets

Networking

```
#include <sys/socket.h>
int bind(
    int socket,
    const struct sockaddr *address,
    socklen_t address_len
);
```

Sockets

Networking

```
#include <sys/socket.h>  
int listen(int socket, int backlog);
```

Sockets

Networking

```
#include <sys/socket.h>
int accept(
    int socket,
    struct sockaddr *__restrict__ address,
    socklen_t *__restrict__ address_len
);
```

Sockets

Networking

```
#include <sys/socket.h>
int connect(
    int socket,
    const struct sockaddr *address,
    socklen_t address_len
);
```

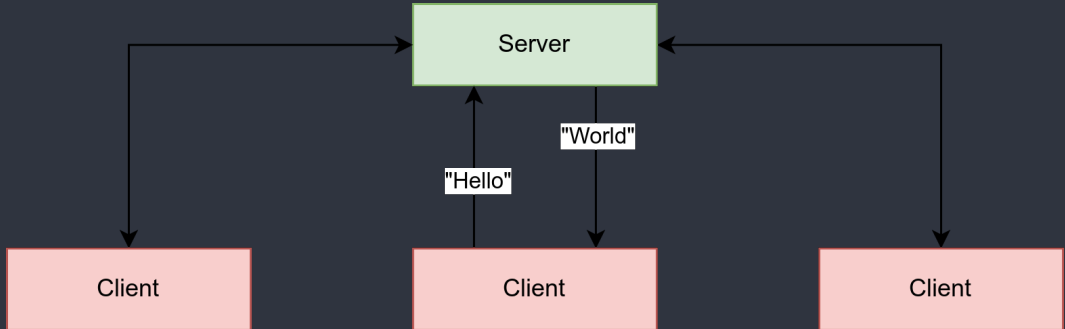

Sockets

Networking

```
#include <unistd.h>
ssize_t read(int fs, void *buf, size_t N);
```

Homework

Echo World



The end

Thank you for your time!