

Charotar University of Science and Technology

[CHARUSAT]

Chandubhai S. Patel Institute of Technology [CSPIT]

U & P U. Patel Department of Computer Engineering

Assignment-1

Aim: Display header (Ethernet, Network and Transport layer) values of received frame at NIC card.

Submission: Student need to upload 3 documents 1) program file 2) Output File and 3) Word Document, Every file must save with your studentID, Sample **20ce005_Ass1.c**, **20ce005_out.o**, **20ce005.docx(Combined file of .c/java/etc & Outputfile)**. Upload assignment in MS team before deadline. Include Comments in your program, display your student ID and Full name, display total lines of code and total line of comment at the start of program execution. Student may use any programming language.

Rubrics: Nicely drafted document along with your correct program and output file with clarity in answers leads to full marks. Otherwise, submission carries proportional mark.

Use the Coding standard as specified in the Software group project.

Recommended to type required information, avoid copy-paste to increase your typing skill.

Input file: You may download from the Course Website Assignment-1 section. Input file consists of 10 rows of different frames. Your program should read each line of the input file in each iteration to print the content of headers. Sample I/P and O/P is mentioned at the last page of this assignment.

Implement a program which takes sequences of 1's and 0's as input and display values of respective header fields. Program should ask how many rows of stream should be considered to print. In case of non-recognized type in any header, it should print error and exit. Consider and use the following program structure for implementation. Certain fields of header should display in binary, hexadecimal or decimal as mentioned in sample output.

Application Layer() { Rec_App() {.....} } { Send_App() {.....} }
Transport Layer() {Rec_TP() {.....} } {Send_TP() {.....} }
Network Layer() { Rec_NW() {.....} } { Send_NW() {.....} }
Ethernet Layer() { Rec_ETH() {.....} } { Send_ETH() {.....} }
Physical Layer() { Rec_PHY() {.....} } { Send_PHY() {.....} }

Fig 1: Program Structure

Output of Program

This program is prepared by <<Student ID & Student Full name>>

Total line of code = <<value>>

Total lines for comment= <<value>>

Enter path of input file along with file name: c:\input.txt

How many input rows wants to print: 2

Output for the row-1

Ethernet Header

Destination MAC Address:

Source MAC Address:

Type:

Network Header

Version:

IHL:

DSCP:

ECN:

Total Length:

Identification:

Flags:

Fragment Offset:

Time to Live:

Protocol:

Header Checksum:

Source IP Address:

Destination IP Address:

Transport header: TCP

Source Port:

Destination Port:

Sequence Number:

Acknowledge Number:

Header Length:

Reserved bits:

URG:

ACK:

PSH:

RST:

SYN:

FIN:

Window Size:

Check Sum:

Urgent Pointer:

Output for the row-2

Ethernet Header

Destination MAC Address:

Source MAC Address:

Type:

Version:
IHL:
DSCP:
ECN:
Total Length:
Identification:
Flags:
Fragment Offset:
Time to Live:
Protocol:
Header Checksum:
Source IP Address:
Destination IP Address:

Transport header: TCP

Source Port:
Destination Port:
Sequence Number:
Acknowledge Number:
Header Length:
Reserved bits:
URG:
ACK:
PSH:
RST:
SYN:
FIN:
Window Size:
Check Sum:
Urgent Pointer:

Reference:

- Reference of Option of TYPE in Ethernet
1. https://en.wikipedia.org/wiki/Ethernet_frame
- Ethernet Networking Group: <https://www.ieee802.org/3/>
- <https://en.wikipedia.org/wiki/EtherType>
Reference of Option of Type in IP
- <https://en.wikipedia.org/wiki/IPv4>
- https://en.wikipedia.org/wiki/List_of_IP_protocol_numbers
- <https://www.eit.lth.se/ppplab/IPHeader.htm>
- <https://datatracker.ietf.org/doc/html/rfc791>
Reference of Option of Type in UDP
- https://en.wikipedia.org/wiki/User_Datagram_Protocol
Reference of Option of Type in TCP
- https://en.wikipedia.org/wiki/Transmission_Control_Protocol
- <https://www.iana.org/assignments/tcp-parameters/tcp-parameters.xhtml>
- <https://www.rapidtables.com/convert/number/binary-to-hex.html>

Sample Input Stream:

```
000000000001101010001100011010110111011010101100111010001101100011010001010001101
1110011111100010000100000000000100010100000000000000000101000000101011011110101
000000000000001000000000000110000000000000000010101100000100000000110001111011100
011101111101010110111010011101100010101110011000000011011101101001001111011110111
11010001101011110010000010000001101000100111010100000010000000100000000101011111
110111011100000000000000000
```

Output of Program

This program is prepared by <<Student ID & Student Full name>>

Total line of code = <<value>>

Total lines for comment= <<value>>

Enter path of input file along with file name: c:\input.txt

How many input rows wants to print: 2

Output for the row-1

Ethernet Header

Destination MAC Address: 00:1A:8C:6B:76:AC

Source MAC Address: E8:D8:D1:46:F3:F1

Type: x0800

Network Header

Version:x4

IHL:x5

DSCP& ECN:x00

Total Length:x0028

Identification:x15BD

Flags & Fragment Offset:x4000

Time to Live: x80

Protocol:x06

Header Checksum:x0000

Source IP Address: 172.16.12.123

Destination IP Address: 142.250.183.78

Transport header: TCP

Source Port: 197

Destination Port: 115

Sequence Number: x01BB

Acknowledge Number: x49EF

Header Length: x7

Reserved bits: 110100

URG:0

ACK:1

PSH:1

RST:0

SYN:1

FIN:0

Window Size: xF208

Check Sum: x1A27

Urgent Pointer: x5010