**Charotar University of Science and Technology [CHARUSAT]**

**Chandubhai S. Patel Institute of Technology [CSPIT]**

**U & P U. Patel Department of Computer Engineering**

**Assignment-1**

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**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. 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 <<20CS028 YASH KOLADIYA >>

Total line of code = 927

Total lines for comment= <<54>>

Enter path of input file along with file name: C:\Users\Admin\Downloads\Sample.txt

How many input rows wants to print: 2

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Output for the row-1

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**Ethernet Header**

Destination MAC Address: 00:1a:8c:6b:76:ac

Source MAC Address: e8:d8:d1:46:f3:f1

Type: 0800

**Network Header**

Version :4

IHL: 5

DSCP: 00

ECN: 0

Total Length: 00028

Identification: 15bd

Flags: 1

Fragment Offset: 00

Time to Live: 80

Protocol: 06

Header Checksum: 0000

Source IP Address: ac100c7b

Destination IP Address: 8efab74e

**Transport header: TCP**

Source Port: 49ef

Destination Port: 7d1a

Sequence Number: f2081a27

Acknowledge Number: 5010100a

Header Length: f

Reserved bits: ee

URG: 1

ACK: 0

PSH: 1

RST: 1

SYN: 1

FIN: 0

Window Size: 0000

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Output for the row-2

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**Ethernet Header**

Destination MAC Address: 00:1a:8c:6b:76:ac

Source MAC Address: e8:d8:d1:46:f3:f1

Type: 0800

**Network Header**

Version :4

IHL: 5

DSCP: 00

ECN: 0

Total Length: 00028

Identification: BFD2

Flags: 1

Fragment Offset: 00

Time to Live: 40

Protocol: 06

Header Checksum: csd0

Source IP Address: 673b8c66

Destination IP Address: ac100c7b

**Transport header: TCP**

Source Port: 3110

Destination Port: 05e0

Sequence Number: e400429a

Acknowledge Number: 501000fb

Header Length: b

Reserved bits: 00

URG: 0

ACK: 1

PSH: 1

RST: 1

SYN: 0

FIN: 1

Window Size: 10000

Reference:

Reference of Option of TYPE in Ethernet

1. <https://en.wikipedia.org/wiki/Ethernet_frame>
2. Ethernet Networking Group: <https://www.ieee802.org/3/>
3. https://en.wikipedia.org/wiki/EtherType

Reference of Option of Type in IP

1. <https://en.wikipedia.org/wiki/IPv4>
2. <https://en.wikipedia.org/wiki/List_of_IP_protocol_numbers>
3. <https://www.eit.lth.se/ppplab/IPHeader.htm>
4. <https://datatracker.ietf.org/doc/html/rfc791>

Reference of Option of Type in UDP

1. <https://en.wikipedia.org/wiki/User_Datagram_Protocol>

Reference of Option of Type in TCP

1. <https://en.wikipedia.org/wiki/Transmission_Control_Protocol>
2. <https://www.iana.org/assignments/tcp-parameters/tcp-parameters.xhtml>
3. https://www.rapidtables.com/convert/number/binary-to-hex.html

**Sample Input Stream:**

000000000001101010001100011010110111011010101100111010001101100011010001010001101111001111110001000010000000000001000101000000000000000000101000000101011011110101000000000000001000000000000110000000000000000010101100000100000000110001111011100011101111101010110111010011101100010101110011000000011011101101001001111011110111110100011010111100100000100000011010001001110101000000010000000100000000101011111110111011100000000000000000

**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

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Output for the row-1

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**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