Batch: **SY-IT (B2)**   **Experiment Number: 4**

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Aim of the Experiment: To write a program to implement TCP header

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Program/ Steps:

list =(input("Enter a hex value to scan : \n"))

if len(list) == 40:

   print("THE INPUT IS VALID !")

else:

   print("THE INPUT IS INVALID ...")

mylist6 = []

mylist7 = []

tcp_1 = list[0:4]

print("Your source port address : ", tcp_1)

tcp_2 = list[4:8]

print("Your destination port address : ", tcp_2)

tcp_3 = list[8:16]

print("Your sequence number : ", tcp_3)

tcp_4 = list[16:24]

print("Your acknowledgemnt number : ", tcp_4)

tcp_5 = list[24:25]

print("Your HLEN number : ", tcp_5)

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tcp_6 = list[25:28]

for i in range(25,28):

    mylist6.append(list[i])

for j in range(0,3):

    mylist7.append("{0:04b}" .format(int(mylist6[j])))

print(mylist7)

str_1 = " "

str_2 = str_1.join(mylist7)

print(str_2)

print("Your Reserved number :",str_2[0:6])

print("Your Flag number :",str_2[6:12])


tcp_7 = list[28:32]

print("Your Window size number : ", tcp_7)

tcp_8 = list[32:36]

print("Your check sum number : ", tcp_8)

tcp_9 = list[36:40]

print("Your urgent pointer number : ", tcp_9)
```

Output/Result:

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Output

Enter a hex value to scan :
9F8E7D6C5B4A391827364554332211 0099887766
THE INPUT IS VALID !
Your source port address :  9F8E
Your destination port address :  7D6C
Your sequence number :  5B4A3918
Your acknowledgemnt number :  27364554
Your HLEN number :  3
['0011', '0010', '0010']
0011 0010 0010
Your Reserved number : 0011 0
Your Flag number : 010 00
Your Window size number :  1100|
Your check sum number :  9988
Your urgent pointer number :  7766

=== Code Execution Successful ===
```

Post Lab Question-Answers:

1. The unit of data transfer between two devices using TCP is called a <u>segment</u>.

2. Which type of addressing is used at Transport Layer?
a) Port addressing

b) Logical addressing

c) Physical Addressing

d) None of the Above

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Answer **:** a) Port addressing

3. What is the difference between TCP and UDP?

TCP (Transmission Control Protocol) is connection-oriented, meaning it establishes a connection before data is sent and ensures the data reaches its destination in the correct order. It's reliable but slower.
UDP (User Datagram Protocol) is connectionless, meaning it sends data without establishing a connection, making it faster but less reliable as it doesn't ensure data delivery or order.

Outcomes:

CO2. Enumerate the layers of the OSI model and TCP/IP model, their functions and Protocols

**Conclusion (based on the Results and outcomes achieved):**

From this experiment number 4, I learned about to implement the TCP header using wireshark. I also wrote a python code to find out, the details such as source port address, destination port address, sequence number, etc from a 40bit hex input.

References:

Books/ Journals/ Websites:

*   Behrouz A Forouzan, Data Communication and Networking, Tata Mc Graw hill, India, 4th Edition
*   A. S. Tanenbaum, "Computer Networks", 4th edition, Prentice Hall

Experiment No. 4

Title: TCP Header Implementation

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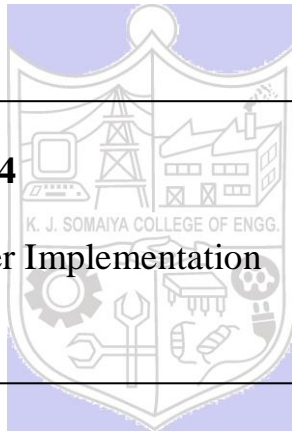
Batch: **Roll No.:**   **Experiment No.:**

Aim: To write a program to implement TCP header

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Resources Used: Java /C/C++/Python

_____

Theory:

The transport service is implemented by a transport protocol used between the two transport entities. Transport protocols resemble the data link protocols. Both have to deal with error control, sequencing, and flow control, among other issues. Differences are due to major dissimilarities between the environments in which the two protocols operate. The Internet has two main protocols in the transport layer, Connectionless protocol: UDP Connection-oriented protocol: TCP TCP (Transmission Control Protocol) was designed to provide a reliable end-to-end byte stream over an unreliable internetwork .

The TCP Protocol: Every byte on a TCP connection has its own 32-bit sequence number. Separate 32-bit sequence numbers are used for acknowledgements and for the window mechanism. The sending and receiving TCP entities exchange data in the form of segments. A TCP segment consists of a fixed 20-byte header (plus an optional part) followed by zero or more data bytes. Two limits restrict the segment size. Each segment, including the TCP header, must fit in the 65,515-byte IP payload. Each network has a Maximum Transfer Unit, or MTU, and each segment must fit in the MTU. In practice, the MTU is generally 1500 bytes (the Ethernet payload size) and thus defines the upper bound on segment size. A segment that is too large for a n/w can be broken into multiple segments by a router. The basic protocol used by TCP entities is the **sliding window protocol**. When a sender transmits a segment, it also starts a timer. When the segment arrives at the destination, the receiving TCP entity sends back a segment (with data if any exist, otherwise without data) bearing an acknowledgement number equal to the next sequence number it expects to receive. If the sender's timer goes off before the acknowledgement is received, the sender transmits the segment again.

The TCP Segment Header: The **Source port** and **Destination port** fields identify the local end points of the connection. A port plus its host's IP address forms a 48-bit unique end point (TSAP). The **Sequence number** defines the number of the first data byte contained in that segment and **Acknowledgement number** specifies the next byte expected, not the last byte correctly received. Both are 32 bits long. The **TCP header length** tells how many 32-bit words are contained in the TCP header.

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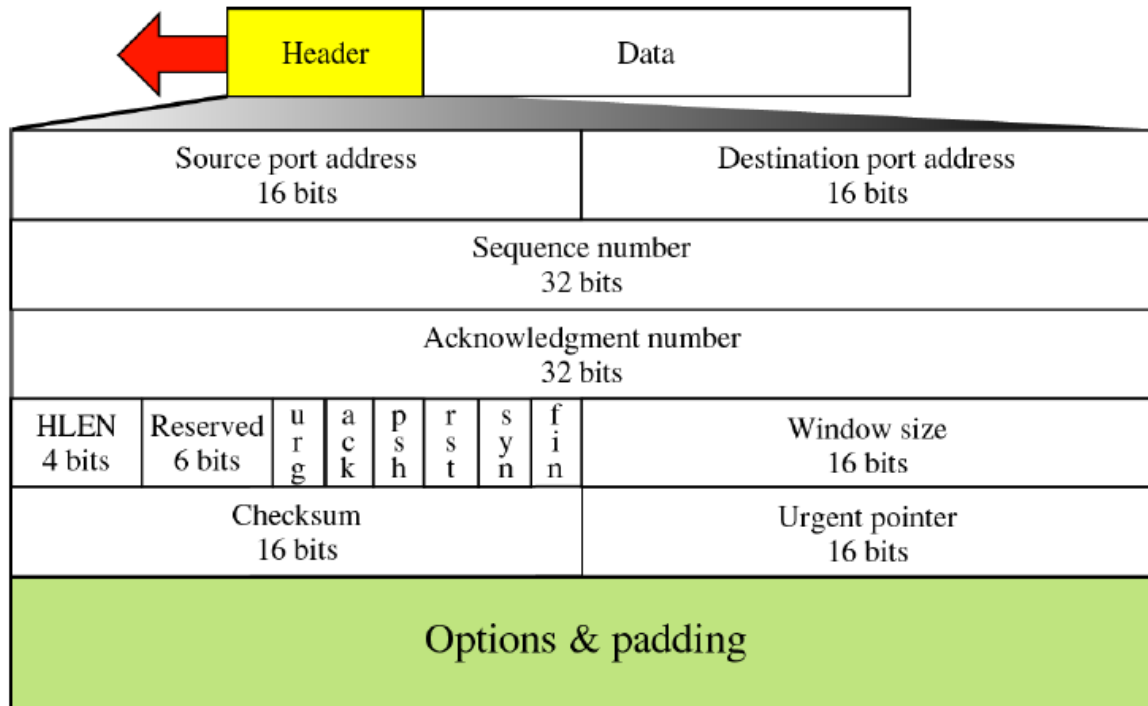
Activity:
Write a program to accept the input in the hexadecimal form (continuous string) and display the value of each field of TCP header.
_____

Program:

_____

Output:

_____

Questions:

1) The unit of data transfer between two devices using TCP is called _____.

2) Which type of addressing is used at Transport Layer?
   a) Port addressing
   b) Logical addressing
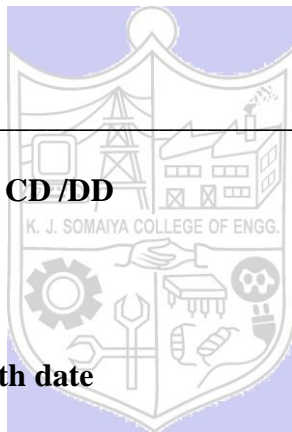   c) Physical Addressing

d) None of the Above

3) What is the difference between TCP and UDP?

_____

Outcomes:

_____

Conclusion:

_____

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of faculty in-charge with date

References:

Books/ Journals/ Websites:
- Behrouz A Forouzan, Data Communication and Networking, Tata Mc Graw hill, India, 4th Edition
- A. S. Tanenbaum, "Computer Networks", 4th edition, Prentice Hall