

# Introduction to Computer Networks

TCP sockets

# TCP server

```
import socket

server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)

server.bind(('', 12345))

server.listen(5)

while True:
    client_socket, client_address = server.accept()
    print('Connection from: ', client_address)

    data = client_socket.recv(100)
    print('Received: ', data)

    client_socket.send(data.upper())

    client_socket.close()
    print('Client disconnected')
```

## TCP client

```
import socket

s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)

s.connect(('127.0.0.1', 12345))

s.send(b'hello')

data = s.recv(100)
print("Server sent: ", data)

s.close()
```

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
user@pc1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45200)
Received: b'hello'
Client disconnected
```

```
user@pc1:~$ python3 tcp_client.py
Server sent: b'HELLO'
user@pc1:~$
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
user@pc1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45200)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45202)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45204)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45206)
Received: b'hello'
Client disconnected
```

```
user@pc1:~$ python3 tcp_client.py
Server sent: b'HELLO'
user@pc1:~$
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
user@pc1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45200)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45202)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45204)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45206)
Received: b'hello'
Client disconnected
KeyboardInterrupt
^CTraceback (most recent call last):
  File "tcp_server.py", line 10, in <module>
    client_socket, client_address = server.accept()
  File "/usr/lib/python3.8/socket.py", line 292, in accept
    fd, addr = self._accept()
KeyboardInterrupt

user@pc1:~$ python3 tcp_server.py
Traceback (most recent call last):
  File "tcp_server.py", line 5, in <module>
    server.bind(('',12345))
 OSError: [Errno 98] Address already in use
user@pc1:~$ python3 tcp_server.py
Traceback (most recent call last):
  File "tcp_server.py", line 5, in <module>
    server.bind(('',12345))
 OSError: [Errno 98] Address already in use
user@pc1:~$
```

```
user@pc1:~$ python3 tcp_client.py
Server sent: b'HELLO'
user@pc1:~$
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
GNU nano 4.8          tcp_server.py          Modified
import socket, time
server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server.bind(('127.0.0.1',12345))
server.listen(5)
while True:
    print('Good night')
    time.sleep(10)
    print('Good morning')
    client_socket, client_address = server.accept()
    print('Connection from: ', client_address)
    data = client_socket.recv(100)
    print('Received: ', data)
    client_socket.send(data.upper())
    client_socket.close()
    print('Client disconnected')
```

```
user@pcl:~$ python3 tcp_client.py []
user@pcl:~$
```

```
user@pcl:~$ python3 tcp_client.py
user@pcl:~$
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP:** 10.0.2.6

**Alice MAC:** 08:00:27:4f:4f:b9

**Bob IP:** 10.0.2.7

**Bob MAC:** 08:00:27:75:60:78

```
user@pcl:~$ python3 tcp_server.py
```

```
Good night
```

```
user@pcl:~$ python3 tcp_client.py
```

**Default gateway IP:** 10.0.2.1  
**Default gateway MAC:** 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
user@pcl:~$ python3 tcp_server.py
Good night
Good morning
Connection from: ('10.0.2.7', 45238)
Received: b'hello'
Client disconnected
Good night
[...]
```

```
user@pcl:~$ python3 tcp_client.py
Server sent: b'HELLO'
user@pcl:~$ [ ]
```

```
user@pcl:~$ python3 tcp_client.py
Server sent: b'HELLO'
user@pcl:~$ [ ]
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
user@pcl:~$ python3 tcp_server.py
Good night
Good morning
Connection from: ('10.0.2.7', 45238)
Received: b'hello'
Client disconnected
Good night
Good morning
Connection from: ('10.0.2.7', 45240)
Received: b'hello'
Client disconnected
Good night
Good morning
[
```

```
user@pcl:~$ python3 tcp_client.py
Server sent: b'HELLO'
user@pcl:~$ [
```

```
user@pcl:~$ python3 tcp_client.py
Server sent: b'HELLO'
user@pcl:~$ [
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
698	63.22010...	10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN] Seq=0 Win=64240 Len=0 ...
699	63.22053...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6...
700	63.22055...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ...
701	63.22276...	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
702	63.22397...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280 ...
703	65.56656...	10.0.2.7	10.0.2.6	TCP	74 45240 - 12345 [SYN] Seq=0 Win=64240 Len=0 ...
704	65.56693...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45240 [SYN, ACK] Seq=0 Ack=1 Win=6...
705	65.56695...	10.0.2.7	10.0.2.6	TCP	66 45240 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ...
706	65.56690...	10.0.2.7	10.0.2.6	TCP	71 45240 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
707	65.56710...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45240 [ACK] Seq=1 Ack=6 Win=65280 ...
708	70.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6...
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6...
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...
712	70.75292...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=7 Ack=7 Win=65280 ...
713	80.76582...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45240 [PSH, ACK] Seq=1 Ack=6 Win=6...
714	80.76583...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45240 [FIN, ACK] Seq=6 Ack=6 Win=6...
715	80.76586...	10.0.2.7	10.0.2.6	TCP	66 45240 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
716	80.76612...	10.0.2.7	10.0.2.6	TCP	66 45240 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...
717	80.76630...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45240 [ACK] Seq=7 Ack=7 Win=65280 ...

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

tcp.stream eq 1

No.	Time	Source	Destination	Protocol	Length Info	Content	Action
698	63.22610...	10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN]	Seq=0 Win=44944 Len=8	Mark/Unmark Packet Ctrl+M
699	63.22653...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK]	Seq=1 Ack=1	Ignore/Unignore Packet Ctrl+D
700	63.22655...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK]	Seq=1 Ack=2	Set/Unset Time Reference Ctrl+F
701	63.22726...	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK]	Seq=2 Ack=2	Time Shift... Ctrl+Shift+T
702	63.22736...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK]	Seq=1 Ack=3	Packet Comment... Ctrl+Alt+C
703	70.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK]	Seq=2 Ack=3	Edit Resolved Name
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK]	Seq=3 Ack=4	Apply as Filter
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK]	Seq=6 Ack=4	Prepare as Filter
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK]	Seq=7 Ack=5	Conversation Filter
712	70.75292...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK]	Seq=7 Ack=6	Colorize Conversation

SCTP

Follow TCP Stream Ctrl+Alt+Shift+1  
Copy UDP Stream Ctrl+Alt+Shift+U  
Protocol Preferences TLS Stream Ctrl+Alt+Shift+S  
Decode As... HTTP Stream Ctrl+Alt+Shift+H  
Show Packet in New Window QUIC Stream

> Frame 698: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface enp0s3, id 0

> Ethernet II, Src: PcsCompu\_07:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)

> Internet Protocol Version 4, Src: 10.0.2.0, Dst: 10.0.2.6

> Transmission Control Protocol, Src Port: 45238, Dst Port: 12345, Seq: 0, Len: 0

```
0000  08 00 27 fd 74 72 00 00 27 e7 62 c6 00 00 45 00 .tr..`b..E
0010  00 3c ee 90 40 00 40 06 34 0f 00 00 02 07 0a 00 < 0 0 4
0020  02 06 b9 b6 30 39 cd 1c b5 2c 00 00 00 00 a0 02 :00 ,.
0030  fa f0 18 3b 00 00 02 04 b5 b4 04 02 00 0a 73 d0 ; 5
0040  cb e5 00 00 00 00 01 03 93 07 .....
```

Frame (iframe), 74 bytes

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

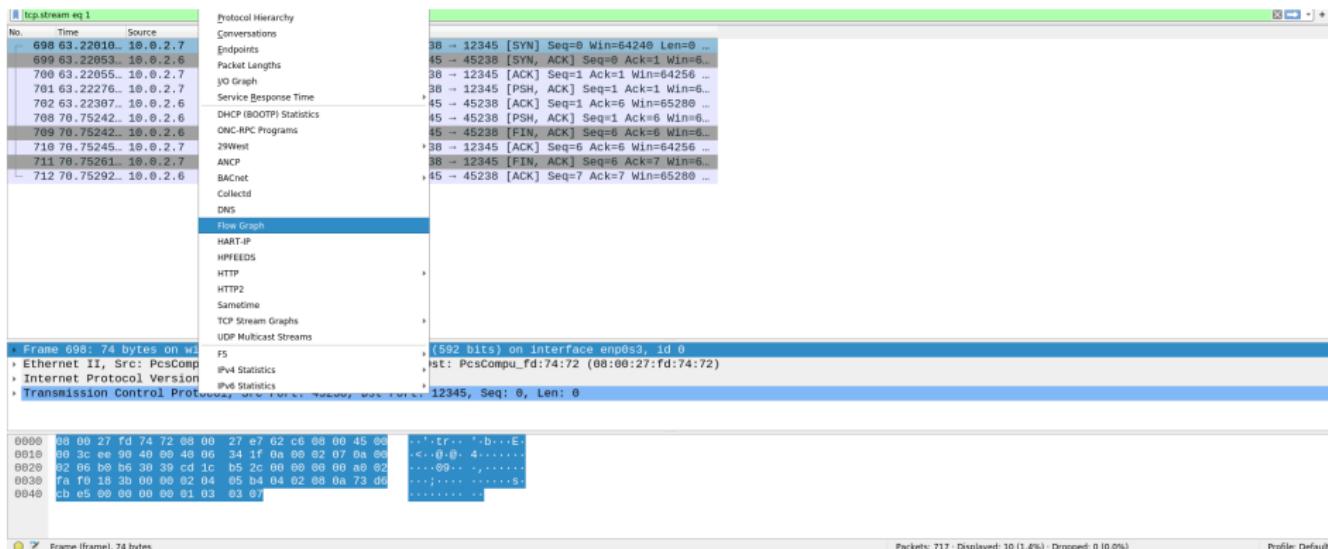
**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**



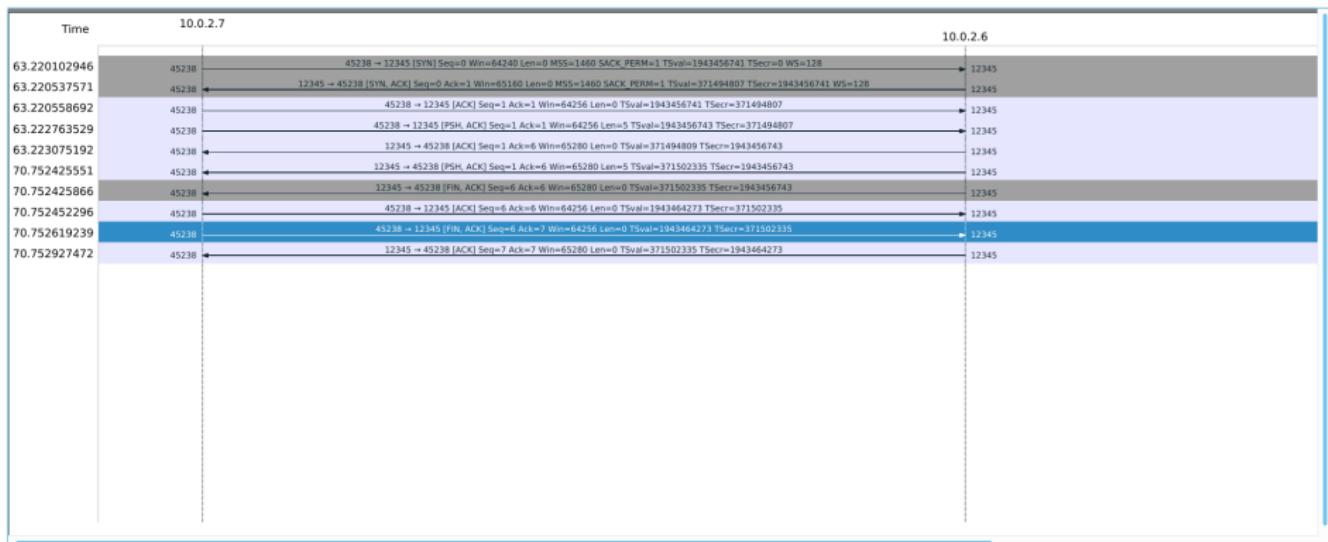
**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**



**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
698	63.22610.. 10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN]	Seq=0 Win=64240 Len=0 ...
699	63.22653.. 10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK]	Seq=0 Ack=1 Win=6 ...
700	63.22655.. 10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK]	Seq=1 Ack=1 Win=6256 ...
701	63.22726.. 10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK]	Seq=1 Ack=1 Win=6 ...
702	63.22737.. 10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK]	Seq=1 Ack=6 Win=65280 ...
708	70.75242.. 10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK]	Seq=1 Ack=6 Win=6 ...
709	70.75242.. 10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK]	Seq=6 Ack=6 Win=6 ...
710	70.75245.. 10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK]	Seq=6 Ack=6 Win=64256 ...
711	70.75261.. 10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK]	Seq=6 Ack=7 Win=6 ...
712	70.75292.. 10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK]	Seq=7 Ack=7 Win=65280 ...

> Ethernet II, Src: PcsCompu\_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)  
 > Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6  
 > Transmission Control Protocol, Src Port: 45238, Dst Port: 12345, Seq: 0, Len: 0

Source Port: 45238  
 Destination Port: 12345  
 [Stream index: 1]  
 [TCP Segment Len: 0]  
 Sequence number: 0 (relative sequence number)  
 Sequence number (raw): 3441210668  
 [Next sequence number: 1 (relative sequence number)]  
 Acknowledgment number: 0  
 Acknowledgment number (raw): 0  
 1010 ... = Header Length: 40 bytes (10)  
 > Flags: 0x0002 (SYN)  
 Window size value: 64240  
 [Calculated window size: 64240]  
 Checksum: 0x183b [unverified]  
 [Checksum Status: Unverified]  
 Urgent pointer: 0  
 > Options: (20 bytes), Maximum segment size, SACK permitted, Timestamps, No-Operation (NOP), Window scale  
 > [Timestamps]

0000 08 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ... tr . b . E .

Frame (iframel), 74 bytes

Packets: 717 - Displayed: 10 (1.4%) - Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

tcp stream eq 1

No.	Time	Source	Destination	Protocol	Length Info
698	63.22610..	10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN] Seq=0 Win=64240 Len=0 ..
699	63.22653..	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6..
700	63.22655..	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ..
701	63.22726..	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6..
702	63.22737..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280 ..
708	70.75242..	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6..
709	70.75242..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6..
710	70.75245..	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ..
711	70.75261..	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6..
712	70.75292..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=7 Ack=7 Win=65280 ..

Transmission Control Protocol, Src Port: 45238, Dst Port: 12345, Seq: 0, Len: 0  
 Source Port: 45238  
 Destination Port: 12345  
 [Stream index: 1]  
 [TCP Segment Len: 0]  
 Sequence number: 0 (relative sequence number)  
 Sequence number (raw): 3441210668  
 [Next sequence number: 1 (relative sequence number)]  
 Acknowledgment number: 0  
 Acknowledgment number (raw): 0  
 1010 ... = Header Length: 40 bytes (10)  
 Flags: 0x002 (SYN)  
 Window size value: 64240  
 [Calculated window size: 64240]  
 Checksum: 0x183b [unverified]  
 [Checksum Status: Unverified]  
 Urgent pointer: 0

Options: (20 bytes), Maximum segment size, SACK permitted, Timestamps, No-Operation (NOP), Window scale  
 > TCP Option - Maximum segment size: 1460 bytes  
 > TCP Option - SACK permitted  
 > TCP Option - Timestamps: TStamp 1943456741, TSectr 8  
 TCP Options (tcp.options), 20 bytes

0030 fa f0 18 3b 00 00 02 04 05 04 04 02 08 0a 73 d6 ...;..-....\$.

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

tcp.stream eq 1

No.	Time	Source	Destination	Protocol	Length Info
698	63.22010...	10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN] Seq=0 Win=64240 Len=0 ...
699	63.22053...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6...
700	63.22055...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ...
701	63.22276...	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
702	63.22307...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280 ...
708	70.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6...
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6...
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...
712	70.75292...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=7 Ack=7 Win=65280 ...

Transmission Control Protocol, Src Port: 12345, Dst Port: 45238, Seq: 0, Ack: 1, Len: 0  
 Source Port: 12345  
 Destination Port: 45238  
 [Stream index: 1]  
 [TCP Segment Len: 0]  
 Sequence number: 0 (relative sequence number)  
 Sequence number (raw): 3423377220  
 [Next sequence number: 1 (relative sequence number)]  
 Acknowledgment number: 1 (relative ack number)  
 Acknowledgment number (raw): 3441210669  
 1010 ... = Header Length: 40 bytes (10)  
 Flags: 0x012 (SYN, ACK)  
 Window size value: 65160  
 [Calculated window size: 65160]  
 Checksum: 0x8557 [unverified]  
 [Checksum Status: Unverified]  
 Urgent pointer: 0

Options: (20 bytes), Maximum segment size, SACK permitted, Timestamps, No-Operation (NOP), Window scale  
 > TCP Option - Maximum segment size: 1460 bytes  
 > TCP Option - SACK permitted  
 > TCP Option - Timestamps: TStamp 371494807, TSectr 1943456741  
 > TCP Option - No Operation (NOP)

```
0030 fe 88 85 57 00 00 02 04 05 04 04 02 08 0a 16 24  ...W..: .....$
```

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

tcp.stream eq 1

No.	Time	Source	Destination	Protocol	Length Info
698	63.22010...	10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN] Seq=0 Win=64240 Len=0 ...
699	63.22053...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6...
700	63.22055...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=6256 ...
701	63.22276...	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
702	63.22307...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280 ...
708	70.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6...
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6...
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...
712	70.75292...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=7 Ack=7 Win=65280 ...

Transmission Control Protocol, Src Port: 45238, Dst Port: 12345, Seq: 1, Ack: 1, Len: 0  
 Source Port: 45238  
 Destination Port: 12345  
 [Stream index: 1]  
 [TCP Segment Len: 0]  
 Sequence number: 1 (relative sequence number)  
 Sequence number (raw): 3441210669  
 [Next sequence number: 1 (relative sequence number)]  
 Acknowledgment number: 1 (relative ack number)  
 Acknowledgment number (raw): 3423377221  
 1000 ... = Header Length: 32 bytes (8)  
 Flags: 0x010 (ACK)  
 Window size value: 502  
 [Calculated window size: 64256]  
 [Window size scaling factor: 128]  
 Checksum: 0x1833 [unverified]  
 [Checksum Status: Unverified]  
 Urgent pointer: 0  
 Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps  
 + TCP Option - No-Operation (NOP)  
 + TCP Option - No-Operation (NOP)

0000 08 00 27 fd 74 72 00 00 27 e7 62 c6 08 00 45 00 ... tr .. b .. E.

wireshark\_eng03\_2021102105420\_NPme4F.pcapng

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
698	63.22010...	10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN] Seq=0 Win=64240 Len=0 ...
699	63.22053...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6...
700	63.22055...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ...
701	63.22276...	10.0.2.7	10.0.2.6	TCP	73 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
702	63.22307...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280 ...
703	70.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6...
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6...
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...
712	70.75292...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=7 Ack=7 Win=65280 ...

Transmission Control Protocol, Src Port: 45238, Dst Port: 12345, Seq: 1, Ack: 1, Len: 5  
 Source Port: 45238  
 Destination Port: 12345  
 [Stream index: 1]  
 [TCP Segment Len: 5]  
 Sequence number: 1 (relative sequence number)  
 Sequence number (raw): 3441210669  
 [Next sequence number: 6 (relative sequence number)]  
 Acknowledgment number: 1 (relative ack number)  
 Acknowledgment number (raw): 3423377221  
 1000 ... = Header Length: 32 bytes (8)  
 Flags: 0x018 (PSH, ACK)  
 Window size value: 502  
 [Calculated window size: 64256]  
 [Window size scaling factor: 128]  
 Checksum: 0x1838 [unverified]  
 [Checksum Status: Unverified]  
 Urgent pointer: 0  
 Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps  
 + TCP Option - No-Operation (NOP)  
 + TCP Option - No-Operation (NOP)

```
0000  08 00 27 fd 74 72 00 00 27 e7 62 c6 08 00 45 00 ...`tr--`b--E-
```

wireshark\_eng03\_20211102105620\_NPme4F.pcapng

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

Alice IP: 10.0.2.6  
Alice MAC: 08:00:27:4f:4f:b9

**Bob IP:** 10.0.2.7  
**Bob MAC:** 08:00:27:75:60:78

tcp.stream eq 1

No.	Time	Source	Destination	Protocol	Length	Info
698	63.22810...	10.0.2.7	10.0.2.6	TCP	74	45236 → 12345 [SYN] Seq=0 Win=64240 Len=0
699	63.22853...	10.0.2.6	10.0.2.7	TCP	74	12345 → 45238 [SYN, ACK] Seq=0 Ack=1 Win=6
700	63.22905...	10.0.2.7	10.0.2.6	TCP	66	45236 → 12345 [ACK] Seq=1 Ack=1 Win=64256
701	63.22276...	10.0.2.7	10.0.2.6	TCP	71	45236 → 12345 [PSH, ACK] Seq=1 Ack=1 Win=6
702	63.22387...	10.0.2.6	10.0.2.7	TCP	66	12345 → 45238 [ACK] Seq=1 Ack=6 Win=65280
708	70.75242...	10.0.2.6	10.0.2.7	TCP	71	12345 → 45238 [PSH, ACK] Seq=1 Ack=6 Win=6
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66	12345 → 45238 [FIN, ACK] Seq=6 Ack=6 Win=6
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66	45236 → 12345 [ACK] Seq=6 Ack=6 Win=64256
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66	45236 → 12345 [FIN, ACK] Seq=6 Ack=7 Win=6
712	70.75292...	10.0.2.6	10.0.2.7	TCP	66	12345 → 45238 [ACK] Seq=7 Ack=7 Win=65280

[Next sequence number: 6 (relative sequence number)]  
Acknowledgment number: 1 (relative ack number)  
Acknowledgment number (raw): 3423377221  
1000 .... = Header Length: 32 bytes (8)  
Flags: 0x018 (PSH, ACK)  
Window size value: 592  
[Calculated window size: 64256]  
[Window size scaling factor: 128]  
Checksum: 0xb1b38 [unverified]  
[Checksum Status: Unverified]  
Urgent pointer: 0  
Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps  
  + TCP Option - No-Operation (NOP)  
  + TCP Option - No-Operation (NOP)  
  + TCP Option - Timestamps: TStamp 1943456743, TSectr 371494807  
[SEQ/ACK analysis]  
[Timestamps]  
TCP payload (5 bytes)  
Data (5 bytes)  
Data: 08856c6c6f  
[Length: 5]

0000 00 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ... -tr- -b-E-

wireshark\_enp3\_2021102105620\_Npmef4P.pcapng

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

Default gateway IP: 10.0.2.1  
Default gateway MAC: 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

tcp.stream eq 1

No.	Time	Source	Destination	Protocol	Length Info
698	63.22810...	10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN] Seq=0 Win=64240 Len=0 ...
699	63.22853...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6...
700	63.22855...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ...
701	63.22876...	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
702	63.22877...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280
708	70.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6...
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6...
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...

Source Port: 12345  
 Destination Port: 45238  
 [Stream index: 1]  
 [TCP Segment Len: 0]  
 Sequence number: 1 (relative sequence number)  
 Sequence number (raw): 3423377221  
 [Next sequence number: 1 (relative sequence number)]  
 Acknowledgment number: 6 (relative ack number)  
 Acknowledgment number (raw): 3441210674  
 1000 .... = Header Length: 32 bytes (8)  
 Flags: 0x010 (ACK)  
 Window size value: 518  
 [Calculated window size: 65280]  
 [Window size scaling factor: 128]  
 Checksum: 0xb6b8 [unverified]  
 [Checksum Status: Unverified]  
 Urgent pointer: 0  
 - Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps  
   -> TCP Option - No-Operation (NOP)  
   -> TCP Option - No-Operation (NOP)  
   -> TCP Option - Timestamps: TSval 371494809, TSecr 1943456743  
 > [SEQ/ACK analysis]  
 > [Timestamps]

0000 08 00 27 e7 62 c6 08 00 27 fd 74 72 08 00 45 00 ..`-b-.. `-.tr..-E-

wireshark\_eng03\_20211102105620\_NPme4Fpcapng

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

Alice IP: 10.0.2.6  
Alice MAC: 08:00:27:4f:4f:b9

**Bob IP:** 10.0.2.7  
**Bob MAC:** 08:00:27:75:60:78

tcp stream eq 1						
No.	Time	Source	Destination	Protocol	Length	Info
698	6.22.81.16.	10.0.2.7	10.0.2.6	TCP	74	45238 - 12345 [SYN] Seq=0 Win=64240 Len=0
699	6.22.81.16.	10.0.2.6	10.0.2.7	TCP	74	12345 - 45238 [SYN, ACK] Seq=1 Ack=1 Win=6
700	6.22.81.16.	10.0.2.7	10.0.2.6	TCP	66	45238 - 12345 [ACK] Seq=1 Ack=1 Win=64240
701	6.22.72.16.	10.0.2.7	10.0.2.6	TCP	71	45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6
702	6.23.23.07.	10.0.2.6	10.0.2.7	TCP	66	12345 - 45238 [ACK] Seq=1 Ack=6 Win=65262
703	6.22.72.16.	10.0.2.6	10.0.2.7	TCP	71	12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6
704	6.22.72.16.	10.0.2.6	10.0.2.7	TCP	66	45238 - 12345 [ACK] Seq=1 Ack=6 Win=6
705	6.22.72.16.	10.0.2.7	10.0.2.6	TCP	66	12345 - 45238 [FIN, ACK] Seq=7 Win=6
710	6.22.72.16.	10.0.2.7	10.0.2.6	TCP	66	45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256
711	6.22.72.16.	10.0.2.7	10.0.2.6	TCP	66	45238 - 12345 [FIN, ACK] Seq=7 Win=6

```
Sequence number: 1 (relative sequence number)
Sequence number (raw): 3423377221
[Next sequence number: 6 (relative sequence number)]
Acknowledgment number: 6 (relative ack number)
Acknowledgment number (raw): 3441218674
1000 .... = Header Length: 32 bytes (8)
Flags: 0x018 (PSH, ACK)
Window size value: 510
[Calculated window size: 65280]
[Window size scaling factor: 128]
Checksum: 0xafa8 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps
    + TCP Option - No-Operation (NOP)
    + TCP Option - No-Operation (NOP)
    + TCP Option - Timestamps: TSval 371502335, TSeср 1943456743
[SEQ/ACK analysis]
[timestamps]
TCP payload (5 bytes)
Data (5 bytes)
Data: 48454c4c4f
[Length: 51]
```

[Concerto 6] ...b... 'tr' E

— 1 —

Default gateway IP: 10.0.2.1  
Default gateway MAC: 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
698	63.22010...	10.0.2.7	10.0.2.6	TCP	74 45238 - 12345 [SYN] Seq=0 Win=64240 Len=0 ...
699	63.22053...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6...
700	63.22055...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ...
701	63.22276...	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
702	63.22307...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280 ...
703	60.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6...
704	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6...
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...
712	70.75262...	10.0.2.6	10.0.2.7	TCP	66 45238 - 12345 [ACK] Seq=7 Ack=7 Win=6...

Transmission Control Protocol, Src Port: 12345, Dst Port: 45238, Seq: 6, Ack: 6, Len: 0

```

Source Port: 12345
Destination Port: 45238
[Stream index: 1]
[TCP Segment Len: 0]
Sequence number: 6 (relative sequence number)
Sequence number (raw): 3423377226
[Next sequence number: 7 (relative sequence number)]
Acknowledgment number: 6 (relative ack number)
Acknowledgment number (raw): 3441210674
1000 ... = Header Length: 32 bytes (8)
Flags: 0x011 (FIN, ACK)
Window size value: 510
[Calculated window size: 65280]
[window size scaling factor: 128]
Checksum: 0x9339 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps
  > TCP Option - No-Operation (NOP)
  > TCP Option - No-Operation (NOP)
  > TCP Option - Timestamps: TStamp 371502335, TSectr 1943456743
  > [Timestamps]
```

0000 08 00 27 e7 62 c6 08 00 27 fd 74 72 08 00 45 00 ...`-b--`-tr--E-

wireshark\_enp0s3\_20211102105620\_NPme4Fpcapng

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

Alice IP: 10.0.2.6  
Alice MAC: 08:00:27:4f:4f:b9

**Bob IP: 10.0.2.7**

tcp stream eq 1						
No.	Time	Source	Destination	Protocol	Length	Info
698	6.22.16.10.6.2.7	16.6.2.6	TCP	74	45238 - 12345	[SYN] Seq=0 Win=64240 Len=0
699	6.22.16.10.6.2.6	16.6.2.7	TCP	74	45238 - 45238	[SYN, ACK] Seq=0 Win=64240 Len=0
700	6.22.16.10.6.2.7	16.6.2.6	TCP	66	45238 - 12345	[ACK] Seq=1 Ack=1 Win=64240 Len=0
701	6.22.16.10.6.2.7	16.6.2.6	TCP	71	45238 - 12345	[PSH, ACK] Seq=1 Ack=1 Win=64240 Len=0
702	6.22.16.10.6.2.6	16.6.2.7	TCP	66	12345 - 45238	[ACK] Seq=1 Ack=6 Win=56289 Len=0
708	7.6.75.242.10.6.2.6	16.6.2.7	TCP	71	12345 - 45238	[PSH, ACK] Seq=1 Ack=6 Win=56289 Len=0
709	7.6.75.242.10.6.2.6	16.6.2.7	TCP	66	12345 - 45238	[FIN, ACK] Seq=6 Win=56289 Len=0
710	7.6.75.245.10.6.2.7	16.6.2.6	TCP	66	45238 - 12345	[ACK] Seq=6 Win=47526 Len=0
711	7.6.75.261.10.6.2.7	16.6.2.6	TCP	66	45238 - 12345	[FIN, ACK] Seq=7 Win=56289 Len=0

```
Source Port: 45238
Destination Port: 12345
[Stream index: 1]
[TCP Segment Len: 0]
Sequence number: 6 (relative sequence number)
Sequence number (raw): 3441218674
[Next sequence number: 6 (relative sequence number)]
Acknowledgment number: 6 (relative ack number)
Acknowledgment number (raw): 3423377226
1000 .... + Header Length: 32 bytes (8)
+ Flags: 0x010 (ACK)
Window size value: 582
[Calculated window size: 64256]
[Window size scaling factor: 128]
Checksum: 0x1833 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
- Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps
  + TCP Option - No-Operation (NOP)
  + TCP Option - No-Operation (NOP)
  + TCP Option - Timestamps: Tsvr 1943464273, TSecr 371502335
[SEQ/ACK analysis]
[Timestamps]
```

0000 08 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ...tr...`-b...

Packets: 313 · Discarded: 10 (3.4%) · Dropped: 0 (0.0%)

Profile: Default

Default gateway IP: 10.0.2.1  
Default gateway MAC: 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

tcp.stream eq 1

No.	Time	Source	Destination	Protocol	Length Info
699	63.22053...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6...
700	63.22055...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ...
701	63.22276...	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
702	63.22307...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280 ...
708	70.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6...
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6...
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...
712	70.75292...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=7 Ack=7 Win=65280 ...

```

Source Port: 45238
Destination Port: 12345
[Stream index: 1]
[TCP Segment Len: 0]
Sequence number: 6      (relative sequence number)
Sequence number (raw): 3441210674
[Next sequence number: 7      (relative sequence number)]
Acknowledgment number: 7      (relative ack number)
Acknowledgment number (raw): 3423377227
1000 .... = Header Length: 32 bytes (8)
Flags: 0x011 (FIN, ACK)
Window size value: 502
[Calculated window size: 64256]
[Window size scaling factor: 128]
Checksum: 0x1833 [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
- Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps
  > TCP Option - No-Operation (NOP)
  > TCP Option - No-Operation (NOP)
  > TCP Option - Timestamps: TSval 1943464273, TSevr 371502335
  > [SEQ/ACK analysis]
  > [Timestamps]

```

0000 08 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ..`..tr..`..E..

wireshark\_enp0s3\_2021102105620\_NPme4Fpcapng

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
699	63.22053...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45238 [SYN, ACK] Seq=0 Ack=1 Win=6...
700	63.22055...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=1 Ack=1 Win=64256 ...
701	63.22276...	10.0.2.7	10.0.2.6	TCP	71 45238 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=6...
702	63.22307...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=1 Ack=6 Win=65280 ...
708	70.75242...	10.0.2.6	10.0.2.7	TCP	71 12345 - 45238 [PSH, ACK] Seq=1 Ack=6 Win=6...
709	70.75242...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [FIN, ACK] Seq=6 Ack=6 Win=6...
710	70.75245...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [ACK] Seq=6 Ack=6 Win=64256 ...
711	70.75261...	10.0.2.7	10.0.2.6	TCP	66 45238 - 12345 [FIN, ACK] Seq=6 Ack=7 Win=6...
712	70.75292...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45238 [ACK] Seq=7 Ack=7 Win=65280 ...

Source Port: 12345  
 Destination Port: 45238  
 [Stream index: 1]  
 [TCP Segment Len: 0]  
 Sequence number: 7 (relative sequence number)  
 Sequence number (raw): 3423377227  
 [Next sequence number: 7 (relative sequence number)]  
 Acknowledgment number: 7 (relative ack number)  
 Acknowledgment number (raw): 3441210675  
 1000 .... = Header Length: 32 bytes (8)  
 Flags: 0x010 (ACK)  
 Window size value: 510  
 [Calculated window size: 65280]  
 [Window size scaling factor: 128]  
 Checksum: 0x75ce [unverified]  
 [Checksum Status: Unverified]  
 Urgent pointer: 0  
 - Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps  
   ↳ TCP Option - No-Operation (NOP)  
   ↳ TCP Option - No-Operation (NOP)  
   ↳ TCP Option - Timestamps: TSval 371502335, TSecr 1943464273  
 ↳ [SEQ/ACK analysis]  
 ↳ [Timestamps]

```
0000  08 00 27 e7 62 c6 08 00  27 fd 74 72 08 00 45 00  ..`-b--`-tr--E-
```

wireshark\_eng03\_2021102105620\_NPme4Fncaping

Packets: 717 · Displayed: 10 (1.4%) · Dropped: 0 (0.0%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
GNU nano 4.8          tcp_server.py
import socket, time
server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server.bind(('127.0.0.1',12345))
server.listen(5)
while True:
    client_socket, client_address = server.accept()
    print('Connection from: ', client_address)
    data = client_socket.recv(100)
    print('Received: ', data)
    client_socket.send(data.upper() * 10000)
    data = client_socket.recv(100)
    print('Received: ', data)
    client_socket.close()
    print('Client disconnected')
```

```
user@pcl:~          tcp_client.py
Modified [M]
GNU nano 4.8
import socket
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect(("10.0.2.6", 12345))
for i in range(5):
    s.send(b'Hello')
    s.recv(6)
data = ''
while len(data) < 50000:
    temp = s.recv(6)
    print('Server sent: ', temp)
    data += temp
s.close()
```

[ Read 22 lines ]  
Get Help Write Out Where Is Cut Text Justify Cur Pos  
Exit Read File Replace Paste Text To Spell Go To Line

Get Help Write Out Where Is Cut Text Justify Cur Pos  
Exit Read File Replace Paste Text To Spell Go To Line  
user@pcl:~ user@pcl:~ place

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

Alice IP: 10.0.2.6

Alice MAC: 08:00:27:4f:4f:b9

Bob IP: 10.0.2.7

Bob MAC: 08:00:27:75:60:78

```
user@bcl1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45272)
Received: b'hellohellohellohello'
Traceback (most recent call last):
  File "tcp_server.py", line 18, in <module>
    data = client_socket.recv(108)
ConnectionResetError: [Errno 104] Connection reset by peer
user@bcl1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45274)
Received: b'hello'
Received: b'hellohellohellohello'
Client disconnected.
```

Default gateway IP: 10.0.2.1  
Default gateway MAC: 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
45	71.01947..	10.0.2.7	10.0.2.6	TCP	74 45274 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1466 SACK_PERM=1 TSval=1945883935 TSecr=0 W5=128
46	71.01995..	10.0.2.6	10.0.2.7	TCP	74 12345 - 45274 [SYN, ACK] Seq=0 Ack=1 Wln=65160 Len=0 MSS=1466 SACK_PERM=1 TSval=373921400 TSecr=..
47	71.01996..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [ACK] Seq=1 Ack=1 Wln=64256 Len=0 TSval=1945883936 TSecr=373921400
48	71.01999..	10.0.2.7	10.0.2.6	TCP	71 45274 - 12345 [PSH, ACK] Seq=1 Ack=1 Wln=64256 Len=5 TSval=1945883936 TSecr=373921400
49	71.02040..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45274 [ACK] Seq=1 Ack=6 Wln=65280 Len=0 TSval=373921401 TSecr=1945883936
50	71.02041..	10.0.2.7	10.0.2.6	TCP	86 45274 - 12345 [PSH, ACK] Seq=6 Ack=1 Wln=64256 Len=20 TSval=1945883936 TSecr=373921401
51	71.02070..	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45274 [PSH, ACK] Seq=6 Ack=6 Wln=65280 Len=7240 TSval=373921401 TSecr=1945883936
52	71.02070..	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45274 [PSH, ACK] Seq=7:241 Ack=6 Wln=65280 Len=7240 TSval=373921401 TSecr=1945883936
53	71.02072..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [ACK] Seq=26 Ack=7:241 Wln=65280 Len=0 TSval=1945883936 TSecr=373921401
54	71.02075..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [ACK] Seq=26 Ack=14481 Wln=55808 Len=0 TSval=1945883936 TSecr=373921401
55	71.02078..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45274 [ACK] Seq=14481 Ack=26 Wln=65280 Len=0 TSval=373921401 TSecr=1945883936
56	71.02197..	10.0.2.6	10.0.2.7	TCP	18.. 12345 - 45274 [PSH, ACK] Seq=14481 Ack=26 Wln=65280 Len=16136 TSval=373921401 TSecr=1945883936
57	71.02197..	10.0.2.6	10.0.2.7	TCP	14.. 12345 - 45274 [PSH, ACK] Seq=24617 Ack=26 Wln=65280 Len=14480 TSval=373921401 TSecr=1945883936
58	71.02108..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [ACK] Seq=26 Ack=24617 Wln=49152 Len=0 TSval=1945883937 TSecr=373921401
59	71.02109..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [ACK] Seq=26 Ack=30097 Wln=39424 Len=0 TSval=1945883937 TSecr=373921401
60	71.02111..	10.0.2.6	10.0.2.7	TCP	44.. 12345 - 45274 [PSH, ACK] Seq=39097 Ack=26 Wln=65280 Len=4344 TSval=373921401 TSecr=1945883936
61	71.02112..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [ACK] Seq=26 Ack=43441 Wln=36488 Len=0 TSval=1945883937 TSecr=373921401
62	71.02142..	10.0.2.6	10.0.2.7	TCP	29.. 12345 - 45274 [PSH, ACK] Seq=43441 Ack=26 Wln=65280 Len=2896 TSval=373921402 TSecr=1945883937
63	71.02142..	10.0.2.6	10.0.2.7	TCP	37.. 12345 - 45274 [FIN, PSH, ACK] Seq=46337 Ack=26 Wln=65280 Len=3664 TSval=373921402 TSecr=194588393..
64	71.02143..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [ACK] Seq=26 Ack=46337 Wln=34560 Len=0 TSval=1945883937 TSecr=373921402
65	71.02172..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [ACK] Seq=26 Ack=50002 Wln=31616 Len=0 TSval=1945883937 TSecr=373921402
66	71.25544..	10.0.2.7	10.0.2.6	TCP	66 45274 - 12345 [FIN, ACK] Seq=26 Ack=50002 Win=64128 Len=0 TSval=1945884171 TSecr=373921402
67	71.25579..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45274 [ACK] Seq=50002 Ack=27 Wln=65280 Len=0 TSval=373921636 TSecr=1945884171

**Default gateway IP: 10.0.2.1**

**Default gateway MAC: 52:54:00:12:35:00**

Packets: 71 | Displayed: 23 (32.4%)

Profile: Default

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
GNU nano 4.8                               tcp_server.py
import socket, time

server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server.bind(('127.0.0.1',12345))
server.listen(5)

while True:
    client_socket, client_address = server.accept()
    print('Connection from: ', client_address)

    data = client_socket.recv(100)
    print('Received: ', data)

    client_socket.send(data.upper() * 2000)

    data = client_socket.recv(100)
    print('Received: ', data)

    client_socket.close()
    print('Client disconnected')
```

```
GNU nano 4.8                               tcp_client.py
import socket

s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect(('10.0.2.6', 12345))

s.send(b'hello')
s.send(b'hello')
s.send(b'hello')
s.send(b'hello')
s.send(b'hello')

data = bytes('', 'utf-8')
while len(data) < 10000:
    temp = s.recv(6)
    print('Server sent: ', temp)
    data += temp

s.close()
```

[ Read 22 lines ]  
^G Get Help ^O Write Out ^W Where Is ^X Cut Text ^J Justify ^C Cur Pos  
^X Exit ^R Read File ^M Replace ^U Paste Text ^T To Spell ^A Go To Line

[ Read 19 lines ]  
^G Get Help ^O Write Out ^W Where Is ^X Cut Text ^J Justify ^C Cur Pos  
^X Exit ^R Read File ^M Replace ^U Paste Text ^T To Spell ^A Go To Line

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

Alice IP: 10.0.2.6

Alice MAC: 08:00:27:4f:4f:b9

Bob IP: 10.0.2.7

Bob MAC: 08:00:27:75:60:78

```
user@pc1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45296)
Received: b'hello'
Received: b'hellohellohellohello'
Client disconnected
```

Default gateway IP: 10.0.2.1  
Default gateway MAC: 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1946873413 TSecr=374910876
5	0.000943592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=1 Ack=6 Win=65288 Len=0 TSval=374910876 TSecr=1946873413
6	0.000949864	10.0.2.7	10.0.2.6	TCP	86 45296 - 12345 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=20 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296 [PSH, ACK] Seq=7 Ack=1 Win=65288 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296 [PSH, ACK] Seq=7241 Ack=6 Win=65288 Len=2766 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10801 Ack=26 Win=65288 Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=7241 Win=0@672 Len=0 TSval=1946873414 TSecr=374910876
11	0.001243948	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=10801 Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [FIN, ACK] Seq=10801 Ack=26 Win=65288 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [FIN, ACK] Seq=26 Ack=10802 Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.041293781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10802 Ack=27 Win=65288 Len=0 TSval=374910916 TSecr=1946873454

Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)  
 Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6  
 Transmission Control Protocol, Src Port: 45296, Dst Port: 12345, Seq: 0, Len: 0

```
0000  00 00 27 fd 74 72 00 00 27 e7 62 c6 00 00 45 00 ..`tr ..`b..E
0001  00 3c 72 f7 40 00 48 06 af b4 0a 00 02 07 0a 00 ..<@.0......
0020  02 06 b9 f0 39 0f hf 0e 81 00 00 00 00 00 02 .....69......
0030  fa f9 18 3b 00 00 02 04 05 b4 04 02 00 00 0a 74 0a ..;.....t.
0040  ee 45 00 00 00 00 01 03 03 07 E.....
```

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

Alice IP: 10.0.2.6

Alice MAC: 08:00:27:4f:4f:b9

Bob IP: 10.0.2.7

Bob MAC: 08:00:27:75:60:78

tcp.stream eg 6										
No.	Time	Source	Destination	Protocol	Length	Info				
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74	45296 - 12345 [SYN] Seq=0 Win=64248 Len=0 MSS=1468 SACK_PERM=1 Tsval=1946873413 Tsecr=0 WS=128				
2	0.0005104400	10.0.2.6	10.0.2.7	TCP	74	12345 - 45296 [SYN, ACK] Seq=0 Win=65166 Len=0 MSS=1468 SACK_PERM=1 Tsval=374910876 Tsecr=1946873413 WS=128				
3	0.0005029050	10.0.2.7	10.0.2.6	TCP	66	45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 Tsval=1946873413 Tsecr=374910876				
4	0.0005033800	10.0.2.7	10.0.2.6	TCP	74	45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 Tsval=1946873413 Tsecr=374910876				
5	0.0005044592	10.0.2.7	10.0.2.6	TCP	66	12345 - 45296 [ACK] Seq=1 Ack=6 Win=65268 Len=0 Tsval=374910876 Tsecr=1946873413				
6	0.0005049864	10.0.2.7	10.0.2.6	TCP	66	45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=29 Tsval=1946873414 Tsecr=374910876				
7	0.0011225022	10.0.2.6	10.0.2.7	TCP	73	12345 - 45296 [PSH, ACK] Seq=1 Ack=1 Win=65268 Len=7246 Tsval=374910876 Tsecr=1946873413				
8	0.0011225129	10.0.2.6	10.0.2.7	TCP	28	12345 - 45296 [PSH, ACK] Seq=7241 Ack=6 Win=65268 Len=2766 Tsval=374910876 Tsecr=1946873413				
9	0.0011225164	10.0.2.6	10.0.2.7	TCP	66	12345 - 45296 [ACK] Seq=16981 Ack=26 Win=65268 Len=0 Tsval=374910876 Tsecr=1946873414				
10	0.0011235432	10.0.2.7	10.0.2.6	TCP	66	45296 - 12345 [ACK] Seq=26 Ack=7241 Win=66072 Len=0 Tsval=1946873414 Tsecr=374910876				
11	0.0011243498	10.0.2.7	10.0.2.6	TCP	66	12345 - 45296 [ACK] Seq=169811 Win=68572 Len=0 Tsval=1946873414 Tsecr=374910876				
12	0.0011696321	10.0.2.7	10.0.2.6	TCP	66	12345 - 45296 [FIN, ACK] Seq=169811 Win=68572 Len=0 Tsval=374910877 Tsecr=1946873414				
13	0.0014977991	10.0.2.7	10.0.2.6	TCP	66	45296 - 12345 [ACK] Seq=26 Ack=169802 Win=64256 Len=0 Tsval=1946873405 Tsecr=374910877				
14	0.0015000000	10.0.2.7	10.0.2.6	TCP	66	12345 - 45296 [ACK] Seq=26 Ack=169801 Win=64256 Len=0 Tsval=1946873405 Tsecr=374910877				

```
Frame 2: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface enp0s3, id 0
Ethernet II, Src: PcsCompu.Fd:74:72 (08:00:27:fd:74:72), Dst: PcsCompu.et:62:c6 (08:00:27:e7:62:c6)
Internet Protocol Version 4, Src: 18.0.2.6, Dst: 19.0.2.7
Transmission Control Protocol, Src Port: 17245, Dst Port: 45294, Seq: 8, Ack: 1, Len: 8
```

```
0000 00 00 27 e7 62 c6 00 00 27 fd 74 72 00 00 45 00 .`b..`tr..E.
0010 00 3c 00 00 40 00 40 06 22 b0 00 00 02 00 06 00 <@.0@=-
0020 62 87 30 39 b6 f8 af bb 09 4f 8f bf ee 82 a9 12 .89.
0030 ff 8e 4f fb 00 00 02 04 05 b4 04 02 00 00 16 58 0...X
0040 05 0c 7a 00 00 05 b2 01 02 03 .5.
```

Packets: 34 • Played: 34 (22-12)

Profile-Ref-0

Default gateway IP: 10.0.2.1  
Default gateway MAC: 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1946873413 TSecr=374910876
5	0.000943592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=1 Ack=6 Win=65288 Len=0 TSval=374910876 TSecr=1946873413
6	0.000949864	10.0.2.7	10.0.2.6	TCP	86 45296 - 12345 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=20 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296 [PSH, ACK] Seq=7241 Ack=6 Win=65280 Len=2766 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10801 Ack=26 Win=65280 Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=7241 Win=0 TSval=1946873414 TSecr=374910876
11	0.001243948	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=10801 Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [FIN, ACK] Seq=10801 Ack=26 Win=65280 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [FIN, ACK] Seq=26 Ack=10802 Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.041293781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10802 Ack=27 Win=65280 Len=0 TSval=374910916 TSecr=1946873454

Frame 3: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)  
 Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6  
 Transmission Control Protocol, Src Port: 45296, Dst Port: 12345, Seq: 1, Ack: 1, Len: 0

```
0000 00 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ..`tr` ..`b..E
0010 00 34 72 f8 40 00 48 06 af bf 0a 00 02 07 0a 00 ..4r @@......
0020 02 06 b0 f0 39 0f hf 0e 82 af bb 09 f5 00 10 ..-09......
0030 01 f6 18 33 00 00 01 01 08 0a 74 0a ee 45 16 58 ..-3....t..-EX
0040 af 9c ..
```

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1946873414 TSecr=374910876
5	0.000944350	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=1 Ack=6 Win=65280 Len=0 TSval=374910876 TSecr=1946873413
6	0.0009449864	10.0.2.7	10.0.2.6	TCP	86 45296 - 12345 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=20 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296 [PSH, ACK] Seq=6 Ack=1 Win=65280 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296 [PSH, ACK] Seq=7 Ack=1 Win=65280 Len=7240 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10001 Ack=26 Win=65280 Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=26 Win=65280 Len=0 TSval=1946873414 TSecr=374910876
11	0.001239348	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=10001 Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [FIN, ACK] Seq=10001 Ack=26 Win=65280 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [FIN, ACK] Seq=26 Ack=10002 Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.04193781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10002 Ack=27 Win=65280 Len=0 TSval=374910916 TSecr=1946873454

```

> Frame 4: 71 bytes on wire (568 bits), 71 bytes captured (568 bits) on interface enp0s3, id 0
> Ethernet II, Src: PcsCompu_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu_fd:74:72 (08:00:27:fd:74:72)
> Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6
> Transmission Control Protocol, Src Port: 45296, Dst Port: 12345, Seq: 1, Ack: 1, Len: 5
> Data (5 bytes)


```

```

0000  00 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ..`tr . `b..E
0001  00 39 72 f9 40 00 48 06 af b5 0a 00 02 07 0a 00 ..9@ @. .....
0020  02 06 b6 ff 39 0f hf 0e 82 af bb 09 f5 00 18 .....9. .....
0030  01 f6 18 38 00 00 01 b1 08 0a 74 0a ee 45 16 58 ..8... t..EX
0040  af 9c 68 65 6c 6c 6f ..hello


```

Packets: 24 · Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1946873413 TSecr=374910876
5	0.000943592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=1 Ack=6 Win=65280 Len=0 TSval=374910876 TSecr=1946873413
6	0.000949864	10.0.2.7	10.0.2.6	TCP	86 45296 - 12345 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=0 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296 [PSH, ACK] Seq=6 Ack=1 Win=65280 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296 [PSH, ACK] Seq=7241 Ack=6 Win=65280 Len=2766 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10801 Ack=26 Win=65280 Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=7241 Win=00672 Len=0 TSval=1946873414 TSecr=374910876
11	0.001239348	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=108001 Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [FIN, ACK] Seq=108001 Ack=26 Win=65280 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [FIN, ACK] Seq=26 Ack=108002 Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.04193781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=108002 Ack=27 Win=65280 Len=0 TSval=374910916 TSecr=1946873454

Frame 5: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_fd:74:72 (08:00:27:fd:74:72), Dst: PcsCompu\_e7:c6:c6 (08:00:27:e7:c6:c6)  
 Internet Protocol Version 4, Src: 10.0.2.6, Dst: 10.0.2.7  
 Transmission Control Protocol, Src Port: 12345, Dst Port: 45296, Seq: 1, Ack: 6, Len: 0

```
0000 00 00 27 e7 62 c6 08 00 27 fd 74 72 08 00 45 00 ..`b.. `tr..E
0010 00 34 29 c4 00 48 06 78 eb 0a 00 02 06 0a 00 ..4) 0@......
0020 02 07 39 39 b0 af bb 09 f5 0f bf 0e 87 00 10 ..69......
0030 01 fe 7b 4d 00 00 01 01 08 0a 16 58 af 9c 74 0a ..{M.....X.-t..
0040 ee 45 ..E
```

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1946873413 TSecr=374910876
5	0.000943592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=1 Ack=6 Win=65280 Len=0 TSval=374910876 TSecr=1946873413
6	0.000949864	10.0.2.7	10.0.2.6	TCP	86 45296 - 12345 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=29 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296 [PSH, ACK] Seq=1 Ack=1 Win=65280 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296 [PSH, ACK] Seq=7241 Ack=6 Win=65280 Len=2766 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10801 Ack=26 Win=65280 Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=7241 Win=0@672 Len=0 TSval=1946873414 TSecr=374910876
11	0.001239348	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=108001 Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [FIN, ACK] Seq=108001 Ack=26 Win=65280 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [FIN, ACK] Seq=26 Ack=108002 Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.041293781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=108002 Ack=27 Win=65280 Len=0 TSval=374910916 TSecr=1946873454

```

> Frame 6: 86 bytes on wire (688 bits), 86 bytes captured (688 bits) on interface enp0s3, id 0
> Ethernet II, Src: PcsCompu_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu_fd:74:72 (08:00:27:fd:74:72)
> Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6
> Transmission Control Protocol, Src Port: 45296, Dst Port: 12345, Seq: 6, Ack: 1, Len: 20
> Data (20 bytes)

```

```

0000 00 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ..`tr . `b..E
0010 00 48 72 fa 00 48 06 af a9 0a 00 02 07 0a 00 ..H@ @. .....
0020 02 06 b9 f0 39 0f hf 0e 87 af bb 09 f5 00 18 ..09. .....
0030 01 f6 18 47 00 00 01 b1 08 0a 74 0a ee 46 16 58 ..G... -t -F X
0040 af 9c 68 65 6c 6c 6f 68 65 6c 6c 6f 68 65 6c 6c ..hello hellohell
0050 6f 68 65 6c 6f

```

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info	tcp stream eg 0			
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345	[SYN]	Seq=0	Win=64240	Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296	[SYN, ACK]	Seq=0	Ack=1	Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[ACK]	Seq=1	Ack=1	Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345	[PSH, ACK]	Seq=1	Ack=1	Win=64256 Len=5 TSval=1946873413 TSecr=374910876
5	0.0006943592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296	[ACK]	Seq=1	Ack=6	Win=65288 Len=0 TSval=374910876 TSecr=1946873413
6	0.0006949864	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[PSH, ACK]	Seq=6	Ack=1	Win=64256 Len=20 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296	[PSH, ACK]	Seq=1	Ack=1	Win=65280 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296	[PSH, ACK]	Seq=7241	Ack=6	Win=65280 Len=27680 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296	[ACK]	Seq=10801	Ack=2	Win=65280 Len=0 TSval=374910876 TSecr=1946873414
10	0.001225432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[ACK]	Seq=2	Ack=7241	Win=60672 Len=0 TSval=1946873414 TSecr=374910876
11	0.001243948	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[ACK]	Seq=2	Ack=10800	Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296	[FIN, ACK]	Seq=10800	Ack=26	Win=65280 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[FIN, ACK]	Seq=26	Ack=10802	Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.04193781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296	[ACK]	Seq=10802	Ack=27	Win=65280 Len=0 TSval=374910916 TSecr=1946873454

Frame 7: 7306 bytes on wire (58448 bits), 7306 bytes captured (58448 bits) on interface enp0s3, id 0

Ethernet II, Src: PcsCompu\_fd:74:72 (08:00:27:fd:74:72), Dst: PcsCompu\_e7:c6:c6 (08:00:27:e7:62:c6)

Internet Protocol Version 4, Src: 10.0.2.6, Dst: 10.0.2.7

Transmission Control Protocol, Src Port: 12345, Dst Port: 45296, Seq: 1, Ack: 6, Len: 7240

Data (7240 bytes)

0000	00 00 27 e7 62 c6 00 00	27 fd 74 72 00 00 45 00	..`b-` `tr- E
0010	1c 7c 29 cd 40 00 48 06	dc a2 0a 00 02 00 0a 00	] ) @- .....
0020	02 07 39 39 bd f0 af 0b	ff 5f 0f bf 0e 87 00 18	.09- .....
0030	01 fe 34 7b 00 00 01 01	08 0a 16 58 af 9c 74 0a	.4f- X- t
0040	ed 45 48 45 4c 4c 4f 48	45 4c 4c 47 48 45 4c 4c	EHELL0H ELLOHELL
0050	4f 48 45 4c 4c 4f 48 45	4c 4c 4f 48 45 4c 4c 4f	ELLOL0HE LLOHELLO

wireshark\_enp0s3\_20211102115301\_f0C49F.pcapng

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info	tcp stream eg 0				
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345	[SYN]	Seq=0	Win=64240	Len=0	MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296	[SYN, ACK]	Seq=0	Ack=1	Win=65160	Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[ACK]	Seq=1	Ack=1	Win=64256	Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345	[PSH, ACK]	Seq=1	Ack=1	Win=64256	Len=5 TSval=1946873413 TSecr=374910876
5	0.0006943592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296	[ACK]	Seq=1	Ack=6	Win=65280	Len=0 TSval=374910876 TSecr=1946873413
6	0.0006949864	10.0.2.7	10.0.2.6	TCP	86 45296 - 12345	[PSH, ACK]	Seq=6	Ack=1	Win=64256	Len=29 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296	[PSH, ACK]	Seq=6	Ack=1	Win=65280	Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296	[PSH, ACK]	Seq=7241	Ack=6	Win=65280	Len=2766 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296	[ACK]	Seq=10801	Ack=26	Win=65280	Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[ACK]	Seq=2	Ack=7241	Win=60672	Len=0 TSval=1946873414 TSecr=374910876
11	0.001234948	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[ACK]	Seq=2	Ack=10801	Win=58752	Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296	[FIN, ACK]	Seq=10801	Ack=26	Win=65280	Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345	[FIN, ACK]	Seq=26	Ack=10802	Win=64128	Len=0 TSval=1946873454 TSecr=374910877
14	0.04193781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296	[ACK]	Seq=10802	Ack=27	Win=65280	Len=0 TSval=374910916 TSecr=1946873454

Frame 8: 2826 bytes on wire (22608 bits), 2826 bytes captured (22608 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_fd:74:72 (08:00:27:fd:74:72), Dst: PcsCompu\_e7:c6:c6 (08:00:27:e7:62:c6)  
 Internet Protocol Version 4, Src: 10.0.2.6, Dst: 10.0.2.7  
 Transmission Control Protocol, Src Port: 12345, Dst Port: 45296, Seq: 7241, Ack: 6, Len: 2760  
 Data (2760 bytes)

```
0000  00 00 27 e7 62 c6 00 00  27 fd 74 72 08 00 45 00  ..`b.. ``tr-E
0010  00 fc 29 d2 40 00 48 06  ee 1d 0a 00 02 00 0a 00  . ) @. .....
0020  02 07 39 39 b0 f0 af 07  26 3d 0f bf 0e 87 00 18  .09... @=.....
0030  01 fe 22 fb 00 00 01 31  08 0a 16 58 af 9c 74 0a  .`X` t
0040  ee 45 48 45 4c 4c 4f 48  45 4c 4c 47 48 45 4c 4c EHELOLL HELLOHE
0050  4f 48 45 4c 4c 4f 48 45  4c 4c 4f 48 45 4c 4c 4f OHELOLLE LLOHELLO
```

wireshark\_enp0s3\_20211102115301\_f0C49F.pcapng

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1946873413 TSecr=374910876
5	0.000943592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=1 Ack=6 Win=65288 Len=0 TSval=374910876 TSecr=1946873413
6	0.000949864	10.0.2.7	10.0.2.6	TCP	86 45296 - 12345 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=20 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296 [PSH, ACK] Seq=7 Ack=1 Win=65288 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296 [PSH, ACK] Seq=7241 Ack=6 Win=65280 Len=2766 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10801 Ack=26 Win=65280 Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=7241 Win=60672 Len=0 TSval=1946873414 TSecr=374910876
11	0.001239348	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=10801 Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [FIN, ACK] Seq=10801 Ack=26 Win=65280 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [FIN, ACK] Seq=26 Ack=10802 Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.04193781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10802 Ack=27 Win=65280 Len=0 TSval=374910916 TSecr=1946873454

Frame 9: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_fd:74:72 (08:00:27:fd:74:72), Dst: PcsCompu\_e7:c6:c6 (08:00:27:e7:62:c6)  
 Internet Protocol Version 4, Src: 10.0.2.6, Dst: 10.0.2.7  
 Transmission Control Protocol, Src Port: 12345, Dst Port: 45296, Seq: 10001, Ack: 26, Len: 0

```
0000 00 00 27 e7 62 c6 08 00 27 fd 74 72 08 00 45 00 ..`b.. `..tr..E
0001 00 34 29 d4 40 00 48 06 78 e3 0a 00 02 06 0a 00 ..4) 0@ ..-----
0020 02 07 39 39 b0 f0 af bb 31 05 06 bf 0e 9b 00 10 ..69 .. 1 -----
0030 01 fe 54 28 00 00 01 01 08 0a 16 58 af 9c 74 0a ..T( .. .X.-t.
0040 ee 46 ..F
```

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1946873413 TSecr=374910876
5	0.0009443592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=1 Ack=6 Win=65288 Len=0 TSval=374910876 TSecr=1946873413
6	0.000949864	10.0.2.7	10.0.2.6	TCP	86 45296 - 12345 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=20 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296 [PSH, ACK] Seq=7 Ack=1 Win=65288 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296 [PSH, ACK] Seq=7241 Ack=6 Win=65280 Len=2766 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10001 Ack=26 Win=65280 Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=26 Ack=7241 Win=60072 Len=0 TSval=1946873414 TSecr=374910876
11	0.001243948	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=27 Ack=10001 Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [FIN, ACK] Seq=10001 Ack=26 Win=65280 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [FIN, ACK] Seq=26 Ack=10002 Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.04193781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10002 Ack=27 Win=65280 Len=0 TSval=374910916 TSecr=1946873454

Frame 10: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)  
 Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6  
 Transmission Control Protocol, Src Port: 45296, Dst Port: 12345, Seq: 26, Ack: 7241, Len: 0

```
0000  00 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ..`tr ..`b..E
0010  00 34 72 fb 40 00 48 06 af bc 0a 00 02 07 0a 00 ..4r @@. .....
0020  02 06 b6 ff 30 39 0f hf 0e 9b ff bb 26 3d 00 10 ..-09. ....&-
0030  01 da 18 33 00 00 01 01 08 0a 74 0a ee 46 16 58 ..-3....t..F-X
0040  af 9c ..
```

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45296 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1946873413 TSecr=0 WS=128
2	0.000518440	10.0.2.6	10.0.2.7	TCP	74 12345 - 45296 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=374910876 TSecr=1946873413 WS=128
3	0.000529050	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1946873413 TSecr=374910876
4	0.000558380	10.0.2.7	10.0.2.6	TCP	71 45296 - 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1946873413 TSecr=374910876
5	0.000943592	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=1 Ack=6 Win=65280 Len=0 TSval=374910876 TSecr=1946873413
6	0.000949864	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [PSH, ACK] Seq=6 Ack=1 Win=64256 Len=20 TSval=1946873414 TSecr=374910876
7	0.001225022	10.0.2.6	10.0.2.7	TCP	73.. 12345 - 45296 [PSH, ACK] Seq=7 Ack=1 Win=65280 Len=7240 TSval=374910876 TSecr=1946873413
8	0.001225120	10.0.2.6	10.0.2.7	TCP	28.. 12345 - 45296 [PSH, ACK] Seq=7241 Ack=6 Win=65280 Len=2766 TSval=374910876 TSecr=1946873413
9	0.001225164	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10801 Ack=26 Win=65280 Len=0 TSval=374910876 TSecr=1946873414
10	0.001235432	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=7241 Win=60672 Len=0 TSval=1946873414 TSecr=374910876
11	0.001243948	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [ACK] Seq=2 Ack=10801 Win=58752 Len=0 TSval=1946873414 TSecr=374910876
12	0.001296321	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [FIN, ACK] Seq=108001 Ack=26 Win=65280 Len=0 TSval=374910877 TSecr=1946873414
13	0.0407878991	10.0.2.7	10.0.2.6	TCP	66 45296 - 12345 [FIN, ACK] Seq=26 Ack=10802 Win=64128 Len=0 TSval=1946873454 TSecr=374910877
14	0.0419193781	10.0.2.6	10.0.2.7	TCP	66 12345 - 45296 [ACK] Seq=10802 Ack=27 Win=65280 Len=0 TSval=374910916 TSecr=1946873454

Frame 11: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)  
 Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6  
 Transmission Control Protocol, Src Port: 45296, Dst Port: 12345, Seq: 26, Ack: 10001, Len: 0

```
0000  00 00 27 fd 74 72 08 00 27 e7 62 c6 08 00 45 00 ..`tr ..`b..E
0010  00 34 72 fc 40 00 48 06 af bb 0a 00 02 07 0a 00 ..4r @@......
0020  02 06 b0 f0 39 0f hf 0e 9b ff bb 31 05 00 10 ..-09.....1...
0030  01 cb 18 33 00 00 01 01 08 0a 74 0a ee 46 16 58 ..-3.....t..F-X
0040  af 9c ..
```

Packets: 24 | Displayed: 14 (58.3%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
GNU nano 4.8                               tcp_server.py
import socket, time

server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server.bind(('127.0.0.1', 12345))
server.listen(5)

while True:
    client_socket, client_address = server.accept()
    print('Connection from: ', client_address)

    data = client_socket.recv(100)
    print('Received: ', data)

    client_socket.send(data.upper() * 2000)

    client_socket.close()
    print('Client disconnected')
```

```
GNU nano 4.8                               tcp_client.py
Modified [Y/n]?

import socket

s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect(('10.0.2.6', 12345))

s.send(b'hello')

data = bytes('', 'utf-8')
while len(data) < 10000:
    temp = s.recv(6)
    print('Server sent: ', temp)
    data += temp

s.send(b'hello')
temp = s.recv(6)

s.close()
```

**Default gateway IP: 10.0.2.1**

**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
user@pc1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45314)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45316)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45318)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45320)
Received: b'hello'
Client disconnected
Connection from: ('10.0.2.7', 45322)
Received: b'hello'
Client disconnected
```

```
GNU nano 4.8                                         tcp_client.py
import socket,time
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect(('10.0.2.6', 12345))
s.send(b'hello')

data = bytes('', 'utf-8')
while len(data) < 10000:
    temp = s.recv(6)
    #print('Server sent: ', temp)
    data += temp

time.sleep(5)

s.send(b'hello')
s.close()
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000000	10.0.2.7	10.0.2.6	TCP	74 45324 → 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TSval=1947867275 TSecr=0 WS=128
2	0.000511279	10.0.2.6	10.0.2.7	TCP	74 12345 → 45324 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=375904732 TSecr=1947867275 WS=128
3	0.000528221	10.0.2.7	10.0.2.6	TCP	66 45324 → 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1947867276 TSecr=375904732
4	0.000556173	10.0.2.7	10.0.2.6	TCP	71 45324 → 12345 [PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1947867276 TSecr=375904732
5	0.000596650	10.0.2.6	10.0.2.7	TCP	66 12345 → 45324 [ACK] Seq=1 Ack=6 Win=65280 Len=0 TSval=375904733 TSecr=1947867276
6	0.001115958	10.0.2.6	10.0.2.7	TCP	73.. 12345 → 45324 [PSH, ACK] Seq=1 Ack=6 Win=65280 Len=7240 TSval=375904733 TSecr=1947867276
7	0.001116043	10.0.2.6	10.0.2.7	TCP	28.. 12345 → 45324 [PSH, ACK] Seq=7241 Ack=6 Win=65280 Len=2760 TSval=375904733 TSecr=1947867276
8	0.001116071	10.0.2.6	10.0.2.7	TCP	66 12345 → 45324 [FIN, ACK] Seq=10001 Ack=6 Win=65280 Len=0 TSval=375904733 TSecr=1947867276
9	0.001216252	10.0.2.7	10.0.2.6	TCP	66 45324 → 12345 [ACK] Seq=6 Ack=7241 Win=60672 Len=0 TSval=1947867276 TSecr=375904733
10	0.001448835	10.0.2.7	10.0.2.6	TCP	66 45324 → 12345 [ACK] Seq=6 Ack=10001 Win=58752 Len=0 TSval=1947867276 TSecr=375904733
11	0.043465582	10.0.2.7	10.0.2.6	TCP	66 45324 → 12345 [ACK] Seq=6 Ack=10002 Win=64128 Len=0 TSval=1947867319 TSecr=375904733
12	5.018746543	10.0.2.7	10.0.2.6	TCP	71 45324 → 12345 [PSH, ACK] Seq=6 Ack=10002 Win=64128 Len=5 TSval=1947872286 TSecr=375904733
13	5.018787474	10.0.2.7	10.0.2.6	TCP	66 45324 → 12345 [FIN, ACK] Seq=11 Ack=10002 Win=64128 Len=0 TSval=1947872286 TSecr=375904733
14	5.011304531	10.0.2.6	10.0.2.7	TCP	60 12345 → 45324 [RST] Seq=10002 Win=0 Len=0
15	5.011140727	10.0.2.6	10.0.2.7	TCP	60 12345 → 45324 [RST] Seq=10002 Win=0 Len=0

Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)  
 Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6  
 Transmission Control Protocol, Src Port: 45324, Dst Port: 12345, Seq: 0, Len: 0

```
0000  00 00 27 fd 74 72 00 00 27 e7 62 c6 00 00 45 00 ..`tr ..`b..E
0001  00 3c 8d 24 40 00 40 06 95 8b 0a 00 02 07 0a 00 < $0 @ ..... 
0020  02 06 b1 8c 30 39 2e 39 4d 17 00 00 00 a0 02 ..-69.9 M ..... 
0030  fa f9 18 3b 00 00 02 04 05 b4 04 02 08 0a 74 ia ;.....t ..... 
0040  18 0b 00 00 00 00 01 03 03 07 ..... 
```

Packets: 19 | Displayed: 15 (78.9%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
GNU nano 4.8                               tcp_server.py
import socket,time
server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server.bind(('127.0.0.1',12345))
server.listen(5)

while True:
    client_socket, client_address = server.accept()
    print('Connection from: ', client_address)

    data = client_socket.recv(100)
    print('Received: ', data)

    client_socket.send(data.upper() * 2000)
    client_socket.shutdown(socket.SHUT_WR)

    data = client_socket.recv(100)
    print('Received: ', data)

    client_socket.close()
    print('Client disconnected')
```

```
GNU nano 4.8                               tcp_client.py
import socket,time
s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect(('10.0.2.6', 12345))
s.send(b'hello')

data = bytes('', 'utf-8')
while len(data) < 10000:
    temp = s.recv(6)
    #print('Server sent: ', temp)
    data += temp
time.sleep(5)

s.send(b'hello')
s.close()
```

^G Get Help ^A Write Out ^W Where Is ^X Cut Text ^J Justify ^D Cur Pos  
^X Exit ^O Read File ^R Replace ^U Paste Text ^T To Spell ^G Go To Line

^G Get Help ^A Write [ user@pc1:~ ] ^W Where Is ^X Cut Text ^J Justify ^D Cur Pos  
^X Exit ^O Read [ user@pc1:~ ] ^R Replace ^U Paste Text ^T To Spell ^G Go To Line

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
user@pc1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45328)
Received: b'hello'
Received: b'hello'
Client disconnected
[1]
```

```
user@pc1:~$ python3 tcp_client.py
user@pc1:~$ [1]
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info	Details
3	2.686838909	10.0.2.7	10.0.2.6	TCP	74 45328 → 12345	[SYN] Seq=0 Win=64240 MSS=1460 SACK_PERM=1 TSval=1948501531 TSecr=0 WS=128
4	2.687281111	10.0.2.6	10.0.2.7	TCP	74 12345 → 45328	[SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TSval=376538980 TSecr=1948501531 WS=128
5	2.687298611	10.0.2.7	10.0.2.6	TCP	66 45328 → 12345	[ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1948501531 TSecr=376538980
6	2.687363206	10.0.2.7	10.0.2.6	TCP	71 45328 → 12345	[PSH, ACK] Seq=1 Ack=1 Win=64256 Len=5 TSval=1948501531 TSecr=376538980
7	2.687772554	10.0.2.6	10.0.2.7	TCP	66 12345 → 45328	[ACK] Seq=1 Ack=6 Win=65280 Len=0 TSval=376538981 TSecr=1948501531
8	2.688004917	10.0.2.6	10.0.2.7	TCP	73.. 12345 → 45328	[PSH, ACK] Seq=1 Ack=6 Win=65280 Len=7240 TSval=376538981 TSecr=1948501531
9	2.688004991	10.0.2.6	10.0.2.7	TCP	28.. 12345 → 45328	[PSH, ACK] Seq=1 Ack=6 Win=65280 Len=7240 TSval=376538981 TSecr=1948501531
10	2.688005018	10.0.2.6	10.0.2.7	TCP	66 12345 → 45328	[FIN, ACK] Seq=10001 Ack=6 Win=65280 Len=0 TSval=376538981 TSecr=1948501531
11	2.688014813	10.0.2.7	10.0.2.6	TCP	66 45328 → 12345	[ACK] Seq=6 Ack=7241 Win=60672 Len=0 TSval=1948501532 TSecr=376538981
12	2.688023033	10.0.2.7	10.0.2.6	TCP	66 45328 → 12345	[ACK] Seq=6 Ack=10001 Win=58752 Len=0 TSval=1948501532 TSecr=376538981
13	2.731077018	10.0.2.7	10.0.2.6	TCP	66 45328 → 12345	[ACK] Seq=6 Ack=10002 Win=64128 Len=0 TSval=1948501575 TSecr=376538981
14	7.697265979	10.0.2.7	10.0.2.6	TCP	71 45328 → 12345	[PSH, ACK] Seq=6 Ack=10002 Win=64128 Len=5 TSval=1948506541 TSecr=376538981
15	7.697245112	10.0.2.7	10.0.2.6	TCP	66 45328 → 12345	[FIN, ACK] Seq=11 Ack=10002 Win=64128 Len=0 TSval=1948506541 TSecr=376538981
16	7.697665086	10.0.2.6	10.0.2.7	TCP	66 12345 → 45328	[ACK] Seq=10002 Ack=11 Win=65280 Len=0 TSval=376543991 TSecr=1948506541
17	7.697665332	10.0.2.6	10.0.2.7	TCP	66 12345 → 45328	[ACK] Seq=10002 Ack=12 Win=65280 Len=0 TSval=376543991 TSecr=1948506541

Frame 3: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface enp0s3, id 0  
 Ethernet II, Src: PcsCompu\_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)  
 Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6  
 Transmission Control Protocol, Src Port: 45328, Dst Port: 12345, Seq: 0, Len: 0

```
0000  00 00 27 fd 74 72 08 00  27 e7 62 c6 08 00 45 00  .'.tr ..b..E
0001  00 3c f7 75 40 00 40 06  <u@ @: +.....
0020  02 06 b1 18 39 12 28 31 59 00 00 66 00 00 00 02  .-69 ( 1y...#
0030  fa f9 18 3b 00 00 02 64 05 b4 64 02 08 0a 74 23  ;.....t#
0040  c6 1b 00 00 00 00 01 03 03 07  .....#
```

Packets: 19 | Displayed: 15 (78.9%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP:** 10.0.2.6

**Alice MAC:** 08:00:27:4f:4f:b9

**Bob IP:** 10.0.2.7

**Bob MAC:** 08:00:27:75:60:78

```
user@pcl:~$ sudo ethtool -K enp0s3 | grep "tcp-segmentation-offload"
tcp-segmentation-offload: on
user@pcl:~$ sudo ethtool -K enp0s3 tso off
user@pcl:~$ sudo ethtool -K enp0s3 | grep "tcp-segmentation-offload"
tcp-segmentation-offload: off
user@pcl:~$
```

**Default gateway IP:** 10.0.2.1  
**Default gateway MAC:** 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
GNU nano 4.8                               tcp_server.py
import socket, time

server = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
server.bind(('127.0.0.1',12345))
server.listen(5)

while True:
    client_socket, client_address = server.accept()
    print('Connection from: ', client_address)

    data = client_socket.recv(100)
    print('Received: ', data)

    time.sleep(10)

    client_socket.close()
    print('Client disconnected')
```

```
user@pct:~                                     TCP
GNU nano 4.8                               tcp_client.py
import socket, time

s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect(("10.0.2.6", 12345))
s.send(b'Hello'*2000)
data = bytes('', 'utf-8')
while len(data) < 10000:
    data += s.recv(6)
s.close()
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

```
user@pc1:~$ pico tcp_server.py
user@pc1:~$ pico tcp_server.py
user@pc1:~$ python3 tcp_server.py
Connection from: ('10.0.2.7', 45426)
Received: b'hellohellohellohellohellohellohellohellohellohellohellohellohello'
hellohellohellohello'
Client disconnected
[
```

```
user@pc1:~$ pico tcp_client.py
user@pc1:~$ python3 tcp_client.py
Traceback (most recent call last):
  File "tcp_client.py", line 11, in <module>
    data += s.recv(6)
ConnectionResetError: [Errno 104] Connection reset by peer
user@pc1:~$
```

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

Alice IP: 10.0.2.6

Alice MAC: 08:00:27:4f:4f:b9

Bob IP: 10.0.2.7

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length	Info
1	0.0000000..	10.0.2.7	10.0.2.6	TCP	74	45426 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1 TStamp=1950192658 TSecr=0 WS=128
2	0.0000474..	10.0.2.6	10.0.2.7	TCP	74	12345 - 45426 [SYN ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM=1 TStamp=1950192659 TSecr=1950192659
3	0.0000490..	10.0.2.7	10.0.2.6	TCP	66	45426 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TStamp=1950192659 TSecr=378230104
4	0.0000529..	10.0.2.7	10.0.2.6	TCP	15..	45426 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
5	0.0000530..	10.0.2.7	10.0.2.6	TCP	15..	45426 - 12345 [ACK] Seq=1449 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
6	0.0000531..	10.0.2.7	10.0.2.6	TCP	15..	45426 - 12345 [ACK] Seq=2897 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
7	0.0000535..	10.0.2.7	10.0.2.6	TCP	15..	45426 - 12345 [ACK] Seq=4345 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
8	0.0000538..	10.0.2.7	10.0.2.6	TCP	15..	45426 - 12345 [PSH, ACK] Seq=5793 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
9	0.0000605..	10.0.2.7	10.0.2.6	TCP	15..	45426 - 12345 [ACK] Seq=7241 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
10	0.0000611..	10.0.2.7	10.0.2.6	TCP	13..	45426 - 12345 [PSH, ACK] Seq=8689 Ack=1 Win=64256 Len=1212 TStamp=1950192659 TSecr=378230104
11	0.0010804..	10.0.2.6	10.0.2.7	TCP	66	12345 - 45426 [ACK] Seq=2 Ack=7241 Win=60672 Len=0 TStamp=378230104 TSecr=1950192659
12	0.0010863..	10.0.2.6	10.0.2.7	TCP	66	12345 - 45426 [ACK] Seq=2 Ack=7241 Win=180911 Win=58751 Len=0 TStamp=378230104 TSecr=1950192659

```
Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface enp0s3, id 0
Ethernet II, Src: PcsCompu_e7:82:c6 (08:00:27:e7:82:c6), Dst: PcsCompu_f7:74:72 (08:00:27:fd:74:72)
Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6
Inbounding_Coertige_Brotw... Err_Bect... Ifc15... Port_Br... 17345... Seq: 0... Len: 0
```

```
0000 00 00 27 fd 74 72 00 00 27 e7 62 c5 00 00 00 45 00 .`tr .`b ..E
0010 00 3c 5d 0e 40 00 48 06 c5 a1 00 00 02 07 0a 00 <] 0-0 .
0020 02 06 b1 72 30 39 04 ec b0 bb 00 00 00 00 a0 02 r09
0030 00 18 3b 00 00 02 04 05 b4 04 02 00 00 8a 74 3d ;;;t=
0040 04 12 00 00 00 01 03 02 07
```

PacktPub - PacktPub-13 (400-700)

Default gateway IP: 10.0.2.1  
Default gateway MAC: 52:54:00:12:35:00

Alice IP: 10.0.2.6

Alice MAC: 08:00:27:4f:4f:b9

Bob IP: 10.0.2.7

Bob MAC: 08:00:27:75:60:78

No.	Time	Source	Destination	Protocol	Length	Info
1	0.0000000..	10.0.2.7	10.0.2.6	TCP	74	45426 -> 12345 [SYN] Seq=0 Win=64246 Len=0 MSS=1460 SACK_PERM=1 TSval=1950192658 TSecr=0 WS=128
2	0.0000474..	10.0.2.6	10.0.2.7	TCP	74	12345 -> 45426 [SYN, ACK] Seq=0 Ack=1 Win=65186 Len=0 MSS=1460 SACK_PERM=1 TSval=1950192658 TSecr=378230104
3	0.0000490..	10.0.2.7	10.0.2.6	TCP	66	45426 -> 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1950192659 TSecr=378230104
4	0.0000529..	10.0.2.7	10.0.2.6	TCP	15..	45426 -> 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
5	0.0000530..	10.0.2.7	10.0.2.6	TCP	15..	45426 -> 12345 [ACK] Seq=1449 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
6	0.0000531..	10.0.2.7	10.0.2.6	TCP	15..	45426 -> 12345 [ACK] Seq=2897 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
7	0.0000535..	10.0.2.7	10.0.2.6	TCP	15..	45426 -> 12345 [ACK] Seq=4343 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
8	0.0000538..	10.0.2.7	10.0.2.6	TCP	15..	45426 -> 12345 [PSH, ACK] Seq=5793 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
9	0.0000605..	10.0.2.7	10.0.2.6	TCP	15..	45426 -> 12345 [ACK] Seq=7241 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
10	0.0000611..	10.0.2.7	10.0.2.6	TCP	13..	45426 -> 12345 [PSH, ACK] Seq=8689 Ack=1 Win=64256 Len=1312 TSval=1950192659 TSecr=378230104
11	0.0001084..	10.0.2.6	10.0.2.7	TCP	66	12345 -> 45426 [ACK] Seq=1 Ack=7241 Win=66072 Len=0 TSval=378230104 TSecr=1950192659
12	0.0001083..	10.0.2.6	10.0.2.7	TCP	66	12345 -> 45426 [ACK] Seq=1 Ack=1 Win=58752 Len=0 TSval=378230104 TSecr=1950192659
-	0.10..10.2157..	10.0.2.6	10.0.2.7	TCP	66	12345 -> 45426 [RST, ACK] Seq=1 Ack=19801 Win=61428 Len=0 TSval=378240116 TSecr=1950192659

```
[Next sequence number: 1    (relative sequence number)]
Acknowledgment number: 0
Acknowledgment number (raw): 0
1010 .... = Header Length: 40 bytes (10)
Flags: 0x002 (SYN)
Window size value: 64240
[Calculated Window size: 64240]
Checksum: 0x163b [unverified]
[Checksum Status: Unverified]
Urgent pointer: 0
Options: (28 bytes), Maximum segment size, SACK permitted, Timestamps, No-Operation (NOP), Window scale
  + TCP Option - Maximum segment size: 1468 bytes
  + TCP Option - SACK permitted
  + TCP Option - Timestamps: TSval 1950192658, TSecr 8
  + TCP Option - No-Operation (NOP)
  + TCP Option - Window scale: 7 (Multiply by 128)
  [Timestamps]
```

0030 fa f0 18 3b 00 00 02 04 05 b4 04 02 08 0a 74 3d ... } ..... t

Packets: 19 - Displayed: 13 (68.4%)

Profile: Default

Default gateway IP: 10.0.2.1  
Default gateway MAC: 52:54:00:12:35:00

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.000000..	10.0.2.7	10.0.2.6	TCP	74 45426 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1466 SACK_PERM=1 TStamp=1950192658 TSecr=0 W5=128
2	0.000474..	10.0.2.6	10.0.2.7	TCP	74 12345 - 45426 [SYN, ACK] Seq=0 Ack=1 WIn=65160 Len=0 MSS=1466 SACK_PERM=1 TStamp=378230104 TSecr=19501926..
3	0.000490..	10.0.2.7	10.0.2.6	TCP	66 45426 - 12345 [ACK] Seq=1 Ack=1 WIn=64256 Len=0 TStamp=1950192659 TSecr=378230104
4	0.000529..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=1 Ack=1 WIn=64256 Len=1448 TStamp=1950192659 TSecr=378230104
5	0.000535..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=1449 Ack=1 WIn=64256 Len=1448 TStamp=1950192659 TSecr=378230104
6	0.000531..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=2897 Ack=1 WIn=64256 Len=1448 TStamp=1950192659 TSecr=378230104
7	0.000535..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=4345 Ack=1 WIn=64256 Len=1448 TStamp=1950192659 TSecr=378230104
8	0.000538..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [PSH, ACK] Seq=5793 Ack=1 WIn=64256 Len=1448 TStamp=1950192659 TSecr=378230104
9	0.000605..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=7241 Ack=1 WIn=64256 Len=1448 TStamp=1950192659 TSecr=378230104
10	0.000611..	10.0.2.7	10.0.2.6	TCP	13. 45426 - 12345 [PSH, ACK] Seq=8689 Ack=1 WIn=64256 Len=1312 TStamp=1950192659 TSecr=378230104
11	0.001084..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [ACK] Seq=1 Ack=7241 WIn=60672 Len=0 TStamp=378230104 TSecr=1950192659
12	0.001863..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [ACK] Seq=1 Ack=10981 WIn=58752 Len=0 TStamp=378230105 TSecr=1950192659
13	15 10 01251..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [RST, ACK] Seq=1 Ack=10981 WIn=64128 Len=0 TStamp=378240110 TSecr=1950192659

> Frame 4: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface enp0s3, id 0  
 > Ethernet II, Src: PcsCompu\_e7:62:c6 (08:00:27:e7:62:c6), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)  
 > Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6  
 0100 .... = Version: 4  
 .... 0101 = Header Length: 20 bytes (5)  
 > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)  
 Total Length: 1500  
 Identification: 0x5d10 (23824)  
 > Flags: 0x4000, Don't fragment  
 Fragment offset: 0  
 Time to live: 64  
 Protocol: TCP (6)  
 Header checksum: 0xbffff [validation disabled]  
 [Header checksum status: Unverified]  
 Source: 10.0.2.7  
 Destination: 10.0.2.6  
 > Transmission Control Protocol, Src Port: 45426, Dst Port: 12345, Seq: 1, Ack: 1, Len: 1448  
 > Initial bytes: UXHello hellohell  
 0040 55 58 68 65 6c 6f 68 65 6c 6f 68 65 6c 6c 6c UXHello hellohell  
 Data (data), 1448 bytes  
 Packets: 29 | Displayed: 13 (44.8%)  
 Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.000000..	10.0.2.7	10.0.2.6	TCP	74 45426 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1466 SACK_PERM=1 TStamp=1950192658 TSecr=0 W5=128
2	0.000474..	10.0.2.6	10.0.2.7	TCP	74 12345 - 45426 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1466 SACK_PERM=1 TStamp=378230104 TSecr=19501926..
3	0.000490..	10.0.2.7	10.0.2.6	TCP	66 45426 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TStamp=1950192659 TSecr=378230104
4	0.000529..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
5	0.000530..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=1449 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
6	0.000531..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=2897 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
7	0.000535..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=4345 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
8	0.000538..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [PSH, ACK] Seq=5793 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
9	0.000605..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=7241 Ack=1 Win=64256 Len=1448 TStamp=1950192659 TSecr=378230104
10	0.000611..	10.0.2.7	10.0.2.6	TCP	13. 45426 - 12345 [PSH, ACK] Seq=8689 Ack=1 Win=64256 Len=1312 TStamp=1950192659 TSecr=378230104
11	0.001084..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [ACK] Seq=1 Ack=7241 Win=60672 Len=0 TStamp=378230104 TSecr=1950192659
12	0.001083..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [ACK] Seq=1 Ack=10981 Win=58752 Len=0 TStamp=378230105 TSecr=1950192659
15	10.01251..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [RST, ACK] Seq=1 Ack=10981 Win=64128 Len=0 TStamp=378240110 TSecr=1950192659

> Frame 4: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface enp0s3, id 0

> Ethernet II, Src: PcsCompu\_7:62:c6 (08:00:27:75:60:78), Dst: PcsCompu\_fd:74:72 (08:00:27:fd:74:72)

> Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.6

> Transmission Control Protocol, Src Port: 45426, Dst Port: 12345, Seq: 1, Ack: 1, Len: 1448

Source Port: 45426

Destination Port: 12345

[Stream index: 0]

[TCP Segment Len: 1448]

Sequence number: 1 (relative sequence number)

Sequence number (raw): 82628428

[Next sequence number: 1449 (relative sequence number)]

Acknowledgment number: 1 (relative ack number)

Acknowledgment number (raw): 2706744667

1800 ... = Header Length: 32 bytes (8)

> Flags: 0x010 (ACK)

Window size value: 502

[Calculated window size: 64256]

[Window size scaling factor: 128]

0040 55 58 08 85 6C 6C 6F 68 65 6C 6C 6F 68 65 6C 6C UX[hellohellohell]

Packets: 29 | Displayed: 13 (44.8%)

Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info
1	0.0000000..	10.0.2.7	10.0.2.6	TCP	74 45426 - 12345 [SYN] Seq=0 Win=64240 Len=0 MSS=1466 SACK_PERM=1 TSval=1950192658 TSecr=0 W5=128
2	0.000474..	10.0.2.6	10.0.2.7	TCP	74 12345 - 45426 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1466 SACK_PERM=1 TSval=378230104 TSecr=19501926..
3	0.000490..	10.0.2.7	10.0.2.6	TCP	66 45426 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=0 TSval=1950192659 TSecr=378230104
4	0.000529..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=1 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
5	0.000529..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=1449 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
6	0.000531..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=2897 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
7	0.000535..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=4345 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
8	0.000538..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [PSH, ACK] Seq=5793 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
9	0.000605..	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK] Seq=7241 Ack=1 Win=64256 Len=1448 TSval=1950192659 TSecr=378230104
10	0.000611..	10.0.2.7	10.0.2.6	TCP	13. 45426 - 12345 [PSH, ACK] Seq=8689 Ack=1 Win=64256 Len=1312 TSval=1950192659 TSecr=378230104
11	0.001084..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [ACK] Seq=1 Ack=7241 Win=60672 Len=0 TSval=378230104 TSecr=1950192659
12	0.001083..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [ACK] Seq=1 Ack=10901 Win=58752 Len=0 TSval=378230105 TSecr=1950192659
15	10.01251..	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [RST, ACK] Seq=1 Ack=10901 Win=64128 Len=0 TSval=378240110 TSecr=1950192659

Sequence number (raw): 82629428  
[Next sequence number: 1449 (relative sequence number)]  
Acknowledgment number: 1 (relative ack number)  
Acknowledgment number (raw): 2786744667  
1000 .... = Header Length: 32 bytes (8)  
↳ Flags: 0x010 (ACK)  
Window size value: 502  
[Calculated window size: 64256]  
[Window size scaling factor: 128]  
Checksum: 0x1dbb [unverified]  
[Checksum Status: Unverified]  
Urgent pointer: 8  
↳ Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps  
↳ TCP Option - No-Operation (NOP)  
↳ TCP Option - No-Operation (NOP)  
↳ TCP Option - Timestamps: TSval 1950192659, TSecr 378230104  
↳ [SEQ/ACK analysis]  
↳ [Timestamps]

0040 55 58 68 65 6c 6f 68 65 6c 6f 68 65 6c 6c UXHello!ellohell

Packets: 29 | Displayed: 13 (44.8%) Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**

**Alice IP: 10.0.2.6**

**Alice MAC: 08:00:27:4f:4f:b9**

**Bob IP: 10.0.2.7**

**Bob MAC: 08:00:27:75:60:78**

No.	Time	Source	Destination	Protocol	Length Info		
1	0.000000...	10.0.2.7	10.0.2.6	TCP	74 45426 - 12345 [SYN]	Seq=0 Win=64240 Len=0 MSS=1466 SACK_PERM=1	Tsval=1950192658 TSecr=0 W5=128
2	0.000474...	10.0.2.6	10.0.2.7	TCP	74 12345 - 45426 [SYN, ACK]	Seq=0 Ack=1 Win=65160 Len=0 MSS=1466 SACK_PERM=1	Tsval=378230104 TSecr=19501926...
3	0.000490...	10.0.2.7	10.0.2.6	TCP	66 45426 - 12345 [ACK]	Seq=1 Ack=1 Win=64256 Len=0 Tsval=1950192659 TSecr=378230104	
4	0.000529...	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK]	Seq=1 Ack=1 Win=64256 Len=1448 Tsval=1950192659 TSecr=378230104	
5	0.000535...	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK]	Seq=1449 Ack=1 Win=64256 Len=1448 Tsval=1950192659 TSecr=378230104	
6	0.000531...	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK]	Seq=2897 Ack=1 Win=64256 Len=1448 Tsval=1950192659 TSecr=378230104	
7	0.000530...	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK]	Seq=4345 Ack=1 Win=64256 Len=1448 Tsval=1950192659 TSecr=378230104	
8	0.000538...	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [PSH, ACK]	Seq=5793 Ack=1 Win=64256 Len=1448 Tsval=1950192659 TSecr=378230104	
9	0.000605...	10.0.2.7	10.0.2.6	TCP	15. 45426 - 12345 [ACK]	Seq=7241 Ack=1 Win=64256 Len=1448 Tsval=1950192659 TSecr=378230104	
10	0.000611...	10.0.2.7	10.0.2.6	TCP	13. 45426 - 12345 [PSH, ACK]	Seq=8689 Ack=1 Win=64256 Len=1312 Tsval=1950192659 TSecr=378230104	
11	0.001084...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [ACK]	Seq=1 Ack=7241 Win=60672 Len=0 Tsval=378230104 TSecr=1950192659	
12	0.001863...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [ACK]	Seq=1 Ack=10901 Win=58752 Len=0 Tsval=378230105 TSecr=1950192659	
13	15 10 01251...	10.0.2.6	10.0.2.7	TCP	66 12345 - 45426 [RST, ACK]	Seq=1 Ack=10901 Win=64128 Len=0 Tsval=378240110 TSecr=1950192659	

Acknowledgment number (raw): 2706744667  
1000 .... = Header Length: 32 bytes (8)  
+ Flags: 0x10 (ACK)  
Window size value: 502  
[Calculated window size: 64256]  
[Window size scaling factor: 128]  
Checksum: 0x1dbb [unverified]  
[Checksum Status: Unverified]  
Urgent pointer: 0  
- Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps  
+ TCP Option - No-Operation (NOP)  
+ TCP Option - No-Operation (NOP)  
+ TCP Option - Timestamps: Tsval 1950192659, TSecr 378230104  
+ [SEQ/ACK analysis]  
+ [Timestamps]  
TCP payload (1448 bytes)  
+ Data (1448 bytes)

0040 55 58 68 65 6c 6c 6f 68 65 6c 6c 6f 68 65 6c 6c UX[hellohellohell]

Packets: 29 | Displayed: 13 (44.8%) | Profile: Default

**Default gateway IP: 10.0.2.1**  
**Default gateway MAC: 52:54:00:12:35:00**