

# 【2023 Advanced Computer Networks Homework 1】

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## Part 1: Web Browsing (DNS, TCP)

### Protocol Analysis Questions

#### ● 1

#### (1) Examine the Ethernet

a.

```
Ethernet II, Src: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f), Dst: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
  ▾ Destination: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
    Address: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
    .... 0. .... = LG bit: Globally unique address (factory default)
    .... 0. .... = IG bit: Individual address (unicast)
  ▾ Source: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f)
    Address: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f)
    .... 1. .... = LG bit: Locally administered address (this is NOT the factory default)
    .... 0. .... = IG bit: Individual address (unicast)
```

b.

```
Ethernet II, Src: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f), Dst: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
  > Destination: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
  > Source: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f)
  Type: IPv4 (0x0800)
```

#### (2) Examine the Internet Protocol

a.

```
Internet Protocol Version 4, Src: 172.20.31.82, Dst: 140.117.13.241
```

b.

```
Internet Protocol Version 4, Src: 172.20.31.82, Dst: 140.117.13.241
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  Total Length: 48
  Identification: 0xba69 (47721)
```

c.

- ✓ Internet Protocol Version 4, Src: 172.20.31.82, Dst: 140.117.13.241
  - 0100 .... = Version: 4
  - .... 0101 = Header Length: 20 bytes (5)
  - > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  - Total Length: 48
  - Identification: 0xba69 (47721)
  - > 010. .... = Flags: 0x2, Don't fragment
  - ...0 0000 0000 0000 = Fragment Offset: 0
  - Time to Live: 128
  - Protocol: TCP (6)
  - Header Checksum: 0x0000 [validation disabled]
  - [Header checksum status: Unverified]
  - Source Address: 172.20.31.82
  - Destination Address: 140.117.13.241

### (3) Examine the User Datagram Protocol

a.

- ✓ Transmission Control Protocol, Src Port: 55746, Dst Port: 443, Seq: 0, Len: 0
  - Source Port: 55746
  - Destination Port: 443

b.

- ✓ Transmission Control Protocol, Src Port: 55746, Dst Port: 443, Seq: 0, Len: 0
  - Source Port: 55746
  - Destination Port: 443

### (4) Examine the Domain Name System (query)

a.

QR (query/response): It is a 1-bit subfield. If its value is 0, the message is of request type and if its value is 1, the message is of response type.

- ✓ Domain Name System (query)
  - Transaction ID: 0xcb34
  - ✓ Flags: 0x0100 Standard query
    - 0... .. = Response: Message is a query
- Domain Name System (response)
  - Transaction ID: 0x66d9
  - ✓ Flags: 0x8180 Standard query response, No error
    - 1... .. = Response: Message is a response
    - .000 0... .. = Opcode: Standard query (0)
    - .... .0.. .... = Authoritative: Server is not an authority for domain
    - .... ..0. .... = Truncated: Message is not truncated
    - .... ..1. .... = Recursion desired: Do query recursively
    - .... ....1... .. = Recursion available: Server can do recursive queries
    - .... ....0.. .... = Z: reserved (0)
    - .... ....0. .... = Answer authenticated: Answer/authority portion was not authenticated by the server
    - .... ....0... .. = Non-authenticated data: Unacceptable
    - .... ....0000 = Reply code: No error (0)

b.

Domain Name System (query)

Transaction ID: 0xcb34

c.

▼ Queries

▼ cse.nsysu.edu.tw: type A, class IN

Name: cse.nsysu.edu.tw

[Name Length: 16]

[Label Count: 4]

Type: A (Host Address) (1)

Class: IN (0x0001)

● 2

(1) Examine the Ethernet

a.

```
Ethernet II, Src: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86), Dst: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f)
> Destination: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f)
> Source: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
```

b.

```
Ethernet II, Src: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86), Dst: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f)
> Destination: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f)
> Source: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
Type: IPv4 (0x0800)
```

(2) Examine the Internet Protocol & Domain Name System (response)

a.

```
Internet Protocol Version 4, Src: 168.95.1.1, Dst: 172.20.31.82
```

b.

```
Internet Protocol Version 4, Src: 168.95.1.1, Dst: 172.20.31.82
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 78
Identification: 0xee9d (61085)
```

Compare with query, total packet length is longer than query.

c.

▼ Answers

▼ cse.nsysu.edu.tw: type A, class IN, addr 140.117.13.241

Name: cse.nsysu.edu.tw

Type: A (Host Address) (1)

Class: IN (0x0001)

Time to live: 300 (5 minutes)

Data length: 4

Address: 140.117.13.241

[Request In: 2733]

[Time: 0.067572000 seconds]

The response DNS message contains one answer.

Time-to-live values: 0.067572000 seconds.

● 3.

3303 4.072539	172.20.31.82	140.117.13.241	TCP	62 [55749 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM
3304 4.076002	140.117.13.241	172.20.31.82	TCP	62 443 → 55749 [SYN, ACK] Seq=0 Ack=1 Win=13860 Len=0 MSS=1386 SACK_PERM
3305 4.076093	172.20.31.82	140.117.13.241	TCP	54 55749 → 443 [ACK] Seq=1 Ack=1 Win=64240 Len=0

a.

✓ Transmission Control Protocol, Src Port: 55749, Dst Port: 443, :  
 Source Port: 55749  
 Destination Port: 443

b.

```

Frame 3305: 54 bytes on wire (432 bits), 54 bytes captured (432 bits) on interface \Device\NPF_{74E44C44-DDE3-4F9A-9E49-BDDC86B167E3}, id 0
Ethernet II, Src: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f), Dst: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
Internet Protocol Version 4, Src: 172.20.31.82, Dst: 140.117.13.241
Transmission Control Protocol, Src Port: 55749, Dst Port: 443, Seq: 1, Ack: 1, Len: 0
  Source Port: 55749
  Destination Port: 443
  [Stream index: 52]
  [Conversation completeness: Complete, WITH_DATA (63)]
  [TCP Segment Len: 0]
  
```

c.

No.3303 : initial sequence number : 1124289852

No.3305 : initial sequence number : 1124289853



ISN +1

```

> Ethernet II, Src: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f), Dst: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
> Internet Protocol Version 4, Src: 172.20.31.82, Dst: 140.117.13.241
✓ Transmission Control Protocol, Src Port: 55749, Dst Port: 443, Seq: 0, Len: 0
  Source Port: 55749
  Destination Port: 443
  [Stream index: 52]
  [Conversation completeness: Complete, WITH_DATA (63)]
  [TCP Segment Len: 0]
  Sequence Number: 0 (relative sequence number)
  Sequence Number (raw): 1124289852

> Ethernet II, Src: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f), Dst: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
> Internet Protocol Version 4, Src: 172.20.31.82, Dst: 140.117.13.241
✓ Transmission Control Protocol, Src Port: 55749, Dst Port: 443, Seq: 1, Ack: 1, Len: 0
  Source Port: 55749
  Destination Port: 443
  [Stream index: 52]
  [Conversation completeness: Complete, WITH_DATA (63)]
  [TCP Segment Len: 0]
  Sequence Number: 1 (relative sequence number)
  Sequence Number (raw): 1124289853
  
```

d.

```
> Ethernet II, Src: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f), Dst: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
> Internet Protocol Version 4, Src: 172.20.31.82, Dst: 140.117.13.241
✓ Transmission Control Protocol, Src Port: 55749, Dst Port: 443, Seq: 0, Len: 0
    Source Port: 55749
    Destination Port: 443
    [Stream index: 52]
    [Conversation completeness: Complete, WITH_DATA (63)]
    [TCP Segment Len: 0]
    Sequence Number: 0 (relative sequence number)
    Sequence Number (raw): 1124289852
    [Next Sequence Number: 1 (relative sequence number)]
    Acknowledgment Number: 0
    Acknowledgment number (raw): 0
    0111 .... = Header Length: 28 bytes (7)
    > Flags: 0x002 (SYN)
    Window: 64240
    [Calculated window size: 64240]

> Ethernet II, Src: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86), Dst: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f)
> Internet Protocol Version 4, Src: 140.117.13.241, Dst: 172.20.31.82
✓ Transmission Control Protocol, Src Port: 443, Dst Port: 55749, Seq: 0, Ack: 1, Len: 0
    Source Port: 443
    Destination Port: 55749
    [Stream index: 52]
    [Conversation completeness: Complete, WITH_DATA (63)]
    [TCP Segment Len: 0]
    Sequence Number: 0 (relative sequence number)
    Sequence Number (raw): 4025359839
    [Next Sequence Number: 1 (relative sequence number)]
    Acknowledgment Number: 1 (relative ack number)
    Acknowledgment number (raw): 1124289853
    0111 .... = Header Length: 28 bytes (7)
    > Flags: 0x012 (SYN, ACK)
    Window: 13860
    [Calculated window size: 13860]

> Ethernet II, Src: e2:be:3b:cd:77:9f (e2:be:3b:cd:77:9f), Dst: Fortinet_ce:dc:86 (70:4c:a5:ce:dc:86)
> Internet Protocol Version 4, Src: 172.20.31.82, Dst: 140.117.13.241
✓ Transmission Control Protocol, Src Port: 55749, Dst Port: 443, Seq: 1, Ack: 1, Len: 0
    Source Port: 55749
    Destination Port: 443
    [Stream index: 52]
    [Conversation completeness: Complete, WITH_DATA (63)]
    [TCP Segment Len: 0]
    Sequence Number: 1 (relative sequence number)
    Sequence Number (raw): 1124289853
    [Next Sequence Number: 1 (relative sequence number)]
    Acknowledgment Number: 1 (relative ack number)
    Acknowledgment number (raw): 4025359840
    0101 .... = Header Length: 20 bytes (5)
    > Flags: 0x010 (ACK)
    Window: 64240
    [Calculated window size: 64240]
```

e.

3303	4.072539	172.20.31.82	140.117.13.241	TCP	62	55749 → 443	[SYN]	Seq=0	Win=64240	Len=0	MSS=1460	SACK_PERM	
3304	4.076002	140.117.13.241	172.20.31.82	TCP	62	443 → 55749	[SYN, ACK]	Seq=0	Ack=1	Win=13860	Len=0	MSS=1386	SACK_PERM
3305	4.076093	172.20.31.82	140.117.13.241	TCP	54	55749 → 443	[ACK]	Seq=1	Ack=1	Win=64240	Len=0		

- Options: (8 bytes), Maximum segment size, No-Operation (NOP), No-Operation (NOP), SACK permitted
  - TCP Option: Maximum segment size: 1460 bytes
    - Kind: Maximum Segment Size (2)
    - Length: 4
    - MSS Value: 1460
- Options: (8 bytes), Maximum segment size, SACK permitted, End of Option List (EOL), End of Option List (EOL)
  - TCP Option: Maximum segment size: 1386 bytes
    - Kind: Maximum Segment Size (2)
    - Length: 4
    - MSS Value: 1386

f.

#### Flags: 0x002 (SYN)

```

000. .... = Reserved: Not set
...0 .... = Accurate ECN: Not set
.... 0... = Congestion Window Reduced: Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...0 = Acknowledgment: Not set
.... .... 0... = Push: Not set
.... .... .0.. = Reset: Not set

```

> .... ..1. = Syn: Set

```
.... .... ...0 = Fin: Not set
```

[TCP Flags: .....S.]

#### Flags: 0x012 (SYN, ACK)

```

000. .... = Reserved: Not set
...0 .... = Accurate ECN: Not set
.... 0... = Congestion Window Reduced: Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
.... .... 0... = Push: Not set
.... .... .0.. = Reset: Not set

```

> .... ..1. = Syn: Set

```
.... .... ...0 = Fin: Not set
```

[TCP Flags: .....A..S.]

#### Flags: 0x010 (ACK)

```

000. .... = Reserved: Not set
...0 .... = Accurate ECN: Not set
.... 0... = Congestion Window Reduced: Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
.... .... 0... = Push: Not set
.... .... .0.. = Reset: Not set

```

.... .... ..0. = Syn: Not set

.... .... ...0 = Fin: Not set

[TCP Flags: .....A.....]

## Part 2 Probing the Internet (ICMP, PING, Traceroute)

### ● 1. Ping Captured

(1)

a.

```
> Frame 186: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{B98FB856-C6FF-43F2-8C...}
> Ethernet II, Src: ASUSTekC_57:d6:6b (0c:9d:92:57:d6:6b), Dst: JuniperN_79:5a:a4 (e0:30:f9:79:5a:a4)
▼ Internet Protocol Version 4, Src: 10.1.0.183, Dst: 8.8.8.8
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 60
    Identification: 0x31f9 (12793)
    > 000. .... = Flags: 0x0
    ... 0 0000 0000 0000 = Fragment Offset: 0
    Time to Live: 128
    Protocol: ICMP (1)
    Header Checksum: 0x0000 [validation disabled]
    [Header checksum status: Unverified]
    Source Address: 10.1.0.183
    Destination Address: 8.8.8.8
> Internet Control Message Protocol
```

b.

```
▼ Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x4d53 [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 8 (0x0008)
    Sequence Number (LE): 2048 (0x0800)
    [Response frame: 188]
> Data (32 bytes)
```

c.

```
▼ Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x4d53 [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence Number (BE): 8 (0x0008)
    Sequence Number (LE): 2048 (0x0800)
    [Response frame: 188]
> Data (32 bytes)
```

(2)

a.



```

> Frame 188: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF_{B98FB856-C6FF-43F2-8C
> Ethernet II, Src: JuniperN_79:5a:a4 (e0:30:f9:79:5a:a4), Dst: ASUSTekC_57:d6:6b (0c:9d:92:57:d6:6b)
> Internet Protocol Version 4, Src: 8.8.8.8, Dst: 10.1.0.183
< Internet Control Message Protocol
  Type: 0 (Echo (ping) reply)
  Code: 0
  Checksum: 0x5553 [correct]
  [Checksum Status: Good]
  Identifier (BE): 1 (0x0001)
  Identifier (LE): 256 (0x0100)
  Sequence Number (BE): 8 (0x0008)
  Sequence Number (LE): 2048 (0x0800)
  [Request frame: 186]
  [Response time: 40.694 ms]
> Data (32 bytes)

```

## ● 2 Traceroute Captured

(1)

a.

```

> Frame 31: 106 bytes on wire (848 bits), 106 bytes captured (848 bits) on interface \Device\NPF_{B98FB856-C6FF-43F2-8C
> Ethernet II, Src: ASUSTekC_57:d6:6b (0c:9d:92:57:d6:6b), Dst: JuniperN_79:5a:a4 (e0:30:f9:79:5a:a4)
< Internet Protocol Version 4, Src: 10.1.0.183, Dst: 8.8.8.8
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  Total Length: 92
  Identification: 0x31fd (12797)
> 000. .... = Flags: 0x0
  ...0 0000 0000 0000 = Fragment Offset: 0
> Time to Live: 1
  Protocol: ICMP (1)
  Header Checksum: 0x0000 [validation disabled]
  [Header checksum status: Unverified]
  Source Address: 10.1.0.183
  Destination Address: 8.8.8.8
> Internet Control Message Protocol

```

b.

```

> Frame 31: 106 bytes on wire (848 bits), 106 bytes captured (848 bits) on interface \Device\NPF_{B98FB856-C6FF-43F2-8C
> Ethernet II, Src: ASUSTekC_57:d6:6b (0c:9d:92:57:d6:6b), Dst: JuniperN_79:5a:a4 (e0:30:f9:79:5a:a4)
< Internet Protocol Version 4, Src: 10.1.0.183, Dst: 8.8.8.8
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  Total Length: 92
  Identification: 0x31fd (12797)
> 000. .... = Flags: 0x0
  ...0 0000 0000 0000 = Fragment Offset: 0
> Time to Live: 1
  Protocol: ICMP (1)

```

c.

```

> Frame 31: 106 bytes on wire (848 bits), 106 bytes captured (848 bits) on interface \Device\NPF_{B98FB856-C6FF-43F2-8C
> Ethernet II, Src: ASUSTekC_57:d6:6b (0c:9d:92:57:d6:6b), Dst: JuniperN_79:5a:a4 (e0:30:f9:79:5a:a4)
> Internet Protocol Version 4, Src: 10.1.0.183, Dst: 8.8.8.8
< Internet Control Message Protocol
  Type: 8 (Echo (ping) request)
  Code: 0
  Checksum: 0xf7f2 [correct]
  [Checksum Status: Good]
  Identifier (BE): 1 (0x0001)
  Identifier (LE): 256 (0x0100)
  Sequence Number (BE): 12 (0x000c)
  Sequence Number (LE): 3072 (0xc000)
> [No response seen]
> Data (64 bytes)

```

(2)

a.

```
> Frame 32: 70 bytes on wire (560 bits), 70 bytes captured (560 bits) on interface \Device\NPF_{B98FB856-C6FF-43F2-8C55-000111111111}
> Ethernet II, Src: JuniperN_79:5a:a4 (e0:30:f9:79:5a:a4), Dst: ASUSTekC_57:d6:6b (0c:9d:92:57:d6:6b)
> Internet Protocol Version 4, Src: 10.1.1.254, Dst: 10.1.0.183
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
  Total Length: 56
  Identification: 0x75c5 (30149)
> 000. .... = Flags: 0x0
  ...0 0000 0000 0000 = Fragment Offset: 0
  Time to Live: 254
  Protocol: ICMP (1)
  Header Checksum: 0x3049 [validation disabled]
  [Header checksum status: Unverified]
  Source Address: 10.1.1.254
  Destination Address: 10.1.0.183
```

b.

```
> Frame 32: 70 bytes on wire (560 bits), 70 bytes captured (560 bits) on interface \Device\NPF_{B98FB856-C6FF-43F2-8C55-000111111111}
> Ethernet II, Src: JuniperN_79:5a:a4 (e0:30:f9:79:5a:a4), Dst: ASUSTekC_57:d6:6b (0c:9d:92:57:d6:6b)
> Internet Protocol Version 4, Src: 10.1.1.254, Dst: 10.1.0.183
> Internet Control Message Protocol
  Type: 11 (Time-to-live exceeded)
  Code: 0 (Time to live exceeded in transit)
  Checksum: 0xf4ff [correct]
  [Checksum Status: Good]
  Unused: 00000000
> Internet Protocol Version 4, Src: 10.1.0.183, Dst: 8.8.8.8
> Internet Control Message Protocol
```

● 3

## Part 3 Measuring Network Bandwidth

1.

```
briansu@ubuntu:~$ iperf3 -c 140.117.171.20 -t 10 -i 2
Connecting to host 140.117.171.20, port 5201
[ 4] local 10.0.2.15 port 36966 connected to 140.117.171.20 port 5201
[ ID] Interval           Transfer    Bandwidth  Retr  Cwnd
[ 4]  0.00-2.00      sec   54.1 MBytes  227 Mbits/sec    0   67.0 KBytes
[ 4]  2.00-4.00      sec   42.2 MBytes  177 Mbits/sec    0   67.0 KBytes
[ 4]  4.00-6.00      sec   46.9 MBytes  197 Mbits/sec    0   67.0 KBytes
[ 4]  6.00-8.00      sec   53.3 MBytes  223 Mbits/sec    0   67.0 KBytes
[ 4]  8.00-10.00     sec   50.3 MBytes  211 Mbits/sec    0   67.0 KBytes
- - - - -
[ ID] Interval           Transfer    Bandwidth  Retr
[ 4]  0.00-10.00     sec   247 MBytes  207 Mbits/sec    0             sender
[ 4]  0.00-10.00     sec   246 MBytes  207 Mbits/sec                  receiver

iperf Done.
```

2.

After adjust the window size, Different: Transfer lower, Bandwidth smaller

```
briansu@ubuntu:~$ iperf3 -c 140.117.171.20 -w 2000 -t 10 -i 2
Connecting to host 140.117.171.20, port 5201
[ 4] local 10.0.2.15 port 49078 connected to 140.117.171.20 port 5201
[ ID] Interval            Transfer      Bandwidth      Retr  Cwnd
[ 4]  0.00-2.00    sec   3.55 MBytes  14.9 Mbits/sec    0   143 KBytes
[ 4]  2.00-4.00    sec   2.75 MBytes  11.6 Mbits/sec    0   143 KBytes
[ 4]  4.00-6.01    sec   3.14 MBytes  13.1 Mbits/sec    0   143 KBytes
[ 4]  6.01-8.00    sec   3.20 MBytes  13.5 Mbits/sec    0   143 KBytes
[ 4]  8.00-10.00   sec   2.88 MBytes  12.1 Mbits/sec    0   143 KBytes
- - - - -
[ ID] Interval            Transfer      Bandwidth      Retr
[ 4]  0.00-10.00   sec  15.5 MBytes  13.0 Mbits/sec    0
[ 4]  0.00-10.00   sec  15.4 MBytes  12.9 Mbits/sec    0
                                     sender
                                     receiver

iperf Done.
```

3.

```
briansu@ubuntu:~$ iperf3 -c 140.117.171.20 -u -t 10 -i 2 -b 512G
Connecting to host 140.117.171.20, port 5201
[ 4] local 10.0.2.15 port 55300 connected to 140.117.171.20 port 5201
[ ID] Interval            Transfer      Bandwidth      Total Datagrams
[ 4]  0.00-2.00    sec   381 MBytes  1.60 Gbits/sec  48783
[ 4]  2.00-4.00    sec   386 MBytes  1.62 Gbits/sec  49425
[ 4]  4.00-6.00    sec   391 MBytes  1.64 Gbits/sec  50049
[ 4]  6.00-8.00    sec   372 MBytes  1.56 Gbits/sec  47586
[ 4]  8.00-10.00   sec   381 MBytes  1.60 Gbits/sec  48827
- - - - -
[ ID] Interval            Transfer      Bandwidth      Jitter    Lost/Total Datag
rams
[ 4]  0.00-10.00   sec  1.87 GBytes  1.60 Gbits/sec  0.095 ms  146669/244654 (6
0%)
[ 4] Sent 244654 datagrams

iperf Done.
```

4. There is no package lost

```
briansu@ubuntu:~$ iperf3 -c 140.117.171.20 -u -t 10 -i 2
Connecting to host 140.117.171.20, port 5201
[ 4] local 10.0.2.15 port 60328 connected to 140.117.171.20 port 5201
[ ID] Interval            Transfer      Bandwidth      Total Datagrams
[ 4]  0.00-2.00    sec   256 KBytes  1.05 Mbits/sec   32
[ 4]  2.00-4.00    sec   256 KBytes  1.05 Mbits/sec   32
[ 4]  4.00-6.00    sec   256 KBytes  1.05 Mbits/sec   32
[ 4]  6.00-8.00    sec   256 KBytes  1.05 Mbits/sec   32
[ 4]  8.00-10.01   sec   256 KBytes  1.05 Mbits/sec   32
- - - - -
[ ID] Interval            Transfer      Bandwidth      Jitter    Lost/Total Datag
rams
[ 4]  0.00-10.01   sec  1.25 MBytes  1.05 Mbits/sec  0.413 ms  0/159 (0%)
[ 4] Sent 159 datagrams

iperf Done.
```