

# Computer Networks - Lab 3

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## nslookup

**1. Run nslookup to obtain the IP address of a Web server in Asia. What is the IP address of that server?**

I performed nslookup for `tengine.taobao.org` Its IP address is 47.246.110.143

```
C:\Users\admin>nslookup tengine.taobao.org
Server: INHYDMUDC01.mahindrauniversity.edu.in
Address: 10.59.121.144

DNS request timed out.
        timeout was 2 seconds.
Non-authoritative answer:
Name:   international.ovs.sg.tengine.ingress.alibabacorp.com.gds.alibabadns.com
Address: 47.246.110.143
Aliases: tengine.taobao.org
         international.tengine.ingress.alibabacorp.com
         international.tengine.ingress.alibabacorp.com.gds.alibabadns.com
         international.ovs.sg.tengine.ingress.alibabacorp.com
```

**2. Run nslookup to determine the authoritative DNS servers for a university in Europe.**

I performed nslookup for a European University - Cambridge University. Its IP address is 155.198.142.82

```
C:\Users\admin>nslookup -type=NS cam.ac.uk
Server: INHYDMUDC01.mahindrauniversity.edu.in
Address: 10.59.121.144

Non-authoritative answer:
cam.ac.uk      nameserver = ns3.mythic-beasts.com
cam.ac.uk      nameserver = ns2.ic.ac.uk
cam.ac.uk      nameserver = ns1.mythic-beasts.com
cam.ac.uk      nameserver = auth0.dns.cam.ac.uk
cam.ac.uk      nameserver = dns0.eng.cam.ac.uk
cam.ac.uk      nameserver = dns0.cl.cam.ac.uk

ns2.ic.ac.uk   internet address = 155.198.142.82
ns2.ic.ac.uk   AAAA IPv6 address = 2a0c:5bc0:4:1::82
auth0.dns.cam.ac.uk internet address = 131.111.8.37
auth0.dns.cam.ac.uk AAAA IPv6 address = 2001:630:212:8::d:a0
dns0.eng.cam.ac.uk internet address = 129.169.8.8
dns0.cl.cam.ac.uk internet address = 128.232.0.19
dns0.cl.cam.ac.uk AAAA IPv6 address = 2a05:b400:110::d:a0
```

**3. Run nslookup so that one of the DNS servers obtained in Question 2 is queried for the mail servers for Yahoo! mail. What is its IP address?**

The IP address is 155.198.142.82

```
C:\Users\admin>nslookup mail.yahoo.com ns2.ic.ac.uk
Server: ns2.ic.ac.uk
Address: 155.198.142.82
```

# ipconfig

```
wireless LAN adapter Wi-Fi 2:

Connection-specific DNS Suffix . : mahindrauniversity.edu.in
Description . . . . . : Killer(R) Wi-Fi 6 AX1650x 160MHz Wireless Network Adapter (200NGW)
Physical Address. . . . . : 14-85-7F-29-CF-98
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::5046:851:a645:847c%14(Preferred)
IPv4 Address. . . . . : 10.70.60.153(Preferred)
Subnet Mask . . . . . : 255.255.192.0
Lease Obtained. . . . . : 20 February 2024 18:28:24
Lease Expires . . . . . : 21 February 2024 18:28:24
Default Gateway . . . . . : 10.70.0.1
DHCP Server . . . . . : 10.20.0.50
DHCPv6 IAID . . . . . : 253003135
DHCPv6 Client DUID. . . . . : 00-01-00-01-2C-F5-D6-44-60-18-95-34-D9-07
DNS Servers . . . . . : 10.59.121.144
                        10.59.121.244
NetBIOS over Tcpip. . . . . : Enabled
```

## Tracing DNS with Wireshark

### Part 3a. <http://www.ietf.org>

4. Locate the DNS query and response messages. Are then sent over UDP or TCP?  
The DNS query and response messages are sent over TCP

No.	Time	Source	Destination	Protocol	Length	Info
5	1.22483	162.159.135.234	10.70.60.153	TLSv1.2	190	Application Data
6	1.317583	10.70.60.153	162.159.135.234	TCP	54	61540 → 443 [ACK] Seq=55 Ack=179 Win=510 Len=0
7	1.370756	162.159.135.234	10.70.60.153	TLSv1.2	153	Application Data
8	1.406213	10.70.60.153	162.159.135.234	TCP	54	61540 → 443 [ACK] Seq=55 Ack=278 Win=510 Len=0
9	1.458966	162.159.135.234	10.70.60.153	TLSv1.2	462	Application Data
10	1.503688	10.70.60.153	162.159.135.234	TCP	54	61540 → 443 [ACK] Seq=55 Ack=686 Win=514 Len=0
11	2.507230	10.70.60.153	104.16.45.99	TCP	55	61580 → 443 [ACK] Seq=1 Ack=1 Min=513 Len=1 [TCP segment of a reassembled PDU]
12	2.609062	104.16.45.99	10.70.60.153	TCP	60	443 → 61580 [ACK] Seq=1 Ack=2 Min=8 Len=0 SLE=1 SRE=2
13	2.695426	10.70.60.153	104.16.44.99	TCP	55	61555 → 443 [ACK] Seq=1 Ack=1 Min=513 Len=1 [TCP segment of a reassembled PDU]
14	2.714404	104.16.44.99	10.70.60.153	TCP	60	443 → 61555 [ACK] Seq=1 Ack=2 Min=8 Len=0 SLE=1 SRE=2
15	2.788859	10.70.60.153	142.250.182.42	TCP	55	61566 → 443 [ACK] Seq=1 Ack=1 Min=514 Len=1 [TCP segment of a reassembled PDU]
16	2.809217	142.250.182.42	10.70.60.153	TCP	60	443 → 61566 [ACK] Seq=1 Ack=2 Min=311 Len=0 SLE=1 SRE=2
17	4.525515	10.70.60.153	34.120.52.64	TCP	55	61553 → 443 [ACK] Seq=1 Ack=1 Min=513 Len=1 [TCP segment of a reassembled PDU]
18	4.548499	34.120.52.64	10.70.60.153	TCP	60	443 → 61553 [ACK] Seq=1 Ack=2 Min=300 Len=0 SLE=1 SRE=2
19	5.367095	20.198.118.190	10.70.60.153	TLSv1.2	417	Application Data
20	5.367283	162.159.135.234	10.70.60.153	TLSv1.2	155	Application Data
21	5.376953	10.70.60.153	20.198.118.190	TLSv1.2	185	Application Data
22	5.407717	10.70.60.153	162.159.135.234	TCP	54	61540 → 443 [ACK] Seq=55 Ack=787 Win=513 Len=0
23	5.448946	20.198.118.190	10.70.60.153	TCP	60	443 → 49440 [ACK] Seq=364 Ack=132 Min=7343 Len=0
24	5.716698	10.70.60.153	163.70.140.61	TCP	60	61581 → 80 [SYN] Seq=0 Min=64240 Len=0 MSS=1460 WS=256 SACK_PERM WS=256
25	5.724385	163.70.140.61	10.70.60.153	TCP	60	80 → 61581 [SYN, ACK] Seq=0 Ack=1 Min=65335 Len=0 MSS=1386 SACK_PERM WS=256
26	5.724611	10.70.60.153	163.70.140.61	TCP	54	61581 → 80 [ACK] Seq=1 Ack=1 Min=131584 Len=0
27	5.725301	10.70.60.153	163.70.140.61	TCP	460	61581 → 80 [PSH, ACK] Seq=1 Ack=1 Min=131584 Len=415 [TCP segment of a reassembled PDU]
28	5.731154	163.70.140.61	10.70.60.153	TCP	60	80 → 61581 [ACK] Seq=1 Ack=416 Min=66816 Len=0
29	5.981678	163.70.140.61	10.70.60.153	TCP	183	80 → 61581 [PSH, ACK] Seq=1 Ack=416 Min=66816 Len=129 [TCP segment of a reassembled PDU]

Frame 1: 108 bytes on wire (864 bits), 108 bytes captured (864 bits) on interface Vmnic0\NPF{A7303A38-EDBA-4E27-891D-2028A3B87173}, id 0  
Ethernet II, Src: Intel\_29:cf:98 (14:85:7f:29:cf:98), Dst: Hewlett-Packard\_92:b3:5c (70:10:6f:92:b3:5c)  
Internet Protocol Version 4, Src: 10.70.60.153, Dst: 162.159.135.234  
Transmission Control Protocol, Src Port: 61540, Dst Port: 443, Seq: 1, Ack: 1, Len: 54  
Transport Layer Security

5. What is the destination port for the DNS query message? What is the source port of DNS response message?

The destination port for the DNS query is 53 and the source port of the DNS response is 53.

6. To what IP address is the DNS query message sent? Use ipconfig to determine the IP address of your local DNS server. Are these two IP addresses the same?

It's sent to 10.59.121.144, which is the IP address of one of my local DNS servers.

Source Address: 10.70.60.153  
Destination Address: 10.59.121.144

7. Examine the DNS query message. What “Type” of DNS query is it? Does the query message contain any “answers”?

DNS query message is of the type HTTPS and there are not answers

```
▼ Domain Name System (query)
  Transaction ID: 0xde49
  ► Flags: 0x0100 Standard query
  Questions: 1
  Answer RRs: 0
  Authority RRs: 0
  Additional RRs: 0
  ▼ Queries
    ▼ static.ietf.org: type HTTPS, class IN
      Name: static.ietf.org
      [Name Length: 15]
      [Label Count: 3]
      Type: HTTPS (65) (HTTPS Specific Service Endpoints)
      Class: IN (0x0001)
    [Response In: 103]
```

8. Examine the DNS response message. How many “answers” are provided? What do each of these answers contain?

DNS response message is of the type HTTPS and contains one answer containing the name of the host, the type of address and the class.

```

Domain Name System (response)
Transaction ID: 0xde49
Flags: 0x0180 Standard query response, No error
Questions: 1
Answer RRs: 1
Authority RRs: 0
Additional RRs: 0
Queries
  static.ietf.org: type HTTPS, class IN
    Name: static.ietf.org
    [Name Length: 15]
    [Label Count: 3]
    Type: HTTPS (65) (HTTPS Specific Service Endpoints)
    Class: IN (0x0001)
Answers
  static.ietf.org: type HTTPS, class IN
    Name: static.ietf.org
    Type: HTTPS (65) (HTTPS Specific Service Endpoints)
    Class: IN (0x0001)
    Time to live: 60 (1 minute)
    Data length: 33
    SvcPriority: 1
    TargetName: <Root>
    SvcParam: alpn=h3,h2
    SvcParam: ipv6hint=2606:4700:8392:c0ba:44c5:0:6810:2c63
[Request ID: 70]
[Time: 0.049341000 seconds]

```

9. Consider the subsequent TCP SYN packet sent by your host. Does the destination IP address of the SYN packet correspond to any of the IP addresses provided in the DNS response message?

The first SYN packet was sent to 209.173.57.180 which corresponds to the first IP address provided in the DNS response message.

```

196 49.811547 10.70.60.153 52.108.9.12 TCP 66 61713 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
197 49.825211 52.108.9.12 10.70.60.153 TCP 66 443 → 61713 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1180 WS=256 SACK_PERM
198 49.829481 10.70.60.153 52.108.9.12 TCP 54 61713 → 443 [ACK] Seq=1 Ack=1 Win=131584 Len=0
199 49.836084 10.70.60.153 52.108.9.12 TLSv1.3 2380 Client Hello [SHA256-view.officeapps.live.com]
200 49.853394 52.108.9.12 10.70.60.153 TLSv1.3 153 Hello Retry Request, Change Cipher Spec
201 49.853560 52.108.9.12 10.70.60.153 TCP 60 443 → 61713 [ACK] Seq=1 Ack=2255 Win=4195328 Len=0
202 49.853671 10.70.60.153 52.108.9.12 TCP 54 61713 → 443 [ACK] Seq=2255 Ack=1300 Win=131328 Len=0
203 49.854031 10.70.60.153 52.108.9.12 TLSv1.3 1154 Change Cipher Spec [SHA256-view.officeapps.live.com]

Internet Protocol Version 4, Src: 10.70.60.153, Dst: 52.108.9.12
Transmission Control Protocol, Src Port: 61713, Dst Port: 443, Seq: 0, Len: 0
Source Port: 61713
Destination Port: 443
[Stream index: 1]
[Conversation completeness: Incomplete, DATA (15)]
[TCP Segment Len: 0]
Sequence Number: 0 (relative sequence number)
Sequence Number (raw): 1614581280
[Next Sequence Number: 1 (relative sequence number)]
Acknowledgment Number: 0
Acknowledgment number (raw): 0
1000 .... = Header Length: 32 bytes (0)
Flags: 0x002 (SYN)
...00000000 = Reserved: Not set
...00000000 = Accurate ECN: Not set
...00000000 = Congestion Window Reduced: Not set
...00000000 = ECH Echo: Not set
...00000000 = Urgent: Not set
...00000000 = Acknowledgment: Not set
...00000000 = Push: Not set
...00000000 = Reset: Not set
...00000001 = SYN: Set
...00000000 = FIN: Not set
[TCP Flags: .....S-]

```

10. This web page contains images. Before retrieving each image, does your host issue new DNS queries?

No

### Part 3b. nslookup www.mit.edu

11. What is the destination port for the DNS query message? What is the source port of DNS response message?

The destination port of the DNS query is 53 and the source port of the DNS response is 53.

```
Source Port: 62700
Destination Port: 53
```

```
Source Port: 53
Destination Port: 62700
```

12. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server? ?

It is 10.70.60.153, and yes it is local DNS server.

13. Examine the DNS query message. What “Type” of DNS query is it? Does the query message contain any “answers”?

DNS query is of the type 0x0100 Standard query and have no answers.

```

▼ Domain Name System (query)
  Transaction ID: 0x0004
  ▶ Flags: 0x0100 Standard query
    Questions: 1
    Answer RRs: 0
    Authority RRs: 0
    Additional RRs: 0
  ▼ Queries
    ▼ www.mit.edu.edu.in: type A, class IN
      Name: www.mit.edu.edu.in
      [Name Length: 18]
      [Label Count: 5]
      Type: A (1) (Host Address)
      Class: IN (0x0001)
      [Response_In: 77]

```

14. Examine the DNS response message. How many “answers” are provided? What do each of these answers contain?

DNS response message is of the type AAAA and has 4 answers.

```

→ 82 26.708369 10.70.60.153 10.59.121.144 DNS 71 Standard query 0x0007 AAAA www.mit.edu
→ 83 26.789983 10.59.121.144 10.70.60.153 DNS 200 Standard query response 0x0007 AAAA www.
Answers RRs: 4
Authority RRs: 0
Additional RRs: 0
▼ Queries
  ▼ www.mit.edu: type AAAA, class IN
    Name: www.mit.edu
    [Name Length: 11]
    [Label Count: 3]
    Type: AAAA (28) (IPv6 Address)
    Class: IN (0x0001)
  ▼ Answers
    ▼ www.mit.edu: type CNAME, class IN, cname www.mit.edu.edgekey.net
      Name: www.mit.edu
      Type: CNAME (5) (Canonical NAME for an alias)
      Class: IN (0x0001)
      Time to live: 1682 (28 minutes, 2 seconds)
      Data length: 25
      CNAME: www.mit.edu.edgekey.net
    ▼ www.mit.edu.edgekey.net: type CNAME, class IN, cname e9566.dscb.akamaiedge.net
      Name: www.mit.edu.edgekey.net
      Type: CNAME (5) (Canonical NAME for an alias)
      Class: IN (0x0001)
      Time to live: 3 (3 seconds)
      Data length: 24
      CNAME: e9566.dscb.akamaiedge.net

```

15. Provide a screenshot

Have attached screenshots above.

### Part 3c. nslookup -type=NS mit.edu

[illegible]

16. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server?

It is 10.70.60.153, and yes it is local DNS server.

```
Internet Protocol Version 4, Src: 10.70.60.153, Dst: 10.59.121.144
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 53
Identification: 0x521d (21021)
0000 .... = Flags: 0x0
...0 0000 0000 0000 = Fragment Offset: 0
Time to Live: 128
Protocol: UDP (17)
Header Checksum: 0x0000 [validation disabled]
[Header checksum status: Unverified]
Source Address: 10.70.60.153
Destination Address: 10.59.121.144
```

17. Examine the DNS query message. What “Type” of DNS query is it? Does the query message contain any “answers”?

It’s a type NS DNS query that doesn’t contain any answers.

```

Domain Name System (query)
  Transaction ID: 0x0004
  ▶ Flags: 0x0100 Standard query
  Questions: 1
  Answer RRs: 0
  Authority RRs: 0
  Additional RRs: 0
  ▼ Queries
    ▼ mit.edu: type NS, class IN
      Name: mit.edu
      [Name Length: 7]
      [Label Count: 2]
      Type: NS (2) (authoritative Name Server)
      Class: IN (0x0001)
      [Response In: 40]

```

18. Examine the DNS response message. What MIT nameservers does the response message provide? Does this response message also provide the IP addresses of the MIT nameservers?

```

39 4.769158 10.70.60.153 10.59.121.144 DNS 67 Standard query 0x0004 NS mit.edu
40 4.772663 10.59.121.144 10.70.60.153 DNS 266 Standard query response 0x0004 NS mit.edu NS use5.akam.net NS use2.akam.net NS ns1-37.akam.net NS ns1-173.akam.net NS eur5.akam.net NS usw2.akam.net NS asia2.akam.net NS asia1.akam.net

▶ Frame 40: 266 bytes on wire (2128 bits), 266 bytes captured (2128 bits) on interface \Device\NPF_{A7303A38-ED0A-4E27-891D-2020A3B87173}, id 0
▶ Ethernet II, Src: HewlettPacka_92:b3:5c (70:10:6f:92:b3:5c), Dst: Intel_29:cf:98 (14:85:7f:29:cf:98)
▶ Internet Protocol Version 4, Src: 10.59.121.144, Dst: 10.70.60.153
▶ User Datagram Protocol, Src Port: 53, Dst Port: 52115
▼ Domain Name System (response)
  Transaction ID: 0x0004
  ▶ Flags: 0x8180 Standard query response, No error
  Questions: 1
  Answer RRs: 8
  Authority RRs: 0
  Additional RRs: 2
  ▼ Queries
    ▼ mit.edu: type NS, class IN
      Name: mit.edu
      [Name Length: 7]
      [Label Count: 2]
      Type: NS (2) (authoritative Name Server)
      Class: IN (0x0001)
  ▼ Answers
    ▼ mit.edu: type NS, class IN, ns use5.akam.net
      Name: mit.edu
      Type: NS (2) (authoritative Name Server)
      Class: IN (0x0001)
      Time to live: 1650 (27 minutes, 30 seconds)
      Data length: 15
      Name Server: use5.akam.net
    ▶ mit.edu: type NS, class IN, ns use2.akam.net
    ▶ mit.edu: type NS, class IN, ns ns1-37.akam.net
    ▶ mit.edu: type NS, class IN, ns ns1-173.akam.net
    ▶ mit.edu: type NS, class IN, ns eur5.akam.net
    ▶ mit.edu: type NS, class IN, ns usw2.akam.net
    ▶ mit.edu: type NS, class IN, ns asia2.akam.net
    ▶ mit.edu: type NS, class IN, ns asia1.akam.net
  ▶ Additional records
    [Time: 0.003505000 seconds]

```

19. Provide a screenshot.

Attached in the above questions.

### Part 3d. nslookup www.aiit.or.kr bitsy.mit.edu

20. To what IP address is the DNS query message sent? Is this the IP address of your default local DNS server? If not, what does the IP address correspond to?

It is 10.70.60.153, and yes it is local DNS server.

21. Examine the DNS query message. What “Type” of DNS query is it? Does the query message contain any “answers”?

```

▼ Queries
  ▼ www.aiit.or.kr: type AAAA, class IN
    Name: www.aiit.or.kr
    [Name Length: 14]
    [Label Count: 4]
    Type: AAAA (28) (IP6 Address)
    Class: IN (0x0001)

```

**22. Examine the DNS response message. How many “answers” are provided? What does each of these answers contain?**

I was unable to get a response to this query on my server.

**23. Provide a screenshot.**

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	10.70.60.153	18.0.72.3	DNS	82	Standard query 0x0001 PTR 3.72.0.18.in-addr.arpa
2	2.010682	10.70.60.153	18.0.72.3	DNS	100	Standard query 0x0002 A www.aiit.or.kr.mahindrauniversity.edu.in
3	4.016152	10.70.60.153	18.0.72.3	DNS	100	Standard query 0x0003 AAAA www.aiit.or.kr.mahindrauniversity.edu.in
4	6.026289	10.70.60.153	18.0.72.3	DNS	74	Standard query 0x0004 A www.aiit.or.kr
5	8.037825	10.70.60.153	18.0.72.3	DNS	74	Standard query 0x0005 AAAA www.aiit.or.kr
32	79.948724	10.70.60.153	10.59.121.144	DNS	76	Standard query 0xcac5 A go.microsoft.com
33	79.954262	10.59.121.144	10.70.60.153	DNS	171	Standard query response 0xcac6 A go.microsoft.com CNAME go.microsoft.co
61	80.283371	10.70.60.153	10.59.121.144	DNS	100	Standard query 0x3bd2 A devicemetadata.service.trafficmanager.net

Frame 5: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface \Device\NPF\_{A7303A38-ED0A-4E27-891D-2020A3B87173}, id 0

Ethernet II, Src: Intel\_29:cf:98 (14:85:f7:29:cf:98), Dst: HewlettPacka\_92:b3:5c (70:10:6f:92:b3:5c)

Internet Protocol Version 4, Src: 10.70.60.153, Dst: 18.0.72.3

User Datagram Protocol, Src Port: 62646, Dst Port: 53

Domain Name System (query)