מגישים: 200878627 יניב לידן
204736961 דן אברהם

מעבדה 3 – תקשורת נתונים

1.

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C:\WINDOWS\system32\cmd.exe

Microsoft Windows [Version 10.0.17763.503]
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C:\Users\Dan>tracert bgu.ac.il

Tracing route to bgu.ac.il [132.72.138.38]
over a maximum of 30 hops:

  1    43 ms     6 ms    19 ms  132.73.223.254
  2   119 ms    35 ms     9 ms  132.72.123.132
  3   137 ms   835 ms    24 ms  tzin.bgu.ac.il [132.72.138.38]

Trace complete.

C:\Users\Dan>
```

No.	Time	Source	Destination	Protocol	Length	Info
77	7.200773	dns1.bgu.ac.il	132.73.215.175	DNS	154	Standard query response 0x7722 No such name PTR 178.133.97.52.in-addr.arpa SOA ns1.msft.net
78	7.200773	dns1.bgu.ac.il	132.73.215.175	DNS	436	Standard query response 0xeb4e PTR 70.86.247.72.in-addr.arpa PTR a72-247-86-70.deploy.static.akamaitechnologies.c…
79	10.042511	132.73.215.175	bgu.ac.il	ICMP	106	Echo (ping) request id=0x0001, seq=4129/8464, ttl=2 (no response found!)
80	10.162149	132.72.123.132	132.73.215.175	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
81	10.165515	132.73.215.175	bgu.ac.il	ICMP	106	Echo (ping) request id=0x0001, seq=4130/8720, ttl=2 (no response found!)
82	10.200338	132.72.123.132	132.73.215.175	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
83	10.203560	132.73.215.175	bgu.ac.il	ICMP	106	Echo (ping) request id=0x0001, seq=4131/8976, ttl=2 (no response found!)
84	10.213147	132.72.123.132	132.73.215.175	ICMP	70	Time-to-live exceeded (Time to live exceeded in transit)
85	10.217187	132.73.215.175	dns1.bgu.ac.il	DNS	87	Standard query 0x9dba PTR 132.123.72.132.in-addr.arpa
86	10.248602	132.73.215.175	dns2.bgu.ac.il	DNS	87	Standard query 0x9dba PTR 132.123.72.132.in-addr.arpa
87	10.340948	dns1.bgu.ac.il	132.73.215.175	DNS	150	Standard query response 0x9dba No such name PTR 132.123.72.132.in-addr.arpa SOA dns1.bgu.ac.il
88	10.342337	132.73.215.175	132.72.123.132	NBNS	92	Name query NBSTAT *<00><00><00><00><00><00><00><00><00><00><00><00><00><00><00>
89	10.918537	132.73.215.175	dns1.bgu.ac.il	DNS	87	Standard query 0xb79c PTR 132.123.72.132.in-addr.arpa
90	10.981288	dns2.bgu.ac.il	132.73.215.175	DNS	150	Standard query response 0x9dba No such name PTR 132.123.72.132.in-addr.arpa SOA dns1.bgu.ac.il
91	10.981289	132.72.123.132	132.73.215.175	ICMP	70	Destination unreachable (Port unreachable)
92	10.981290	dns1.bgu.ac.il	132.73.215.175	DNS	150	Standard query response 0xb79c No such name PTR 132.123.72.132.in-addr.arpa SOA dns1.bgu.ac.il
93	11.847334	132.73.215.175	132.72.123.132	NBNS	92	Name query NBSTAT *<00><00><00><00><00><00><00><00><00><00><00><00><00><00><00>
94	11.872070	132.72.123.132	132.73.215.175	ICMP	70	Destination unreachable (Port unreachable)
95	13.357359	132.73.215.175	132.72.123.132	NBNS	92	Name query NBSTAT *<00><00><00><00><00><00><00><00><00><00><00><00><00><00><00>
96	13.374673	132.72.123.132	132.73.215.175	ICMP	70	Destination unreachable (Port unreachable)
97	14.357900	151.139.128.14	132.73.215.175	TCP	54	80 → 52703 [FIN, ACK] Seq=1 Ack=1 Win=60 Len=0

א. 132.73.223.254 ← 132.72.123.132 ← 132.72.138.38 (השרת של bgu.ac.il).

ב. מכיוון שבכל שאילתה כזו מתבצעת בדיקה האם הגענו לשרת היעד, ועד שלא מגיעים השאילתה תחזיר הודעת שגיאה.

ג. תחת הכותרת Info ניתן לראות את הsequence numberו של השאילתה ובעזרתו להתאים את התשובה.

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```
C:\WINDOWS\system32\cmd.exe

C:\Users\Dan>tracert mit.edu

Tracing route to mit.edu [104.82.226.140]
over a maximum of 30 hops:

  1    40 ms    50 ms     8 ms  132.73.223.254
  2     *         *         *     Request timed out.
  3     *         *         *     Request timed out.
  4     *         *         *     Request timed out.
  5     *         *         *     Request timed out.
  6     *         *         *     Request timed out.
  7     *         *         *     Request timed out.
  8     *         *         *     Request timed out.
  9     *      132.73.223.254  reports: Destination net unreachable.

Trace complete.

C:\Users\Dan>
```

No.	Time	Source	Destination	Protocol	Length	Info
327	98.085836	DESKTOP-5DDRAKG.local	dns2.bgu.ac.il	DNS	87	Standard query 0x0c68 PTR 254.223.73.132.in-addr.arpa
328	98.115244	dns1.bgu.ac.il	DESKTOP-5DDRAKG.loc…	DNS	150	Standard query response 0x0c68 No such name PTR 254.223.73.132.in-addr.arpa SOA dns1.bgu.ac.il
329	98.116452	DESKTOP-5DDRAKG.local	132.73.223.254	NBNS	92	Name query NBSTAT *<00><00><00><00><00><00><00><00><00><00><00><00><00><00><00><00>
330	98.118328	DESKTOP-5DDRAKG.local	ff02::1:3	LLMNR	107	Standard query 0xddb6 PTR 254.223.73.132.in-addr.arpa
331	98.118824	DESKTOP-5DDRAKG.local	224.0.0.252	LLMNR	87	Standard query 0xddb6 PTR 254.223.73.132.in-addr.arpa
332	98.236900	dns2.bgu.ac.il	DESKTOP-5DDRAKG.loc…	DNS	150	Standard query response 0x0c68 No such name PTR 254.223.73.132.in-addr.arpa SOA dns1.bgu.ac.il
333	98.529858	DESKTOP-5DDRAKG.local	ff02::1:3	LLMNR	107	Standard query 0xddb6 PTR 254.223.73.132.in-addr.arpa
334	98.529965	DESKTOP-5DDRAKG.local	224.0.0.252	LLMNR	87	Standard query 0xddb6 PTR 254.223.73.132.in-addr.arpa
335	98.762264	Cisco_fa:49:c0	Broadcast	ARP	42	Gratuitous ARP for 132.73.205.217 (Reply)
336	98.804481	DESKTOP-5DDRAKG.local	dns1.bgu.ac.il	DNS	87	Standard query 0xe956 PTR 115.209.73.132.in-addr.arpa
337	99.617105	DESKTOP-5DDRAKG.local	132.73.223.254	NBNS	92	Name query NBSTAT *<00><00><00><00><00><00><00><00><00><00><00><00><00><00><00><00>
338	99.623774	132.73.223.254	DESKTOP-5DDRAKG.loc…	ICMP	70	Destination unreachable (Port unreachable)
339	99.799147	DESKTOP-5DDRAKG.local	dns1.bgu.ac.il	DNS	87	Standard query 0xadcf PTR 217.205.73.132.in-addr.arpa
340	99.818256	dns1.bgu.ac.il	DESKTOP-5DDRAKG.loc…	DNS	150	Standard query response 0xadcf No such name PTR 217.205.73.132.in-addr.arpa SOA dns1.bgu.ac.il
341	100.329959	Cisco_fa:49:c0	Broadcast	ARP	42	Gratuitous ARP for 169.254.123.92 (Request)
342	101.118217	DESKTOP-5DDRAKG.local	132.73.223.254	NBNS	92	Name query NBSTAT *<00><00><00><00><00><00><00><00><00><00><00><00><00><00><00><00>
343	101.155476	132.73.223.254	DESKTOP-5DDRAKG.loc…	ICMP	70	Destination unreachable (Port unreachable)
344	101.800007	DESKTOP-5DDRAKG.local	dns1.bgu.ac.il	DNS	87	Standard query 0xf0b6 PTR 92.123.254.160.in-addr.arpa

לא הצלחנו למצוא את המסלול ל-MIT (ניתן לראות את ההודעה שלא ניתן להגיע ליד). ייתכן והשרת של
MIT חוסם שאילתות ICMP מטעמי אבטחה.

מגישים: יניב לידן 200878627
דן אברהם 204736961

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א. ניתן לראות שה-Subnet Mask הוא 255.255.224.0 כלומר יש לנו 256 ביטים באוקטטה הימנית + 32 ביטים באוקטטה אחת משמאלה, כלומר $256 * 32 = 8192 = 2^{13}$.

ב. ל-Ethernet 2 יש כתובת IPv6 כמו שרואים בצילום מסך השמאלי.

.5 א. מועבר על גבי פרוטוקול UDP.

ב. בעת שחרור ה-IP נשלחה בקשה לשחרור בפרוטוקול DHCP.

No.	Time	Source	Destination	Protocol	Length	Info
26	1.951603	132.73.215.175	one.one.one.one	DHCP	342	DHCP Release - Transaction ID 0x9fd4f8a6

ג. ניתן לראות כי נשלחות בקשות לקבלת כתובת IP בפרוטוקול DHCP.

לבסוף מתקבל הIPn 132.73.215.175 משרת הDHCP.

No.	Time	Source	Destination	Protocol	Length	Info
677	75.441334	0.0.0.0	255.255.255.255	DHCP	332	DHCP Discover - Transaction ID 0x4548a95a
678	75.441629	0.0.0.0	255.255.255.255	DHCP	332	DHCP Discover - Transaction ID 0x4548a95a
807	90.924835	0.0.0.0	255.255.255.255	DHCP	332	DHCP Discover - Transaction ID 0x4548a95a
808	90.925168	0.0.0.0	255.255.255.255	DHCP	332	DHCP Discover - Transaction ID 0x4548a95a
1042	122.950049	0.0.0.0	255.255.255.255	DHCP	334	DHCP Discover - Transaction ID 0x2ff877e0
1043	122.950434	0.0.0.0	255.255.255.255	DHCP	334	DHCP Discover - Transaction ID 0x2ff877e0
1044	122.951378	0.0.0.0	255.255.255.255	DHCP	360	DHCP Request - Transaction ID 0x2ff877e0
1045	122.951448	0.0.0.0	255.255.255.255	DHCP	360	DHCP Request - Transaction ID 0x2ff877e0
1915	126.198930	0.0.0.0	255.255.255.255	DHCP	334	DHCP Discover - Transaction ID 0xe9266b92
1916	126.199121	0.0.0.0	255.255.255.255	DHCP	334	DHCP Discover - Transaction ID 0xe9266b92
1917	126.199667	0.0.0.0	255.255.255.255	DHCP	360	DHCP Request - Transaction ID 0xe9266b92
1918	126.199760	0.0.0.0	255.255.255.255	DHCP	360	DHCP Request - Transaction ID 0xe9266b92
3217	130.252851	DESKTOP-5DDRAKG.local	one.one.one.one	DHCP	358	DHCP Request - Transaction ID 0xcbd4cc69
3218	130.258624	one.one.one.one	DESKTOP-5DDRAKG.loc…	DHCP	346	DHCP ACK - Transaction ID 0xcbd4cc69

```
> Frame 3217: 358 bytes on wire (2864 bits), 358 bytes captured (2864 bits) on interface 1
> Ethernet II, Src: DESKTOP-5DDRAKG.local (3c:f8:62:20:88:f7), Dst: Cisco_2b:96:41 (a8:b4:56:2b:96:41)
v Internet Protocol Version 4, Src: DESKTOP-5DDRAKG.local (132.73.215.175), Dst: one.one.one.one (1.1.1.1)
      0100 .... = Version: 4
      .... 0101 = Header Length: 20 bytes (5)
    > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
      Total Length: 344
      Identification: 0x4b41 (19265)
    > Flags: 0x0000
      Time to live: 128
      Protocol: UDP (17)
      Header checksum: 0x9059 [validation disabled]
      [Header checksum status: Unverified]
      Source: DESKTOP-5DDRAKG.local (132.73.215.175)
      Destination: one.one.one.one (1.1.1.1)
> User Datagram Protocol, Src Port: 68, Dst Port: 67
> Dynamic Host Configuration Protocol (Request)
```