Introduction to Web Science

Assignment 1

TANGO

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1 Ethernet Frame

1. Source MAC Address: `00:13:10:e8:dd:52`
2. Destination MAC Address: `00:27:10:21:fa:48`
3. Protocol: Address Resolution Protocol
4. The penultimate field is the targets MAC Address and the last field is the targets IP Address.

2 Cable Issue

Let c be the speed of light, l the length of the cable and t the time it takes for the first bit to travel the length l. As the length of the cables are equal and the networks bandwidth doesn't change the propagation delay, the calculation for both networks are the same. Given the speed of light $c = 3 \cdot 10^8 \frac{m}{s}$ and the formula for the propagation delay $t = \frac{l}{c}$, the propagation delay is $t = \frac{20}{3 \cdot 10^8} s \approx 67ns$

3 Basic Network Tools

1. The % packet loss if at all it happened after sending 100 packets.
Home: 0%
University:

Listing 1: ping home

```
ping -c 100 -i 0.2  www.wikipedia.de
...
100 packets transmitted, 100 received, 0%
   packet loss, time 19883ms
rtt min/avg/max/mdev =
   18.037/21.074/29.851/1.646 ms
```

2. Size of the packet sent to Wikipedia server.
Home: 64 bytes
University: 64 bytes

Listing 2: man ping

```
-s packetsize
                    Specifies the number of
                       data bytes to be sent.
                        The default is 56,
                       which translates into
                       64 ICMP data
                    bytes when combined with
                       the 8 bytes of ICMP
                       header data.
```

3. IP address of your machine and the Wikipedia server
Home: 192.168.2.115, 91.198.174.192
University:

Listing 3: ifconfig home

```
ifconfig
...
bond0: flags=5187<UP,BROADCAST,RUNNING,MASTER,
   MULTICAST>  mtu 1500
inet 192.168.2.115  netmask 255.255.255.0
   broadcast 192.168.2.255
inet6 fd21:22dd:f528:1:d6b5:5652:241e:f450
   prefixlen 64  scopeid 0x0<global>
inet6 fd21:22dd:f528:1:f2de:f1ff:fe03:c9c9
   prefixlen 64  scopeid 0x0<global>
inet6 2003:c5:5bd7:2653:d8fd:5b7d:730d:9337
   prefixlen 64  scopeid 0x0<global>
inet6 2003:c5:5bd7:2653:f2de:f1ff:fe03:c9c9
   prefixlen 64  scopeid 0x0<global>
inet6 fe80::f2de:f1ff:fe03:c9c9  prefixlen 64
   scopeid 0x20<link>
ether f0:de:f1:03:c9:c9  txqueuelen 1000  (
   Ethernet)
RX packets 7563  bytes 6410345 (6.1 MiB)
RX errors 0  dropped 0  overruns 0  frame 0
TX packets 5621  bytes 1106251 (1.0 MiB)
TX errors 0  dropped 0 overruns 0  carrier 0
```

```
        collisions 0
```

Listing 4: arp wikipedia.org home

```
arp wikipedia.org
...
wikipedia.org (91.198.174.192) -- no entry
```

4. Query Time for DNS query of the above url.
Home: 3msec
University:

Listing 5: dig home

```
dig wikipedia.org
...
; <<>> DiG 9.11.0 <<>> wikipedia.org
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR,
    id: 7395
;; flags: qr rd ra ad; QUERY: 1, ANSWER: 1,
   AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;wikipedia.org.                 IN      A

;; ANSWER SECTION:
wikipedia.org.          38      IN      A
          91.198.174.192

;; Query time: 3 msec
;; SERVER: 192.168.2.1#53(192.168.2.1)
;; WHEN: Wed Nov 02 06:22:14 UTC 2016
;; MSG SIZE  rcvd: 47
```

5. Number of Hops in between your machine and the server
Home: didn't finish after 100+ hops
University:
6. MAC address of the device that is acting as your network gateway.

Home:
University:

Listing 6: arp home

```
arp -n
...
Address                  HWtype  HWaddress           Flags Mask            Iface
192.168.2.1              ether   d4:21:22:dd:f5:28   C                     bond0
```

4 Simple Python Programming

```
# Maps the values of an empty array of length 10 to a random number between 0 and 90.
import random

randlist = list(map(lambda x: random.randint(0,90), [None] * 10))

# Maps the previous generated random numbers to their sine and cosine values.
import math

sin = list(map(math.sin, randlist))
cos = list(map(math.cos, randlist))

# First plot the values of the sin and cos list, set the line type to dots and define the labels. Then the legend for the labels is created. After that the viewport is defined. Finally the plot is rendered.
import matplotlib.pyplot as plt

plt.plot(sin, "o", label="sine")
plt.plot(cos, "o", label="cosine")
```

```
plt.legend(loc=1, borderaxespad=0, numpoints=1)
plt.xlim([-1, 14])
plt.ylim([-5/4, 5/4])
plt.show()
```