

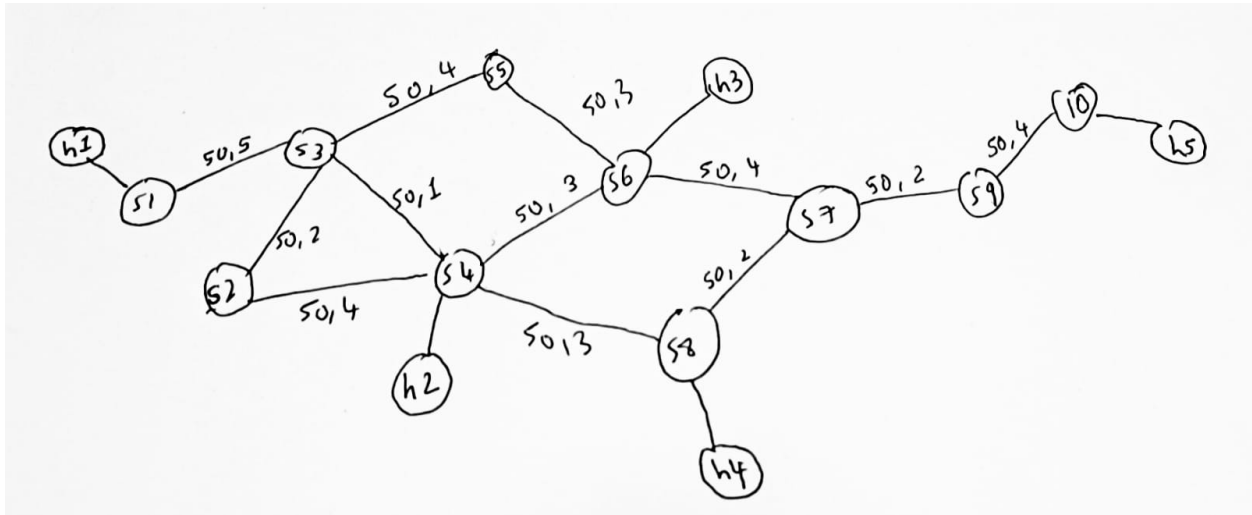
# CS356 Lab Project

Group Name: Group304

Team ID: 27

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## Topology Used



## Topology Discovery

```
Switches: s1 s2 s3 s4 s5 s6 s7 s8 s9 s10
```

```
Links:
s2-1 <----> s3-2
s6-4 <----> s7-1
s3-3 <----> s4-3
s2-2 <----> s4-2
s4-4 <----> s6-2
s3-4 <----> s5-1
s7-3 <----> s9-1
s4-5 <----> s8-2
s7-2 <----> s8-3
s9-2 <----> s10-2
s5-2 <----> s6-3
s1-2 <----> s3-1
```

```
Host 00:00:00:00:00:04 joined network on port 1 of switch 8
Host 00:00:00:00:00:03 joined network on port 1 of switch 6
Host 00:00:00:00:00:05 joined network on port 1 of switch 10
Host 00:00:00:00:00:01 joined network on port 1 of switch 1
Host 00:00:00:00:00:02 joined network on port 1 of switch 4
```

## Link Costs

```
s1-s3: 1.1764705882352942
s2-s3: 0.5882352941176471
s2-s4: 0.9803921568627451
s3-s4: 0.39215686274509803
s3-s5: 0.9803921568627451
s4-s6: 0.7843137254901961
s4-s8: 0.7843137254901961
s5-s6: 0.7843137254901961
s6-s7: 0.9803921568627451
s7-s8: 0.5882352941176471
s7-s9: 0.5882352941176471
s9-s10: 0.9803921568627451
```

## Initial Paths

```
mininet> paths h1
h1 - h2 : h1 s1 s3 s4 h2
h1 - h3 : h1 s1 s3 s4 s6 h3
h1 - h4 : h1 s1 s3 s4 s8 h4
h1 - h5 : h1 s1 s3 s4 s8 s7 s9 s10 h5
```

```
mininet> paths h2
h2 - h1 : h2 s4 s3 s1 h1
h2 - h3 : h2 s4 s6 h3
h2 - h4 : h2 s4 s8 h4
h2 - h5 : h2 s4 s8 s7 s9 s10 h5
```

```
mininet> paths h3
h3 - h1 : h3 s6 s4 s3 s1 h1
h3 - h2 : h3 s6 s4 h2
h3 - h4 : h3 s6 s4 s8 h4
h3 - h5 : h3 s6 s7 s9 s10 h5
```

```
mininet> paths h4
h4 - h1 : h4 s8 s4 s3 s1 h1
h4 - h2 : h4 s8 s4 h2
h4 - h3 : h4 s8 s7 s6 h3
h4 - h5 : h4 s8 s7 s9 s10 h5
```

```
mininet> paths h5
h5 - h1 : h5 s10 s9 s7 s8 s4 s3 s1 h1
h5 - h2 : h5 s10 s9 s7 s8 s4 h2
h5 - h3 : h5 s10 s9 s7 s6 h3
h5 - h4 : h5 s10 s9 s7 s8 h4
```

# Connection Request 1

```
mininet> service 10.0.0.2 10.0.0.4 IPV4 15
Connection generated using the path:
s4 s8
```

```
iperf
-----
Server listening on TCP port 5001
TCP window size: 85.3 KByte (default)
-----
[ 1] local 10.0.0.2 port 5001 connected with 10.0.0.4 port 46004
[ ID] Interval      Transfer    Bandwidth
[ 1] 0.0000-5.0219 sec  9.50 MBytes 15.9 Mbits/sec
```

```
iperf
-----
Client connecting to 10.0.0.2, TCP port 5001
TCP window size: 85.3 KByte (default)
-----
[ 1] local 10.0.0.4 port 46004 connected with 10.0.0.2 port 5001
[ ID] Interval      Transfer    Bandwidth
[ 1] 0.0000-5.0288 sec  9.50 MBytes 15.8 Mbits/sec
```

```
mininet> sh ovs-ofctl dump-flows s4
cookie=0x0, duration=91.809s, table=0, n_packets=148, n_bytes=8880, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x65b8327435ed2621, duration=7.076s, table=0, n_packets=32, n_bytes=2100, priority=1,ip,in_port="s4-eth1",nw_src=10.0.0.2,nw_dst=10.0.0.4 actions=output:"s4-eth5"
cookie=0x7788ebd822d1b88, duration=7.076s, table=0, n_packets=32, n_bytes=526468, priority=1,ip,in_port="s4-eth5",nw_src=10.0.0.4,nw_dst=10.0.0.2 actions=output:"s4-eth1"
cookie=0xb502bc230f370cc9, duration=91.823s, table=0, n_packets=38350, n_bytes=5827449, priority=0 actions=CONTROLLER:65535
```

```
mininet> sh ovs-ofctl dump-flows s8
cookie=0x0, duration=143.448s, table=0, n_packets=116, n_bytes=6960, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x9105fa7815f87b62, duration=58.710s, table=0, n_packets=32, n_bytes=2100, priority=1,ip,in_port="s8-eth2",nw_src=10.0.0.2,nw_dst=10.0.0.4 actions=output:"s8-eth1"
cookie=0x9802a8ca89f83022, duration=58.710s, table=0, n_packets=32, n_bytes=526468, priority=1,ip,in_port="s8-eth1",nw_src=10.0.0.4,nw_dst=10.0.0.2 actions=output:"s8-eth2"
cookie=0x4064add2a5d28042, duration=143.457s, table=0, n_packets=40383, n_bytes=6152351, priority=0 actions=CONTROLLER:65535
```

## Connection Request 2

```
mininet> service 00:00:00:00:00:01 00:00:00:00:00:03 MAC 30
Connection generated using the path:
s1 s3 s4 s6
```

```
iperf
-----
Server listening on TCP port 5001
TCP window size: 85,3 KByte (default)
-----
[ 1] local 10.0.0.1 port 5001 connected with 10.0.0.3 port 51650
[ ID] Interval      Transfer    Bandwidth
[ 1] 0.0000-5.0220 sec 18.9 MBytes 31.5 Mbits/sec
```

```
iperf
-----
Client connecting to 10.0.0.1, TCP port 5001
TCP window size: 85,3 KByte (default)
-----
[ 1] local 10.0.0.3 port 51650 connected with 10.0.0.1 port 5001
[ ID] Interval      Transfer    Bandwidth
[ 1] 0.0000-5.0529 sec 18.9 MBytes 31.3 Mbits/sec
```

```
mininet> sh ovs-ofctl dump-flows s1
cookie=0x0, duration=173.184s, table=0, n_packets=70, n_bytes=4200, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x285fa5d8bc676148, duration=11.828s, table=0, n_packets=1100, n_bytes=72636, priority=1,ip,in_port="s1-eth1",dl_src=00:00:00:00:01,dl_dst=00:00:00:00:00:03 actions=output:"s1-eth2"
cookie=0xf14f1b388f1f4313, duration=11.828s, table=0, n_packets=1226, n_bytes=15678504, priority=1,ip,in_port="s1-eth2",dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:01 actions=output:"s1-eth1"
cookie=0x3e2b3a729506b417, duration=173.193s, table=0, n_packets=36015, n_bytes=5492999, priority=0 actions=CONTROLLER:65535
```

```
mininet> sh ovs-ofctl dump-flows s3
cookie=0x0, duration=178.715s, table=0, n_packets=285, n_bytes=17100, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x89e87ec8bb647031, duration=17.359s, table=0, n_packets=1100, n_bytes=72636, priority=1,ip,in_port="s3-eth1",dl_src=00:00:00:00:01,dl_dst=00:00:00:00:00:03 actions=output:"s3-eth3"
cookie=0xc9f9fedf6d7b6d2d, duration=17.359s, table=0, n_packets=1226, n_bytes=15678504, priority=1,ip,in_port="s3-eth3",dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:01 actions=output:"s3-eth1"
cookie=0x28e8659b4664c441, duration=178.724s, table=0, n_packets=64769, n_bytes=9858784, priority=0 actions=CONTROLLER:65535
```

```
mininet> sh ovs-ofctl dump-flows s4
cookie=0x0, duration=183.696s, table=0, n_packets=291, n_bytes=17460, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x7a015b302234732c, duration=22.344s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s4-eth1",dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:00:04 actions=output:"s4-eth5"
cookie=0x57aa8252762040fb, duration=22.344s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s4-eth5",dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:02 actions=output:"s4-eth1"
cookie=0x78925c95d1f9206, duration=22.344s, table=0, n_packets=1100, n_bytes=72636, priority=1,ip,in_port="s4-eth3",dl_src=00:00:00:00:01,dl_dst=00:00:00:00:00:03 actions=output:"s4-eth4"
cookie=0xe0703a08bcad73e9, duration=22.344s, table=0, n_packets=1226, n_bytes=15678504, priority=1,ip,in_port="s4-eth4",dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:01 actions=output:"s4-eth3"
cookie=0xb502bc230f370cc9, duration=183.710s, table=0, n_packets=78661, n_bytes=11960864, priority=0 actions=CONTROLLER:65535
```

```
mininet> sh ovs-ofctl dump-flows s6
cookie=0x0, duration=194.399s, table=0, n_packets=234, n_bytes=14040, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x3243b7c8069cc81a, duration=33.041s, table=0, n_packets=1100, n_bytes=72636, priority=1,ip,in_port="s6-eth2",dl_src=00:00:00:00:01,dl_dst=00:00:00:00:00:03 actions=output:"s6-eth1"
cookie=0x9e43779c73ecfc68, duration=33.041s, table=0, n_packets=1226, n_bytes=15678504, priority=1,ip,in_port="s6-eth1",dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:01 actions=output:"s6-eth2"
cookie=0x17653da85ad632f6, duration=194.408s, table=0, n_packets=68503, n_bytes=10426294, priority=0 actions=CONTROLLER:65535
```

## Connection Request 3

```
mininet> service 00:00:00:00:00:01 00:00:00:00:00:04 MAC 20
Connection generated using the path:
s1 s3 s4 s8
```

```
iperf
-----
Server listening on TCP port 5001
TCP window size: 85,3 KByte (default)
-----
[ 1] local 10.0.0.1 port 5001 connected with 10.0.0.4 port 46254
[ ID] Interval      Transfer    Bandwidth
[ 1] 0.0000-5.0217 sec 12.6 MBytes 21.1 Mbits/sec
```

```
iperf
-----
Client connecting to 10.0.0.1, TCP port 5001
TCP window size: 85,3 KByte (default)
-----
[ 1] local 10.0.0.4 port 46254 connected with 10.0.0.1 port 5001
[ ID] Interval      Transfer    Bandwidth
[ 1] 0.0000-5.0315 sec 12.6 MBytes 21.0 Mbits/sec
```

```
mininet> sh ovs-ofctl dump-flows s1
cookie=0x0, duration=71.047s, table=0, n_packets=30, n_bytes=1800, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x30bac92fe266be29, duration=34.027s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s1-eth1",dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:03 actions=output:"s1-eth2"
cookie=0xe3bea2db357e0351, duration=34.027s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s1-eth2",dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:01 actions=output:"s1-eth1"
cookie=0x2eea092cfe861acd, duration=34.027s, table=0, n_packets=491, n_bytes=32442, priority=1,ip,in_port="s1-eth1",dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:04 actions=output:"s1-eth2"
cookie=0x8d538f60f80d0d4d, duration=34.027s, table=0, n_packets=515, n_bytes=2917642, priority=1,ip,in_port="s1-eth2",dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:01 actions=output:"s1-eth1"
cookie=0x47442b3ffab67b76, duration=71.056s, table=0, n_packets=14412, n_bytes=2234556, priority=0 actions=CONTROLLER:65535
```

```
mininet> sh ovs-ofctl dump-flows s3
cookie=0x0, duration=111.235s, table=0, n_packets=179, n_bytes=10740, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x9523fa252c98f1f9, duration=74.213s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s3-eth1",dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:03 actions=output:"s3-eth3"
cookie=0xc56710d782f5964e, duration=74.213s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s3-eth3",dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:01 actions=output:"s3-eth1"
cookie=0xe815540a4e81ca37, duration=74.213s, table=0, n_packets=491, n_bytes=32442, priority=1,ip,in_port="s3-eth1",dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:04 actions=output:"s3-eth3"
cookie=0xbab295b538d7959e, duration=74.213s, table=0, n_packets=515, n_bytes=2917642, priority=1,ip,in_port="s3-eth3",dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:01 actions=output:"s3-eth1"
cookie=0x178a3bac352dbf7f, duration=111.244s, table=0, n_packets=41283, n_bytes=6368334, priority=0 actions=CONTROLLER:65535
```

```
mininet> sh ovs-ofctl dump-flows s4
cookie=0x0, duration=119.094s, table=0, n_packets=161, n_bytes=9660, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x6104e45cad4eb000, duration=82.078s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s4-eth1",dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:00:04 actions=output:"s4-eth5"
cookie=0x7c515dab0160925d, duration=82.078s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s4-eth5",dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:02 actions=output:"s4-eth1"
cookie=0xb6e3e72752f28784, duration=82.078s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s4-eth3",dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:03 actions=output:"s4-eth4"
cookie=0xa825214f496ef0cd, duration=82.078s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s4-eth4",dl_src=00:00:00:00:00:03,dl_dst=00:00:00:00:00:01 actions=output:"s4-eth3"
cookie=0x9f20ad39543b2f2e, duration=82.078s, table=0, n_packets=491, n_bytes=32442, priority=1,ip,in_port="s4-eth3",dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:04 actions=output:"s4-eth5"
cookie=0x98eda4046579be47, duration=82.078s, table=0, n_packets=515, n_bytes=2917642, priority=1,ip,in_port="s4-eth5",dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:01 actions=output:"s4-eth3"
cookie=0xid1d10a835971a55, duration=119.087s, table=0, n_packets=41719, n_bytes=6428837, priority=0 actions=CONTROLLER:65535
```

```
mininet> sh ovs-ofctl dump-flows s8
cookie=0x0, duration=134.852s, table=0, n_packets=109, n_bytes=6540, priority=65535,dl_dst=01:80:c2:00:00:0e,dl_type=0x88cc actions=CONTROLLER:65535
cookie=0x943d2a5524d7401a, duration=97.832s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s8-eth2",dl_src=00:00:00:00:00:02,dl_dst=00:00:00:00:00:04 actions=output:"s8-eth1"
cookie=0x8a3ddf447945520, duration=97.832s, table=0, n_packets=0, n_bytes=0, priority=1,ip,in_port="s8-eth1",dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:02 actions=output:"s8-eth2"
cookie=0xe68ca91324953ba6, duration=97.832s, table=0, n_packets=491, n_bytes=32442, priority=1,ip,in_port="s8-eth2",dl_src=00:00:00:00:00:01,dl_dst=00:00:00:00:00:04 actions=output:"s8-eth1"
cookie=0x90d473f4ceb9637e, duration=97.832s, table=0, n_packets=515, n_bytes=2917642, priority=1,ip,in_port="s8-eth1",dl_src=00:00:00:00:00:04,dl_dst=00:00:00:00:00:01 actions=output:"s8-eth2"
cookie=0xd85e9e40dd553de, duration=134.861s, table=0, n_packets=37210, n_bytes=5728177, priority=0 actions=CONTROLLER:65535
```

## Connection Request 4

```
mininet> service 10.0.0.1 10.0.0.5 IPV4 15
Could not find a path
```