
SDN Slicing in ComNetsEmu

Softwarized and Virtualized Mobile Networks

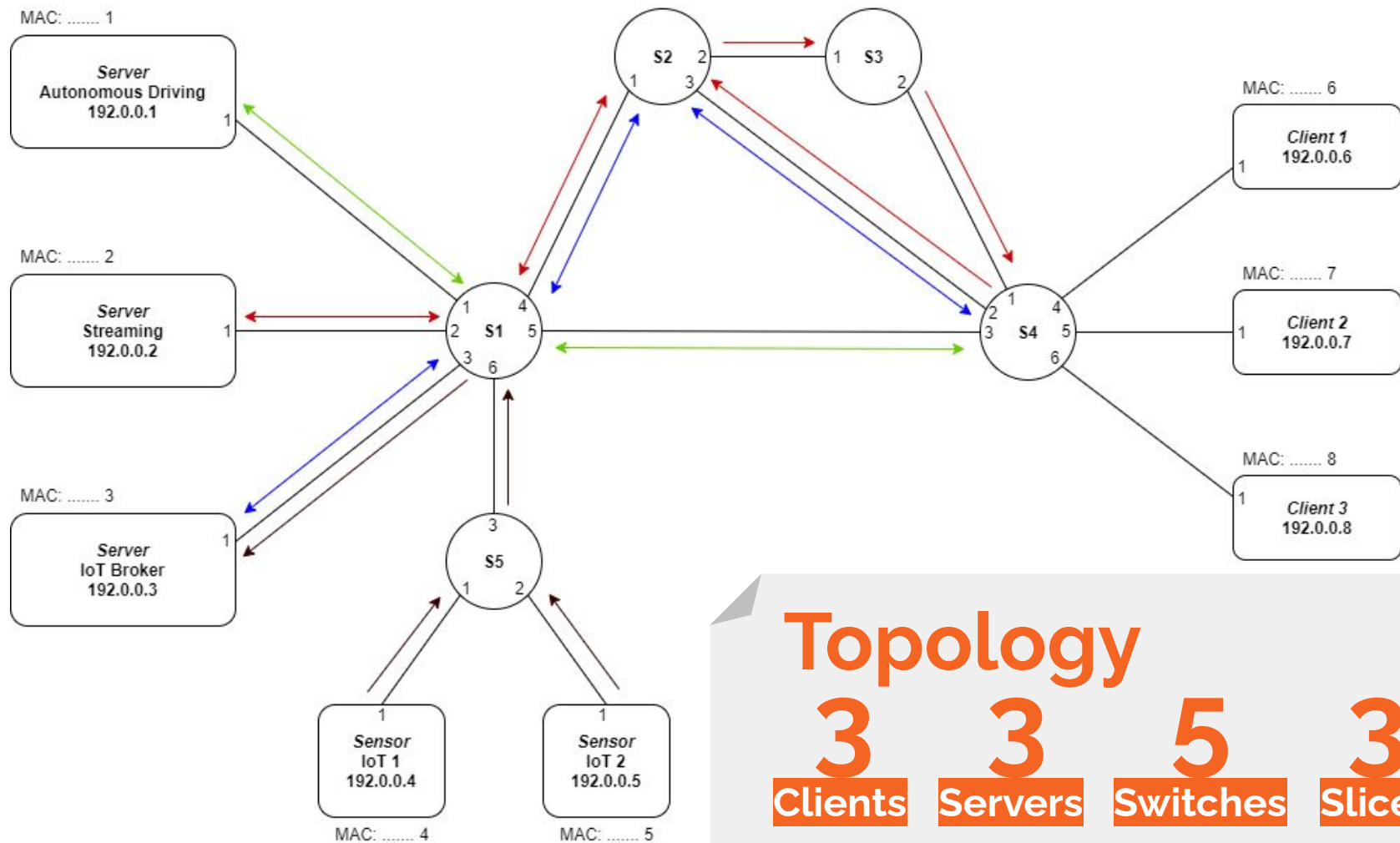
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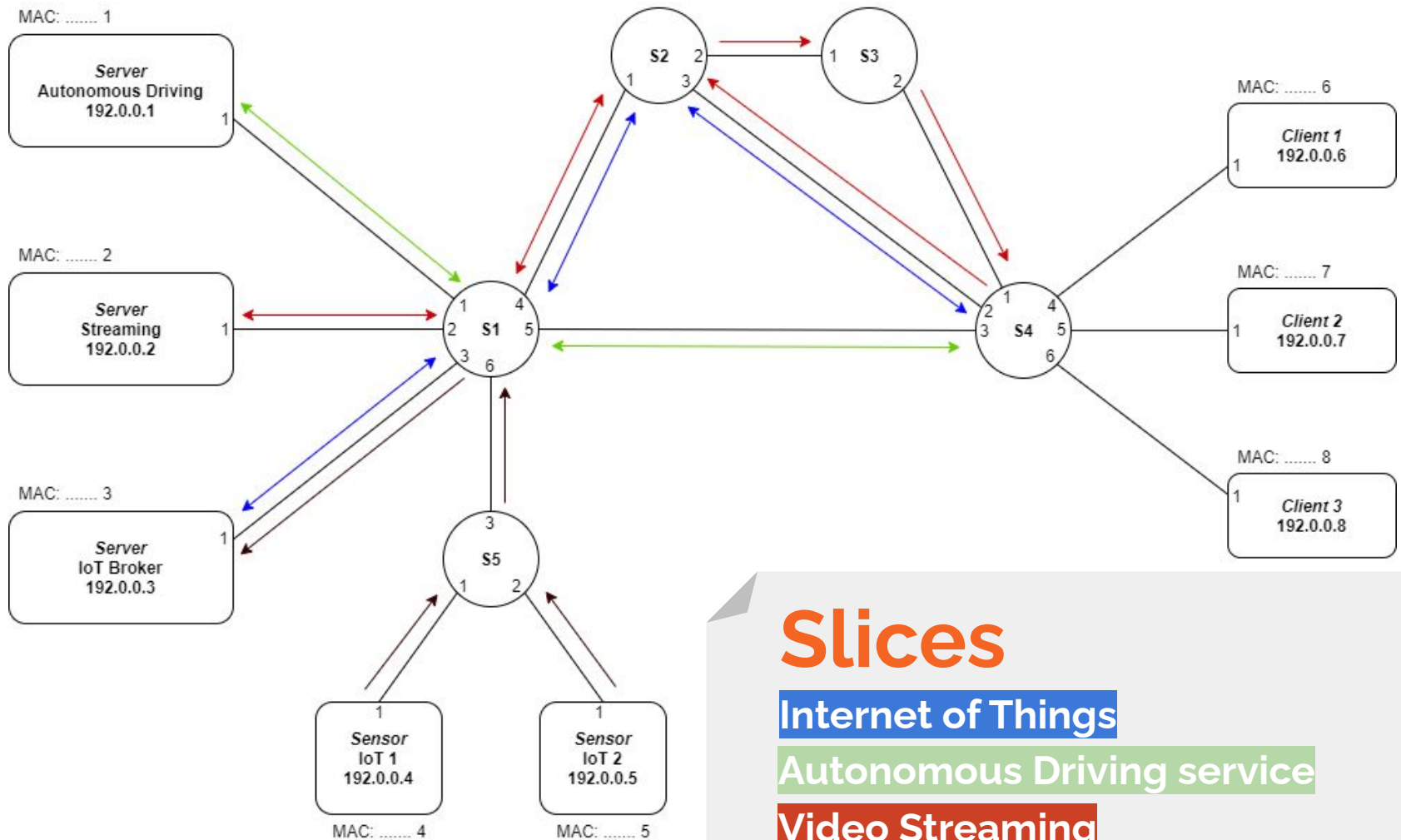
Topology

3
Clients

3
Servers

5
Switches

3
Slices



Slices

Internet of Things

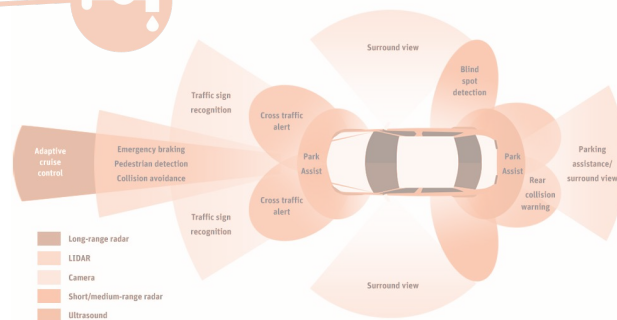
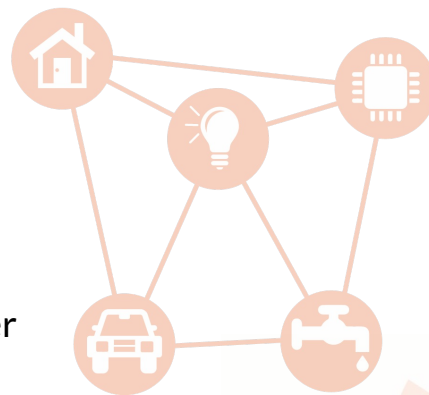
- It does not require special performances
- Sensors can be reached directly only from the broker

Autonomous Driving service

- It works on dedicated paths to avoid congestion
- It is characterized by a very low latency
- It doesn't necessarily require a very broad band

Video Streaming

- Requires an important band for video transmission
- Latency is generally not critical
- The path differs in requests and responses (the former more sensitive to latency, the latter to the band)



Ping

```
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 X X h6 h7 h8
h2 -> h1 h3 X X h6 h7 h8
h3 -> h1 h2 h4 h5 h6 h7 h8
h4 -> X X h3 h5 X X X
h5 -> X X h3 h4 X X X
h6 -> h1 h2 h3 X X h7 h8
h7 -> h1 h2 h3 X X h6 h8
h8 -> h1 h2 h3 X X h6 h7
*** Results: 35% dropped (36/56 received)
```

iperf

Internet of Things

```
dockercontainer:sv2@comnetsemu
bash-5.0# iperf -s
-----
Server listening on TCP port 5001
TCP window size: 85.3 KByte (default)
-----
[  4] local 192.0.0.2 port 5001 connected with 192.0.0.7 port 57044
[ ID] Interval      Transfer    Bandwidth
[  4] 0.0-11.0 sec  1.25 MBytes  957 Kbits/sec
[ ]
```

```
dockercontainer:sv7@comnetsemu
bash-5.0# iperf -c 192.0.0.2
-----
Client connecting to 192.0.0.2, TCP port 5001
TCP window size: 102 KByte (default)
-----
[  3] local 192.0.0.7 port 57044 connected with 192.0.0.2 port 5001
[ ID] Interval      Transfer    Bandwidth
[  3] 0.0-10.3 sec  1.25 MBytes  1.02 Mbits/sec
bash-5.0#
```

iperf

Video Streaming

```
dockercontainers:sv2@comnetsemu
bash-5.0# iperf -c 192.0.0.7 -u -b 10M

-----
Client connecting to 192.0.0.7, UDP port 5001
Sending 1470 byte datagrams, IPG target: 1121.52 us (kalman adjust)
UDP buffer size: 208 KByte (default)
-----
[ 3] local 192.0.0.2 port 47981 connected with 192.0.0.7 port 5001
[ ID] Interval      Transfer    Bandwidth
[ 3] 0.0-10.1 sec  5.90 MBytes  4.92 Mbits/sec
[ 3] Sent 4209 datagrams
[ 3] Server Report:
[ 3] 0.0-10.2 sec  5.90 MBytes  4.85 Mbits/sec  9.443 ms   0/ 4209 (0%)
bash-5.0#
```

```
dockercontainers:sv7@comnetsemu
bash-5.0# iperf -s -u -i 1

-----
Server listening on UDP port 5001
Receiving 1470 byte datagrams
UDP buffer size: 208 KByte (default)
-----
[ 3] local 192.0.0.7 port 5001 connected with 192.0.0.2 port 47981
[ ID] Interval      Transfer    Bandwidth    Jitter    Lost/Total Datagrams
[ 3] 0.0- 1.0 sec   589 KBytes  4.82 Mbits/sec  2.776 ms   0/ 410 (0%)
[ 3] 1.0- 2.0 sec   593 KBytes  4.86 Mbits/sec  3.111 ms   0/ 413 (0%)
[ 3] 2.0- 3.0 sec   591 KBytes  4.85 Mbits/sec  3.829 ms   0/ 412 (0%)
[ 3] 3.0- 4.0 sec   593 KBytes  4.86 Mbits/sec  5.126 ms   0/ 413 (0%)
[ 3] 4.0- 5.0 sec   594 KBytes  4.87 Mbits/sec  7.261 ms   0/ 414 (0%)
[ 3] 5.0- 6.0 sec   593 KBytes  4.86 Mbits/sec  2.861 ms   0/ 413 (0%)
[ 3] 6.0- 7.0 sec   594 KBytes  4.87 Mbits/sec  3.217 ms   0/ 414 (0%)
[ 3] 7.0- 8.0 sec   593 KBytes  4.86 Mbits/sec  3.918 ms   0/ 413 (0%)
[ 3] 8.0- 9.0 sec   593 KBytes  4.86 Mbits/sec  5.320 ms   0/ 413 (0%)
[ 3] 9.0-10.0 sec   593 KBytes  4.86 Mbits/sec  5.512 ms   0/ 413 (0%)
[ 3] 0.0-10.2 sec   5.90 MBytes  4.85 Mbits/sec  9.444 ms   0/ 4209 (0%)
[ 3]
```

telnet

Autonomous Driving service

```
bash-5.0# telnet 192.0.0.1 65000  
Connected to 192.0.0.1
```

```
2020-07-01 12:32:53.164649
```

```
2020-07-01 12:32:53.910459
```

```
2020-07-01 12:32:54.225062
```

```
2020-07-01 12:32:54.775819■
```


Slicing

Test of Reachability

```
dockercontainer:sv2@comnetsemu
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 21.571/21.797/22.095 ms
bash-5.0# iperf -c 192.0.0.1

-----
Client connecting to 192.0.0.1, TCP port 5001
TCP window size: 85.3 KByte (default)
-----
[ 3] local 192.0.0.2 port 56120 connected with 192.0.0.1 port 5001
[ ID] Interval      Transfer    Bandwidth
[ 3] 0.0-10.0 sec  5.00 MBytes  4.19 Mbits/sec
bash-5.0# iperf -c 192.0.0.7

-----
Client connecting to 192.0.0.7, TCP port 5001
TCP window size: 85.3 KByte (default)
-----
[ 3] local 192.0.0.2 port 58394 connected with 192.0.0.7 port 5001
[ ID] Interval      Transfer    Bandwidth
[ 3] 0.0-10.8 sec  1.50 MBytes  1.17 Mbits/sec
bash-5.0# ping 192.0.0.7
PING 192.0.0.7 (192.0.0.7): 56 data bytes
^C
--- 192.0.0.7 ping statistics ---
18 packets transmitted, 0 packets received, 100% packet loss
bash-5.0#

mininet> switch s3 stop
```

```
dockercontainer:h7@comnetsemu
bash-5.0# iperf -s

-----
Server listening on TCP port 5001
TCP window size: 85.3 KByte (default)
-----
[ 4] local 192.0.0.7 port 5001 connected with 192.0.0.2 port 58394
[ ID] Interval      Transfer    Bandwidth
[ 4] 0.0-13.3 sec  1.50 MBytes  950 Kbits/sec
^Cbash-5.0#
```

WHAT IS **NEXT?**

future developments and open points

1

IoT Support

There is no integration
with docker images

2

Queue integration

Ryu manager vs
Open vSwitch