

Solutions: HW4

Problem 1:

Indonesia spans a distance of more than 5000 km. The propagation delay is therefore

$$\frac{5\,000\text{ km}}{300\,000\text{ km/sec}} = 0.01666667\text{ sec} = 16.7\text{ msec.}$$

A single bit takes

$$\frac{1500\text{ b}}{10 \times 10^6\text{ b/sec}} = 0.00015\text{sec} = 0.15\text{ msec.}$$

The critical time is twice the sum or 33.3 msec.

Problem 2:

The maximum transmission time is

$$\frac{2\text{ km}}{200\,000\text{ km/sec}} = 10\ \mu\text{sec.}$$

To avoid collisions, the frame needs to be transmitted for at least $20\ \mu\text{sec}$.

At 20 Gb/sec, one bit takes

$$\frac{1}{20 \times 10^9\text{ sec}} = 0.05\text{ nsec.}$$

The minimum number of bits per frame is

$$\frac{20\ \mu\text{sec}}{0.05\text{ nsec}} = 20 \times 10^{-6} \times 20 \times 10^9 = 400 \times 10^3.$$

With other words, the minimum frame size is 400 Kb, which is large enough to prevent this type of protocol to ever be accepted. A much better alternative is to use a protocol that does not have to deal with collisions, for example, using wavelength multiplexing between the device and the switch.

Problem 3:

When the switch receives the message with destination MAC 80 CF 41 00 00 03 and source MAC 3C 8B 7F 00 00 01, it checks the entry for source and destination in the MAC table. Since there is nothing there, it

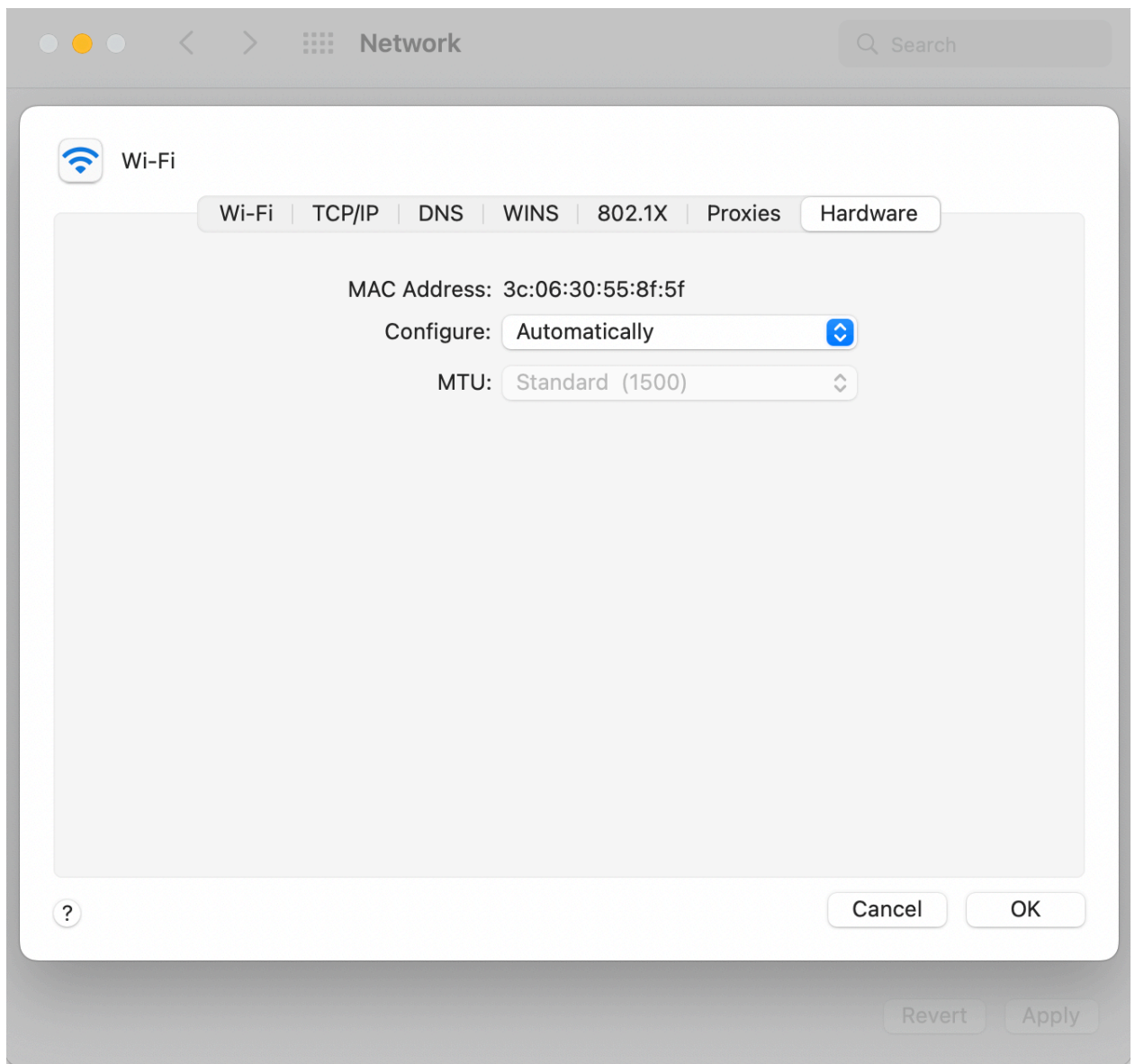
- adds an entry MAC 3C 8B 7F 00 00 01 at Port A
- forwards the message to all other ports.

The Computer 2 drops the forwarded message. Computer 1 receives it. When Computer 1 returns an ack, with destination MAC 3C 8B 7F 00 00 01 and source MAC 80 CF 41 00 00 03, the switch

- Finds MAC 3C 8B 7F 00 00 01 at Port A in its MAC table and forwards to Port A
- Adds MAC 80 CF 41 00 00 03 at Port C to its MAC table.

Problem 4:

There are GUI ways to find the MAC address. We find the MAC address also in the "active" connection of the ifconfig output.



```
en0:
flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST>
mtu 1500

options=6463<RXCSUM, TXCSUM, TS04, TS06, CHANNEL_IO, PARTIAL_CSU
M, ZEROINVERT_CSUM>
  ether 3c:06:30:55:8f:5f
  inet6 fe80::ef:5f9b:71fc:53ba%en0 prefixlen 64 secured
scopeid 0xb
  inet6 2600:1700:9600:1370:1cb8:9811:d8c6:51ba prefixlen
64 autoconf secured
  inet6 2600:1700:9600:1370:14f6:5a1e:db8b:a6e0 prefixlen
64 autoconf temporary
  inet6 2600:1700:9600:1370::1a prefixlen 64 dynamic
  inet 192.168.1.134 netmask 0xffffffff00 broadcast
192.168.1.255
  nd6 options=201<PERFORMNUD,DAD>
  media: autoselect
  status: active
```