PROJECT 2-SIMULATING THE UCR NETWORK IN 2014

SCICOMP202 Networks and Communications

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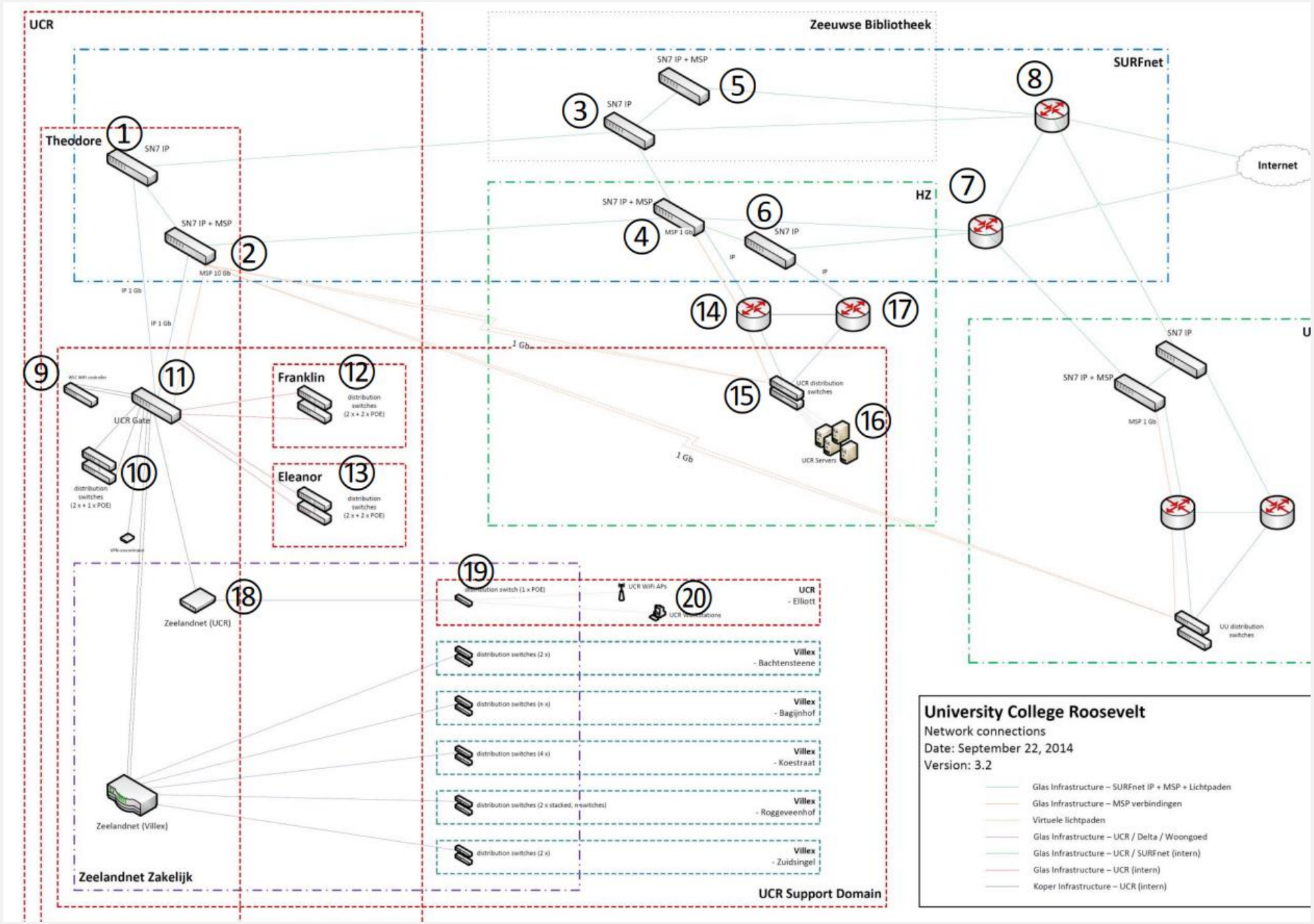
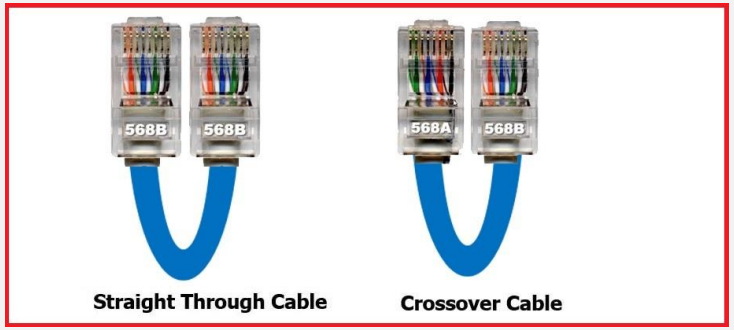
This is all my own work. I have not knowingly allowed others to copy my work. This work has not been submitted for assessment in any other context.

UCR NETWORK IN 2014



WORK ARTIFACTS

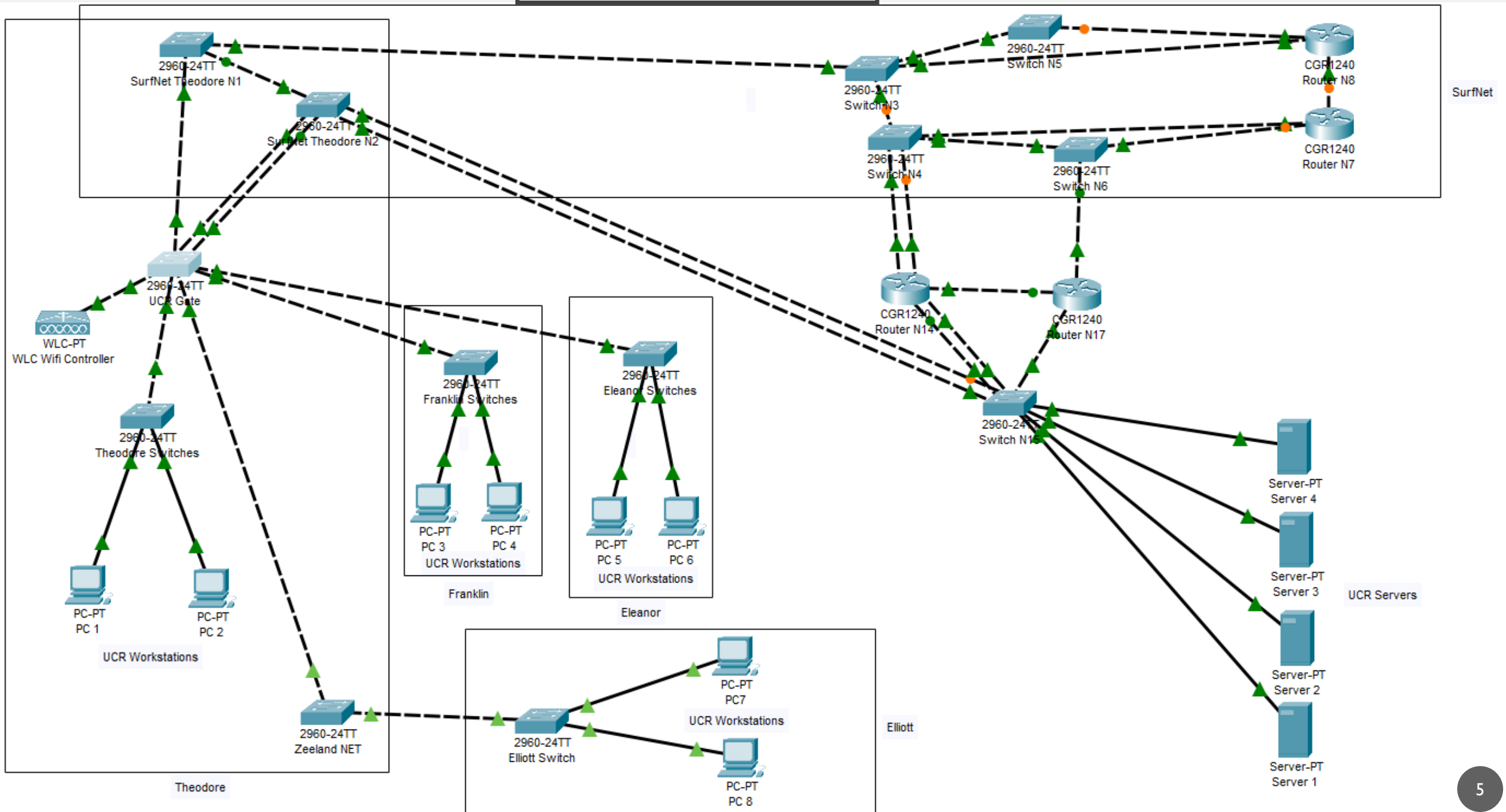
- Routers
- Server
- Switches
- Wireless LAN controller
- PCs
- Copper Cables

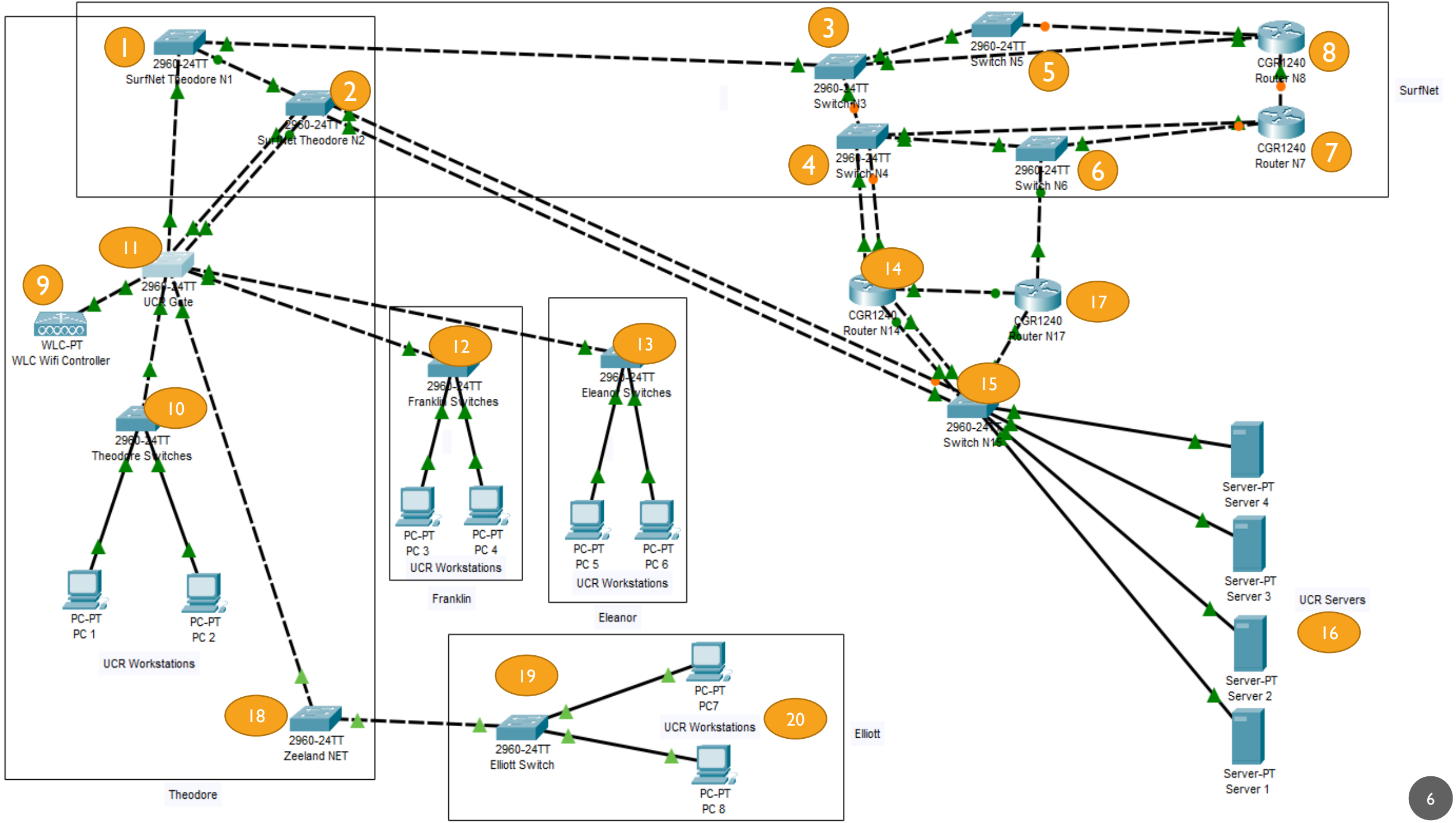


!ASSUMPTIONS!

- I assumed we did not need to map all components and connection names and types.
- I assumed that all connections/links were Fast Ethernet. I was using either copper straight-through or crossover cables.
- Most devices were assumed to be switches (including OBJ 11 and OBJ 18)
- Workstations were comprised of only 2 computers (PC) and no laptops.
- I did not plug in extra non-network components.
- No use of the internet cloud.

MY MODEL


2960-24TT
SurfNet Theodore N1
2960-24TT
SurfNet Theodore N2
2960-24TT
Switch N3
2960-24TT
Switch N5
CGR1240
Router N8
CGR1240
Router N7
2960-24TT
Switch N4
2960-24TT
Switch N6
SurfNet
2960-24TT
UCR Gate
WLC-PT
WLC Wifi Controller
CGR1240
Router N14
CGR1240
Router N17
2960-24TT
Theodore Switches
2960-24TT
Franklin Switches
2960-24TT
Eleanor Switches
2960-24TT
Switch N15
PC-PT
PC 1
PC-PT
PC 2
UCR Workstations
PC-PT
PC 3
PC-PT
PC 4
UCR Workstations
Franklin
PC-PT
PC 5
PC-PT
PC 6
UCR Workstations
Eleanor
Server-PT
Server 4
Server-PT
Server 3
Server-PT
Server 2
Server-PT
Server 1
UCR Servers
2960-24TT
Zeeland NET
Theodore
2960-24TT
Elliott Switch
PC-PT
PC7
UCR Workstations
PC-PT
PC 8
Elliott


1
2960-24TT
SurfNet Theodore N1
2
2960-24TT
SurfNet Theodore N2
3
2960-24TT
Switch N3
2960-24TT
Switch N5
5
CGR1240
Router N8
8
SurfNet
4
2960-24TT
Switch N4
2960-24TT
Switch N6
6
CGR1240
Router N7
7
11
2960-24TT
UCR Gate
9
WLC-PT
WLC Wifi Controller
14
CGR1240
Router N14
CGR1240
Router N17
17
15
2960-24TT
Switch N15
10
2960-24TT
Theodore Switches
12
2960-24TT
Franklin Switches
13
2960-24TT
Eleanor Switches
PC-PT
PC 1
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UCR Workstations
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UCR Workstations
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UCR Workstations
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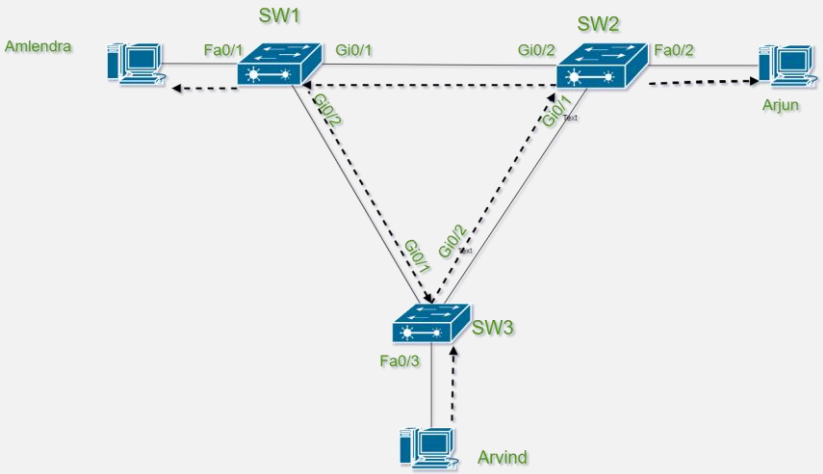
Server-PT
Server 4
Server-PT
Server 3
Server-PT
Server 2
Server-PT
Server 1
UCR Servers
16
18
2960-24TT
Zeeland NET
19
2960-24TT
Elliott Switch
PC-PT
PC7
UCR Workstations
20
PC-PT
PC 8
Elliott
Theodore

EXPERIMENT WITH THE STP PROTOCOL

- The Spanning Tree Protocol (STP) is a network protocol that builds a loop-free logical topology for Ethernet networks. The basic function of STP is to prevent bridge loops.
- The starting point of the STP protocol seems random. In other words, where the first STP message gets sent from is based on an algorithm.
- IMPORTANT NOTE: I did establish the full UCR network with multiple connections and links between the components, resulting in a lot more logical topologies being available for the STP packets.



The STP path cost default was originally calculated by the formula 1 Gbit/s/bandwidth.

HYPOTHESIS AND VARIABLES + CHANGES

- Null Hypothesis: Bandwidth speed does NOT influence the pathway of STP packets.
- Alternative Hypothesis: Bandwidth speed does influence the pathway of STP packets.
- Independent variables: The Bandwidth speed of the switches: UCR gate,(OBJ 11) SurfNet Theodore N2 (OBJ 2), Switch N4 (OBJ 4), Switch N6 (OBJ 6).
- Dependent variables: The Pathway options and Time(s).

Go back to slide 6 to see the objects!

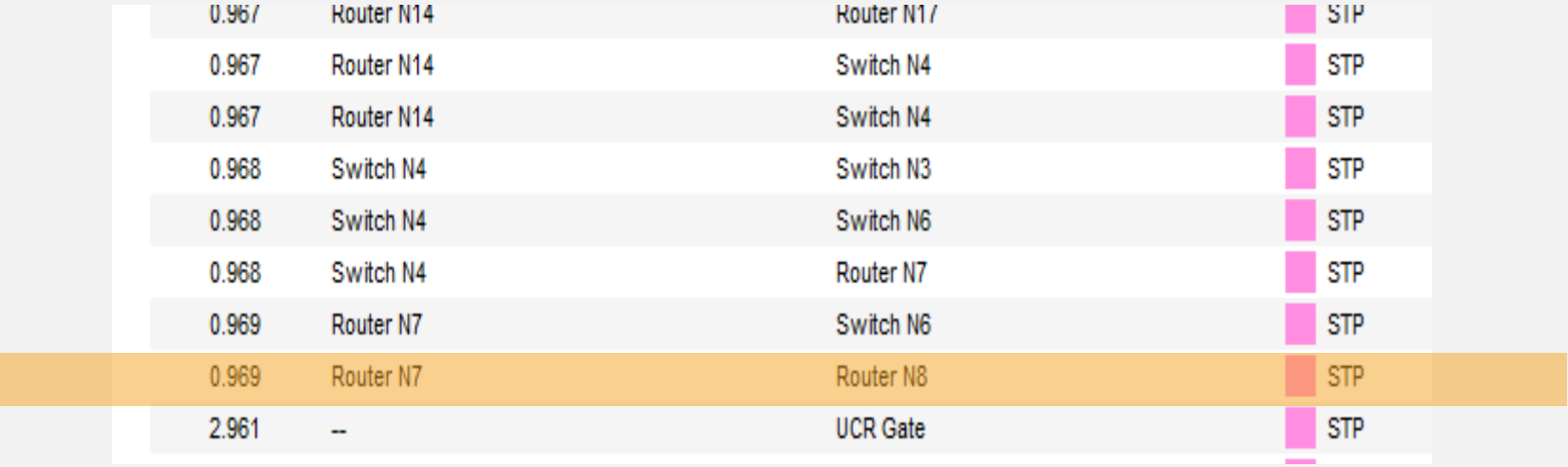
AUTO BANDWIDTH

- After trying a lot of times , I did get send topology for the network in regards of the STP packet (named Topology 1), the last send being highlighted in the box in the picture below.
- The bandwidth for every network component here is set to AUTO, meaning no changes have been done to the configuration of the devices.
- After getting Topology 1 to run multiple times I measured the Time(s) to be = 0.933s to 1s.

0.930	Switch N15	Server 1	STP
0.930	Switch N15	Server 3	STP
0.930	Switch N15	Server 4	STP
0.930	Switch N15	Router N14	STP
0.930	Switch N15	Router N14	STP
0.931	Router N8	Switch N5	STP
0.931	Router N17	Switch N6	STP
0.931	Router N14	Router N17	STP
0.931	Router N14	Switch N4	STP
0.931	Router N14	Switch N4	STP
0.932	Switch N4	Router N7	STP
0.932	Switch N4	Switch N3	STP
0.932	Switch N4	Switch N6	STP
0.933	Router N7	Router N8	STP
0.933	Switch N6	Router N7	STP
2.925	--	UCR Gate	STP

10MPBS BANDWIDTH

- After trying a lot of times , I did get send topology for the network in regards of the STP packet (named Topology 2), the last send being highlighted in the box in the picture below.
- The bandwidth for UCR gate, (OBJ 11) SurfNet Theodore N2 (OBJ 2) , Switch N4 (OBJ 4) , Switch N6 (OBJ 6) here is set to 10mpbs on every port, meaning changes have been done to the configuration of the devices.
- After getting Topology 2 to run multiple times I measured the Time(s) to be = 0.969s to 1s.



0.967	Router N14	Router N17	STP
0.967	Router N14	Switch N4	STP
0.967	Router N14	Switch N4	STP
0.968	Switch N4	Switch N3	STP
0.968	Switch N4	Switch N6	STP
0.968	Switch N4	Router N7	STP
0.969	Router N7	Switch N6	STP
0.969	Router N7	Router N8	STP
2.961	--	UCR Gate	STP

RESULTS

- Because of the nature of STP packets, this test needs to be run an absurd amount of times to have a firm result, my findings may be somewhat anecdotal.
- We reject the null hypothesis. The alternative hypothesis seems to be correct. Bandwidth speed does influence the delivery speed and pathway of STP packets.
- I did seem to notice very different pathways when changing the bandwidth speed of the devices.
- In regards of speed there was an improvement of 0.036s, although we must note that a different pathway was used.

CONCLUSIONS

- Network systems are complicated systems. The UCR networks has a lot of components to it and a lot of connections between different components, resulting in numerous complicated sending patterns for certain packages.
- We can see how packets decide to travel based on certain algorithms.
- In general, bandwidth speed will always determine and be the main factor in delivery speeds.

USED SOURCES

- https://en.wikipedia.org/wiki/Spanning_Tree_Protocol
- https://www.wirelessinfo.be/spanning-tree-protocol/
- https://github.com/search?q=cisco+packet+tracer+network
- Google Images