URI Network Documentation

Prepared for:

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Robert L. Carothers Library & Learning Commons

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OVERVIEW

The contents of this document are related to the network configuration for the front desk of the Robert L. Carothers Library & Learning Commons located on the University of Rhode Island Kingston campus. There will be a completely new and redesigned network for the front desk to have a more efficient structure, connection, and have the ability to be scaled up or down as needed. Hill Valley Networking has been working with the University of Rhode Island to incrementally document and install computer systems and networks across campus. We will create, install, and provide documentation for this new network infrastructure.

HARDWARE AND EQUIPMENT

This section details all hardware and equipment being installed on this network. The physical components being added will be listed below. The layout and implementation of these components will be covered later.

There will be two Dell Precision 3630 workstations equipped with Dell SE2719H monitors at the front desk running Windows 10 Pro. These will be designated for use by the library's staff. They are labeled PC1 and PC2. Each workstation will be connected to a Linksys SE3005 switch labeled Switch1. The switch labeled Switch1 will be connected to a NETGEAR C7000-100NAS router labeled Router2. The router labeled Router2 will be connected to a NETGEAR C7000-100NAS router labeled Router3. The router labeled Router3 will also be connected to the router labeled Router2 with another cable

for link aggregation. Both the router labeled Router2 and the router labeled Router3 will be independently connected to a NETGEAR C7000-100NAS router labeled Router1. The router labeled Router1 will be connected to the RJ45 wall socket already existing next to the equipment. All routers will be placed into an iStarUSA WD-1045 server rack for storage and cable management. All components will be connected with Insignia NS-PNW5625 Ethernet cables. Below will be tables detailing all equipment being used, all segments on the network, and a diagram overviewing the physical placement.

Equipment

Device	Label	Brand	Model
Workstation	PC1	Dell	Precision 3630
Workstation	PC2	Dell	Precision 3630
Switch	Switch1	Linksys	SE3005
Router	Router1	NETGEAR	C7000-100NAS
Router	Router2	NETGEAR	C7000-100NAS
Router	Router3	NETGEAR	C7000-100NAS
Device Rack	Rack	iStarUSA	WD-1045
Ethernet Cable	< None >	Insignia	NS-PNW5625

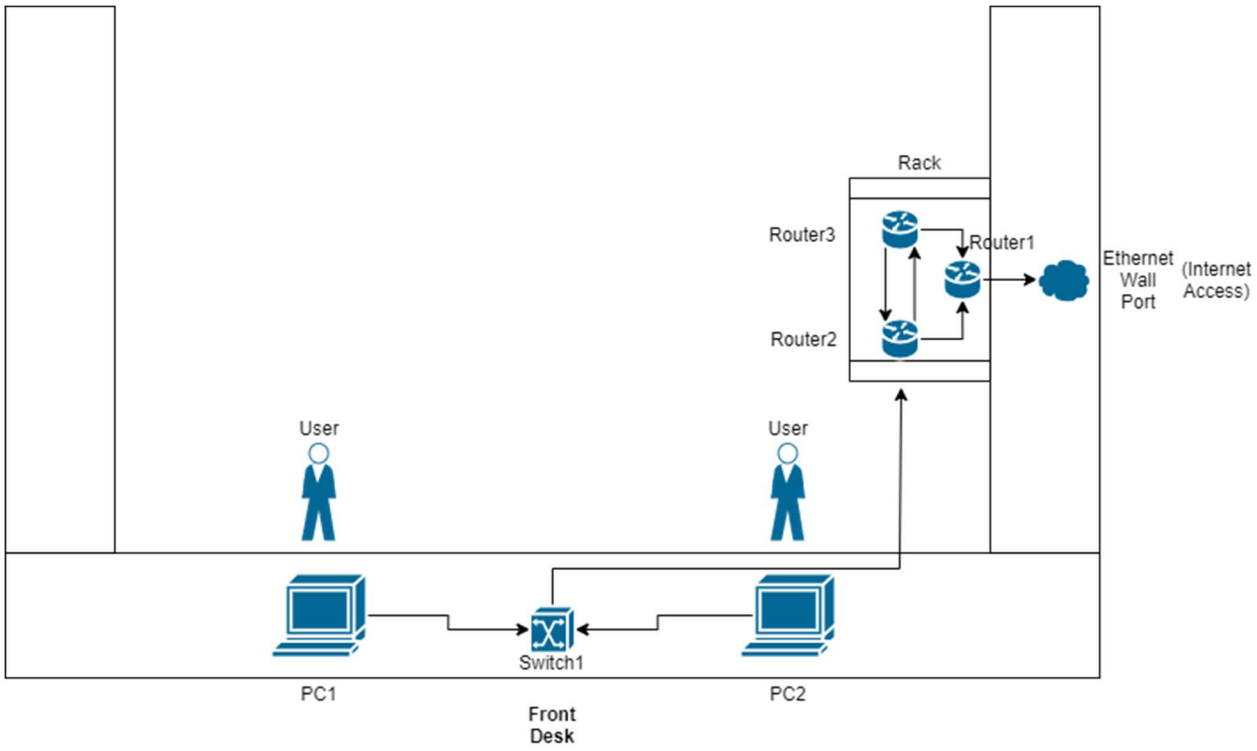
Equipment Information

Device Name	Other Information
Dell Precision 3630	Intel 8th Gen i7-8700 3.2GHz 6-Core 12MB 65W Processor, 32GB DDR4-2666MHz Memory, 512GB NVMe PCIe SSD, NVIDIA Quadro P600 2GB GDDR5, Windows 10 Pro
Linksys SE3005	5 Gigabit ports, Full and half duplex, MDI/MDI X cable detection, Power Save, Auto Sensing Ports
NETGEAR C7000-100NAS	4 Gigabit ports, 400 Mbps cable speed, 1900 Mbps Wi-Fi speed, 1800 sq ft and 30 devices Wi-Fi coverage, DOCSIS 3.0
iStarUSA WD-1045	10U, 450mm Depth, Mountable
Insignia NS-PNW5625	Cat-6, RJ45, 10/100/1000 Ethernet

Segments

Segment	Devices
1	PC1 to Switch1
2	PC2 to Switch1
3	Switch1 to Router2
4	Router1 to Ethernet Wall Port
5	Router2 to Router1
6	Router2 to Router3
7	Router3 to Router1
8	Router3 to Router2

Physical Diagram



Labels

- PC1
- PC2
- Switch1
- Router1
- Router2
- Router3
- Rack
- Ethernet Wall Port

SOFTWARE AND ADMINISTRATION

This section details all software and administration being used on this network. The software information about the workstations and network will be listed below.

There will be two Dell Precision 3630 workstations and monitors at the front desk of the library. These workstations will be used by the library staff. The operating system running on each workstation will be Windows 10 Pro with all Windows firewall, virus scanning, and security features preinstalled. The administration and user accounts will be handled by the university's preexisting system. Users will login using their University of Rhode Island user account credentials. All university software will be integrated directly into the workstations. Staff will have access to any files or services they need provided by the university. We will setup and install the workstations equipped with the operating system and all access to the University of Rhode Island's internal applications. The administration and setup of the network architecture will be handled by the university's IT department and directly integrated into the university's CAN. This document will provide the specifications for configuring the network. Below will be a table detailing the license keys required to verify the operating system if modified.

Licensing Information

Device	Label	OS	License Key
Workstation	PC1	Windows 10 Pro	aH72l-8hsd0
Workstation	PC2	Windows 10 Pro	9pOFf-23yFG

TOPOLOGY

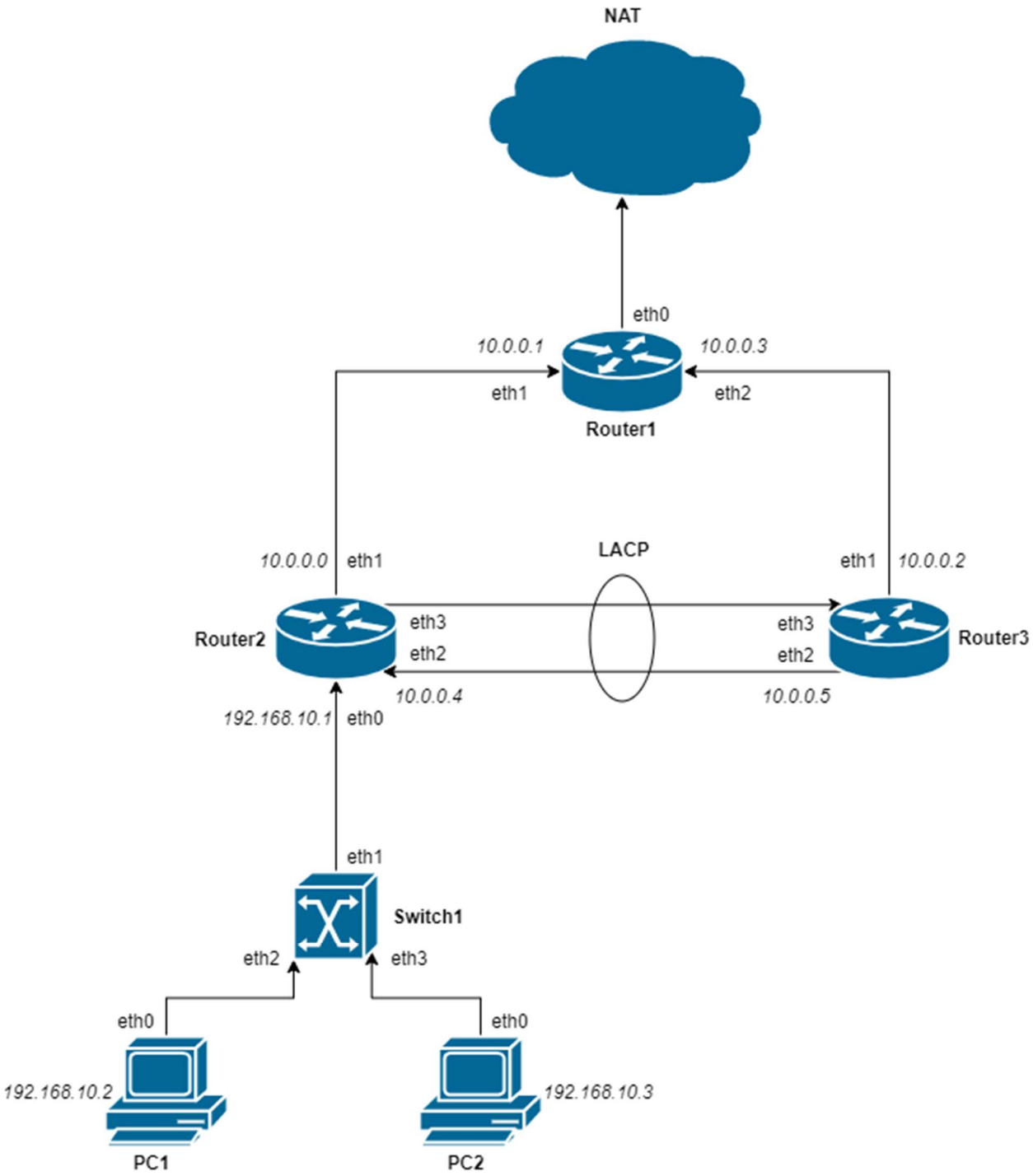
This section details the physical topology of the network. This will be an abstract representation of how the network will be implemented and configured. More in depth details related to the topology will be covered in specifications.

The network will include two workstations labeled PC1 and PC2, one switch labeled Switch1, and three routers labeled Router1, Router2, and Router3. The workstations PC1 and PC2 will both be connected using individual segments to Switch1. Switch1 will be connected to Router2. The routers Router2 and Router3 will be directly connected to each other using two segments and bonded together for link aggregation. The routers Router2 and Router3 will both be connected using individual segments to Router1. The router Router1 will be connected to the Ethernet wall port located next to the rack for internet access. Below will be a diagram representing the physical topology including all hosts, devices, segments, addressing, and protocols.

Devices

- PC1
- PC2
- Switch1
- Router1
- Router2
- Router3

Topology Diagram



SPECIFICATIONS

This section details the specifications of the network. This includes the MAC addresses of the devices and ports, IP address of the devices and ports, and protocols.

MAC Addresses

Device	Label	Port	MAC Address
Workstation	PC1	0	B0-B4-80-B0-77-45
Workstation	PC1	0	3F-60-B5-9E-CB-42
Switch	Switch1	1	D0-55-07-C9-5D-6C
Switch	Switch1	2	EE-D8-5F-1A-3E-DF
Switch	Switch1	3	F3-B0-74-F1-EB-2B
Router	Router1	0	60-42-03-99-1B-C6
Router	Router1	1	98-C1-F2-8C-00-7F
Router	Router1	2	C4-B4-D7-5B-C6-0D
Router	Router2	0	92-95-54-C4-07-91
Router	Router2	1	5B-CD-8C-77-61-25
Router	Router2	2	1D-A2-B7-91-84-B5
Router	Router2	3	16-E5-DF-39-9E-D9
Router	Router3	1	F3-51-AA-44-48-82
Router	Router3	2	20-F5-3F-81-99-17
Router	Router3	3	25-1E-BD-BB-05-28

Device Addressing

PC1 Information

Data Type	Value
IP Address	192.168.10.2/24
Default Gateway	192.168.10.1

PC2 Information

Data Type	Value
IP Address	192.168.10.3/24
Default Gateway	192.168.10.1

Switch1 Information

Data Type	Value
Subnet	192.168.10.0

Router1 Information

Data Type	Value
Port 0: IP Address	DHCP
Port 1: IP Address	10.0.0.1/31
Port 2: IP Address	10.0.0.3/31
Demarcation Point	Port 0

Router2 Information

Data Type	Value
Port 0: IP Address	192.168.10.1/24
Port 1: IP Address	10.0.0.0/31
Bond 0: IP Address	10.0.0.4/31
Loopback Address	10.2.2.2/32

Router3 Information

Data Type	Value
Port 1: IP Address	10.0.0.2/31
Bond 0: IP Address	10.0.0.5/31
Loopback Address	10.3.3.3/32

Protocols

Dynamic Host Configuration Protocol (DHCP)

The Dynamic Host Configuration Protocol (DHCP) will be used to obtain an IP address for port 0 in Router1. This process will be done automatically using the university's default DHCP server settings set up by the IT department.

Network Address Translation (NAT)

The Network Address Translation (NAT) protocol will be used to connect to the internet using Port 0 on Router1 which will be the demarcation point of the network. This port is connected to the Ethernet wall port for internet access. This process will be done automatically using the university's default internet settings set up by the IT department.

Link Aggregation Control Protocol (LACP)

The Link Aggregation Control Protocol (LACP) will be used for link aggregation to bond Router2 and Router3 together. This will bond two port interfaces from each respective router to the other to create a single logical interface. Both routers will use port 2 and port 3 to create the bond. The table below provides the information needed to create and configure the bond using LACP.

Router2 Information

Data Type	Value
Bond 0: IP Address	10.0.0.4/31
Port 2: Bond Group	Bond 0
Port 3: Bond Group	Bond 0

Router3 Information

Data Type	Value
Bond 0: IP Address	10.0.0.5/31
Port 2: Bond Group	Bond 0
Port 3: Bond Group	Bond 0

Open Shortest Path First (OSPF)

Open Shortest Path First (OSPF) will be used as the routing policy to dynamically route the traffic within this network. This will simplify the routing process and make it unnecessary to supply static routes. The information below provides everything needed to create and configure the dynamic routes using OSPF.

Router1 Information

- Router ID: 10.1.1.1
- Area 0 Networks:
    - 10.1.1.1/32
    - 10.0.0.0/31
    - 10.0.0.2/31
    - 192.168.10.0/24

Router2 Information

- Router ID: 10.2.2.2
- Area 0 Networks:
    - 10.2.2.2/32
    - 10.0.0.0/31
    - 10.0.0.4/31
    - 192.168.10.0/24
    - Router1: Port 0 (DHCP Assigned)

Router3 Information

- Router ID: 10.3.3.3
- Area 0 Networks:
    - 10.3.3.3/32
    - 10.0.0.0/31
    - 10.0.0.2/31
    - 10.0.0.4/31
    - 192.168.10.0/24
    - Router1: Port 0 (DHCP Assigned)

CHANGES AND BACKUP

All changes made to the network must be documented using the IT department's existing guidelines. This document gives information on the initial setup and configuration of the network. This network is designed for scalability and efficiency. New hosts or subnets may be added at the discretion of the administration. The configuration of this network, backups, and security are all stored and maintained internally on the IT department's local server. The local content of the workstations as well as the network configuration are stored and backed up daily onto the university's local server. All content accessed by the library staff that is through the university's internal virtualized applications are also stored and backed up daily by the university.

CONCLUSION

This document provides information on the setup, implementation, and configuration of the network newly installed at the Robert L. Carothers Library & Learning Commons located on the University of Rhode Island's Kingston campus. The installation and documentation of the network will be provided by Hill Valley Networking and the maintenance and internal configuration of the network will be completed by the IT department of the University of Rhode Island using their guidelines and standards. This document or similar internally stored documents should be updated if any modification is made to this network in the future.