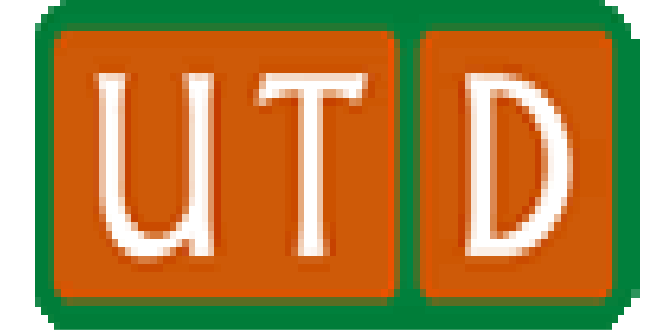


Design of an Enterprise Network with VoIP across Fiber Optics Transmission

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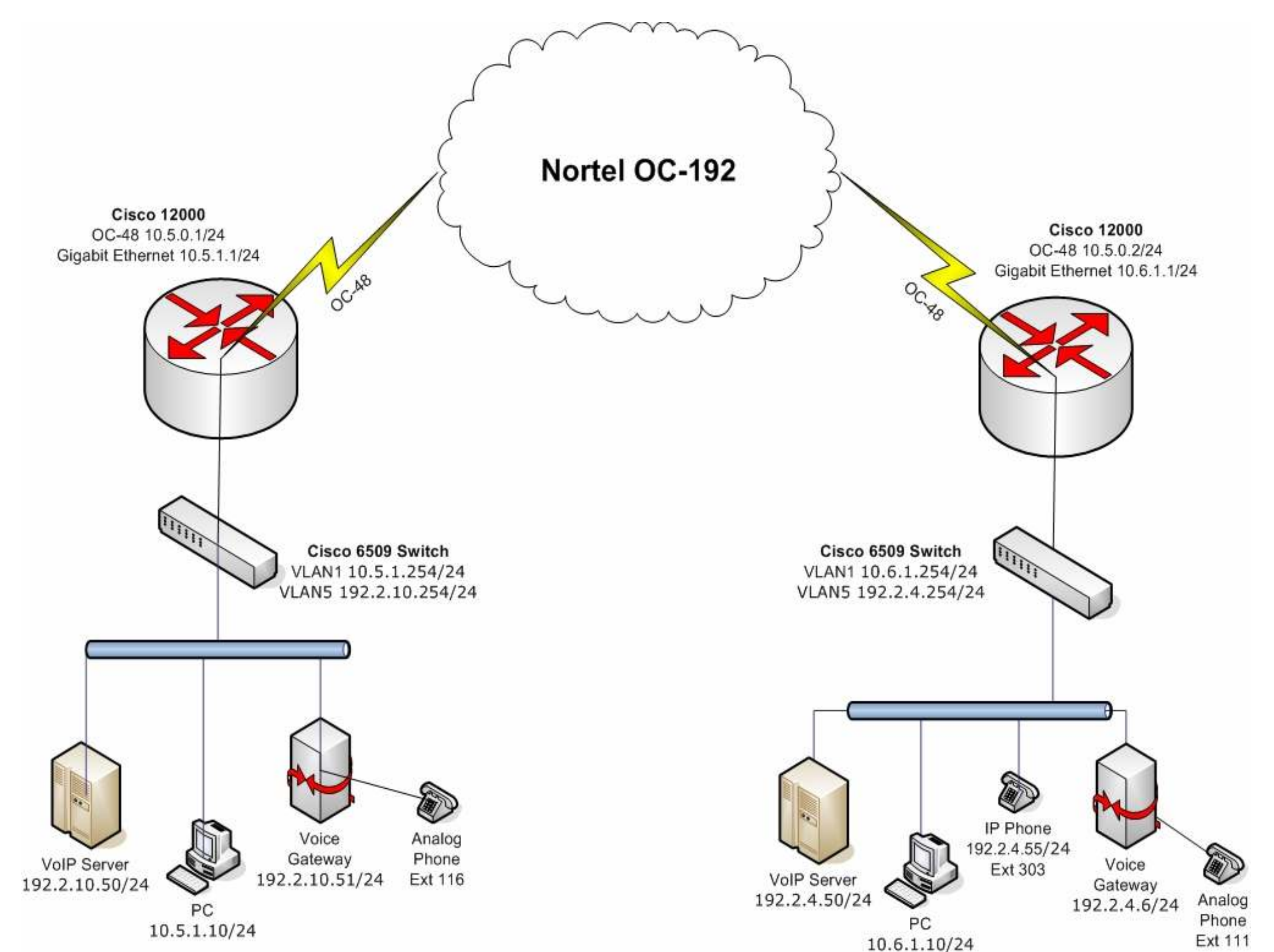
Project Goals:

- ◆ **Goal 1**
 - ◆ Design an enterprise network capable of voice and data transmission over fiber optic transmission.
- ◆ **Goal 2**
 - ◆ Implement an expandable, reliable, and efficient data network.
- ◆ **Goal 3**
 - ◆ Integrate Voice over IP (VoIP) over data network creating fully integrated network.

Project Overview:

- ◆ **Design**
 - ◆ The network was implemented using the hardware available in the TARGET lab. The hardware consisted of two CISCO 12000 routers, two CISCO 6509 switches, two OC 48 links, and one NORTEL OC 192 link. VOIP was implemented using a computer dedicated as a voice server and the software used to facilitate VoIP was Shoretel.
 - ◆ The IP addressing scheme was the most important part of the network. We used "/24" prefix for the IP addresses. Also, the two sides of the network were set up similarly for ease of implementation and troubleshooting.
- ◆ **Technical Approach**
 - ◆ The routers enabled us to route data from a host connected to one end of the network to another. We used RIP as the routing protocol to generate dynamic routing tables. The IP addressing scheme enabled us to create many logical networks including VLANs. All the layers of the TCP/IP protocol got tested once the network was established and a voice call was successfully made.
- ◆ **Organization**
 - ◆ We divided the work into two for this project. One group would work with the hardware and equipment configuration. These included the Cisco 12000 router, the Cisco Switches, and the OC-192. The other group worked with the VoIP side of the project. They were responsible for setting up the Shoretel Voice Server as well as configuring the IP phones and the analog to IP gateway for the analog phones. Each group worked separately, but simultaneously to finish their part of the design. After both sections were complete, the voice server was connected to the network for testing. We were able to successfully combine the network with the voice servers without any major problems.

Project Results:



- ◆ Successfully designed an enterprise network for data transmission.
- ◆ Implemented data network utilizing Cisco routers, Cisco switches, and Nortel fiber optic transmission.
- ◆ Successfully troubleshooted and restored Cisco switch after switch image and configuration were erased.
- ◆ Configured and tested Shoretel Voice Server, IP Phones, and voice gateway.
- ◆ Integrated Shoretel voice network into data network.

Project Conclusions/Outcomes:

- ◆ Modified original network design for more effective use of equipment.
- ◆ Added virtual LAN's for a more efficient network.
- ◆ Added virtual LAN for ease of integrating VoIP system into data network.
- ◆ Communication between PC's, routers, and servers on both ends of the data network was successfully tested.
- ◆ Voice data was successfully integrated with testing of voice calls between IP phones and analog phones through the voice gateway.