

# Design of an Enterprise Telecom Network using a SONET Ring

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**Project Objective:** To design an enterprise telecom network using SONET ring & test the reliability and connectivity of the network using Analog phone, IP phone and Softphone

## Project Overview:

**SONET: Synchronous optical networking** is a method for communicating digital information using lasers or light-emitting diodes (LEDs) over optical fiber. SONET defines optical signals and a synchronous frame structure for multiplexed digital traffic. A similar standard, Synchronous Digital Hierarchy (SDH), is used in Europe by the International Telecommunication Union Telecommunication Standardization Sector (ITU-T). SONET equipment is generally used in North America, and SDH equipment is generally accepted everywhere else in the world.

### Ring Architecture:

The SONET building block for ring architecture is the ADM (Add/Drop Multiplexers). Multiple ADMs can be put into a ring configuration for either bidirectional or unidirectional traffic. The main advantage of the ring topology is its survivability; if a fiber cable is cut, the multiplexers have the intelligence to send the services affected via an alternate path through the ring without interruption.

The demand for survivable services, diverse routing of fiber facilities, flexibility to rearrange services to alternate serving nodes, as well as automatic restoration within seconds, have made rings a popular SONET topology.

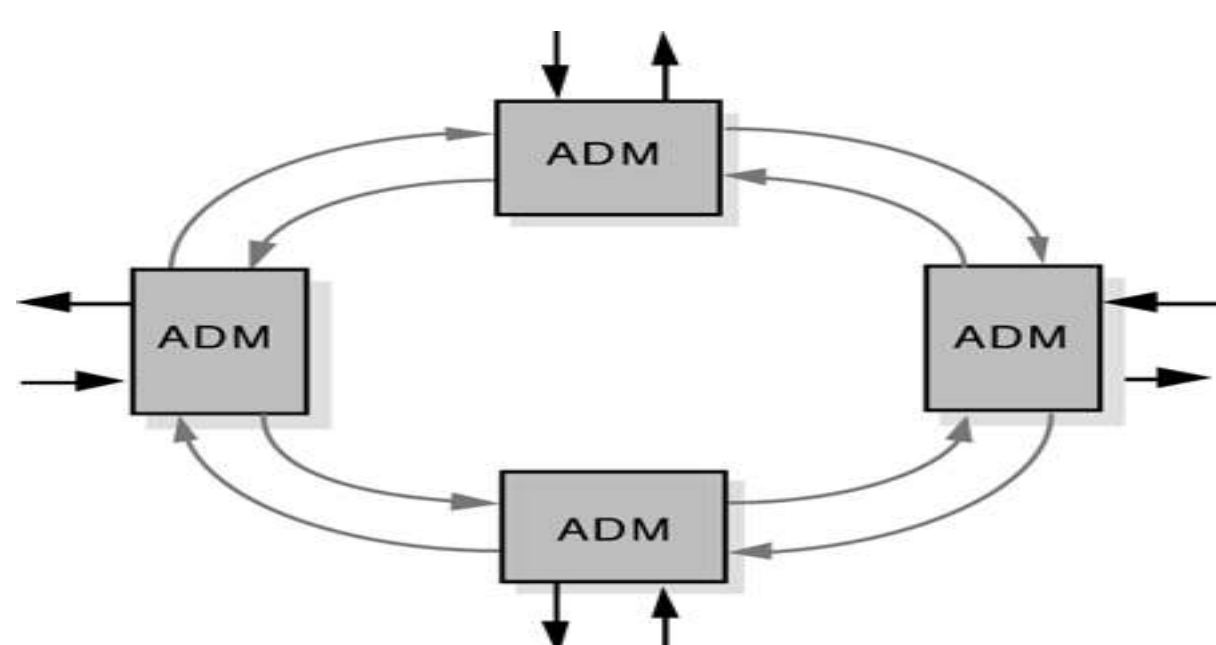
### The Network:

We implemented the Enterprise Network using available optical carriers in the lab (OC-48 and OC-192) in addition to the following:

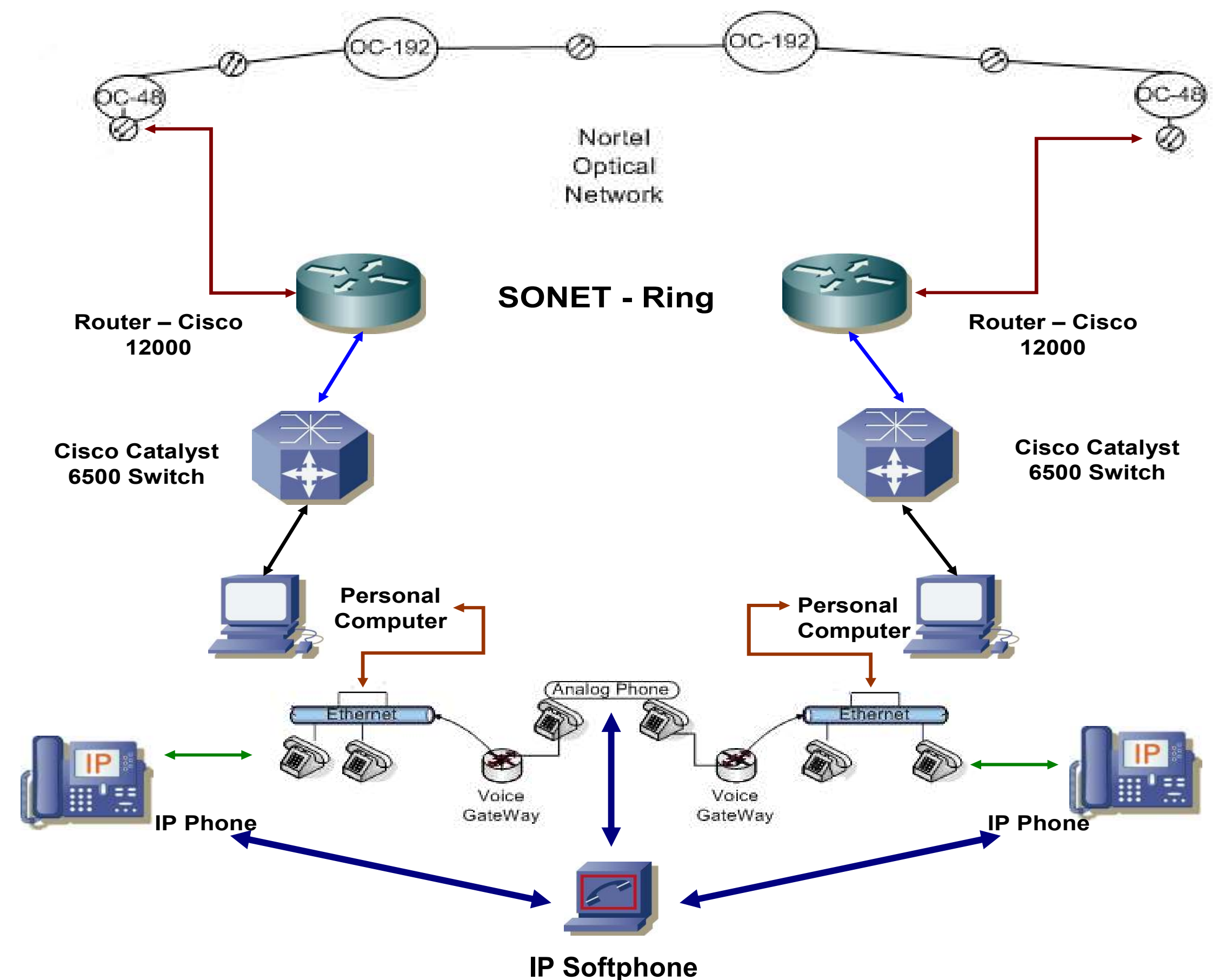
- Cisco OSR 7609 / WS catalyst C6509 NEB: Network switch
- Cisco ONS 454: Optical Switch that will create the ring
- Cisco 12000: GB switch Router
- Nortel OC48/192: Multiplexer

The SONET Ring that we designed consists of several add-drop multiplexers (ADM) linked by upstream and downstream fibers. The Ring architecture allowed multiple services to be supplied to the end user access point. The SONET Terminal Multiplexers fed the ring with traffic and the network had a dual optical ring topology that provided rapid traffic restoration in the event of a link failure.

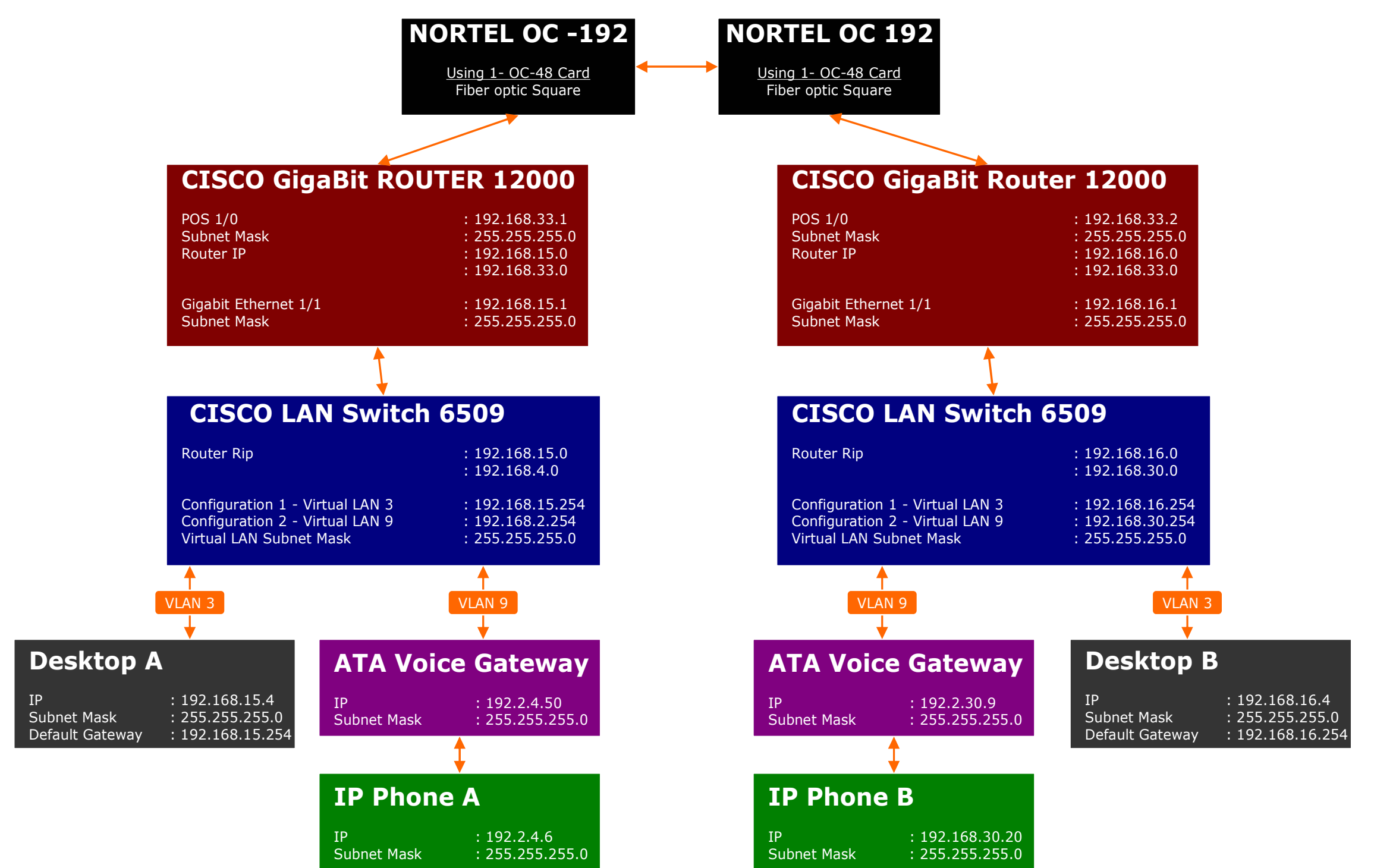
The optical carriers that we have in the telecom lab were connected together to the SONET ring. This technique allowed multiple paths for the signal transfer, giving rise to an efficient form of backup. For example, if one of the nodes failed in the ring, the signal will easily find an alternate path to complete delivery.



## Project Results:



Enterprise Network with SONET ring



Network Addresses

## Project Outcomes:

We have successfully completed the project with all the team member's effort. We have tested the network with different connectivity configurations: IP phone to IP phone, IP phone to Analog phone, IP phone to softphone, Analog phone to softphone and vice-versa. All the connectivity tests came out positive.

Building an enterprise SONET ring network to support VOIP is a very powerful idea that we have explored and put the maximum effort to build and utilize. Our results will help assess the technical and economical feasibility proposal of configuring a highly needed Synchronous Optical Network ring topology in IP telecommunication and networking.