

# **Network Design Description & Guidelines**

**[Building Name]**

## **Revisions**

**10/20/97**

**11/19/97**

## [Building] Site and Facilities Description

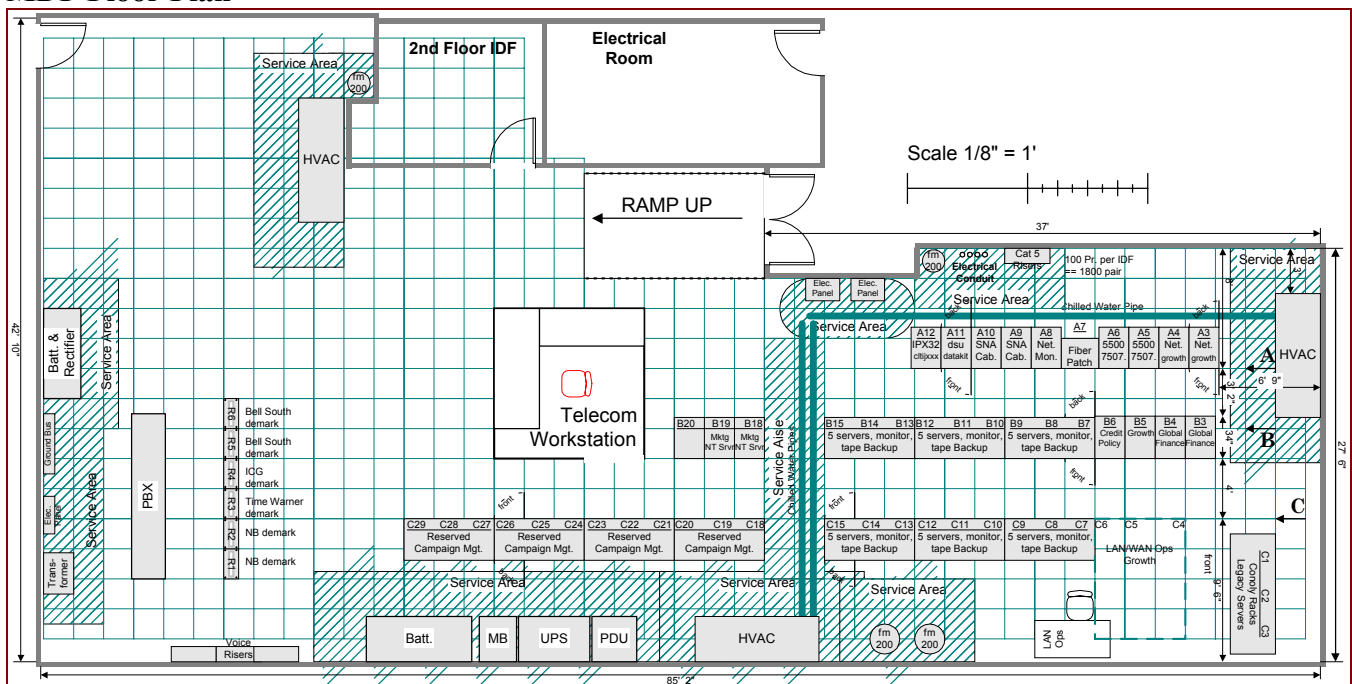
The [building] is 30 stories. Day one, [Company] will occupy floors 2—19 (no 13<sup>th</sup> floor) for a total of 17 floors. A small teller branch will be located on the 1<sup>st</sup> floor. The second floor will include the mail facility and several large conference rooms. With a generous number of conference rooms and moderate sized cubes (8'x8' and 8'x 10'). Each floor has potential for approximately 120 associates. This equates to about 2000 associates in the building. From the current Real Estate relocation plans, approximately 1500 associates have been identified to relocate to the new site between 12/97 and 5/98.

The base building will have one cable jack plate each with 2 data and 2 voice Category 5 UTP runs per cube (office and conference rooms included). These workstation cables will terminate in the Intermediate Distribution Frame (IDF) closet located on each floor (one per floor). The IDF's are vertically stacked above the Main Distribution Frame (MDF / Computer room) which is located on the second floor.

From each IDF 24 strands of multi-mode fiber will terminate in the MDF. In addition to these, 300 pair of UTP voice risers (cat 5) and 100 pair of UTP data risers (cat 5) will also terminate in the MDF.

From the MDF, two independent and diverse runs of 48 strands multi-mode and 12 strands single-mode fiber terminates in the [Campus Hub facility]. One set to the 2<sup>nd</sup> floor computer room. The other set to the 4<sup>th</sup> floor PBX facility. In addition to these, Time Warner, Bell South and ICG have each located facilities in the basement as well as have their own rack on the computer room for circuit termination and service hand-off.

### **MDF Floor Plan**



## **Enterprise LAN/WAN Design**

The basic Enterprise LAN/WAN design is to provide switched 10Mb Ethernet to every desktop. VLANs will be created via an Ethernet switch in each closet to span adjacent floors starting from the 3<sup>rd</sup> floor (i.e. 3—4, 5—6, 7—8, 9—10, 11—12, 14—15, 16—17, 18—19). VLAN 1 on the Cisco switches is reserved for Mgt. Access. VLAN 2 is reserved for the Building Backbone. VLAN 3 will be used for the minimal connections required for the second floor and is otherwise reserved for a future printer VLAN. VLANs 4—11 will be used for the 8 primary user VLANs. VLAN 12 will be used for a small group of Client Services users (currently scheduled for the 10<sup>th</sup> floor) who require IP only access to the WAN, no Netware or other protocols. Reference diagrams for individual floors.

In most cases, at least one General Purpose Netware server will be attached to each VLAN. In addition to this, any special departmental or Application servers will also be attached to VLANs as appropriate or required.

IP addressing in the building will be in the 10.x private network range (ref. RFC 1918). The range 10.32.208.0—10.32.239.255 has been reserved for the building. Reference spreadsheet for details.

Access to the rest of the Enterprise WAN will be via a new Switched Fast Eth. Campus Backbone infrastructure. The IP networks of the new backbone will be 10.32.2.0 and 10.32.2.128 (25 bit mask). The backbone will be comprised of two Eth. Switches, one each in the [Campus Hub Facility 1] and the [Campus Hub Facility 2]. The [Campus Hub Facility 1] switch will be primary for the 10.32.2.0 network. The [Campus Hub Facility 2] switch will be primary for the 10.32.2.128 network. These networks are intended to be a backup to one another in the event of a switch failure or router connection failure.

Since the rest of the Campus (and the legacy Enterprise WAN) is based on the [Legacy IP] networks, a connection to the legacy networks is required. Initially this will be via the 7206 “mini-core” policy router. Eventually this will be migrated to the main router core 7513 policy router. Reference diagram for details. A redundant connection from the [Legacy IP] network is not currently available but will be addressed at a later date as this project as well as the [Campus Hub Facility 1] contingency project continue.

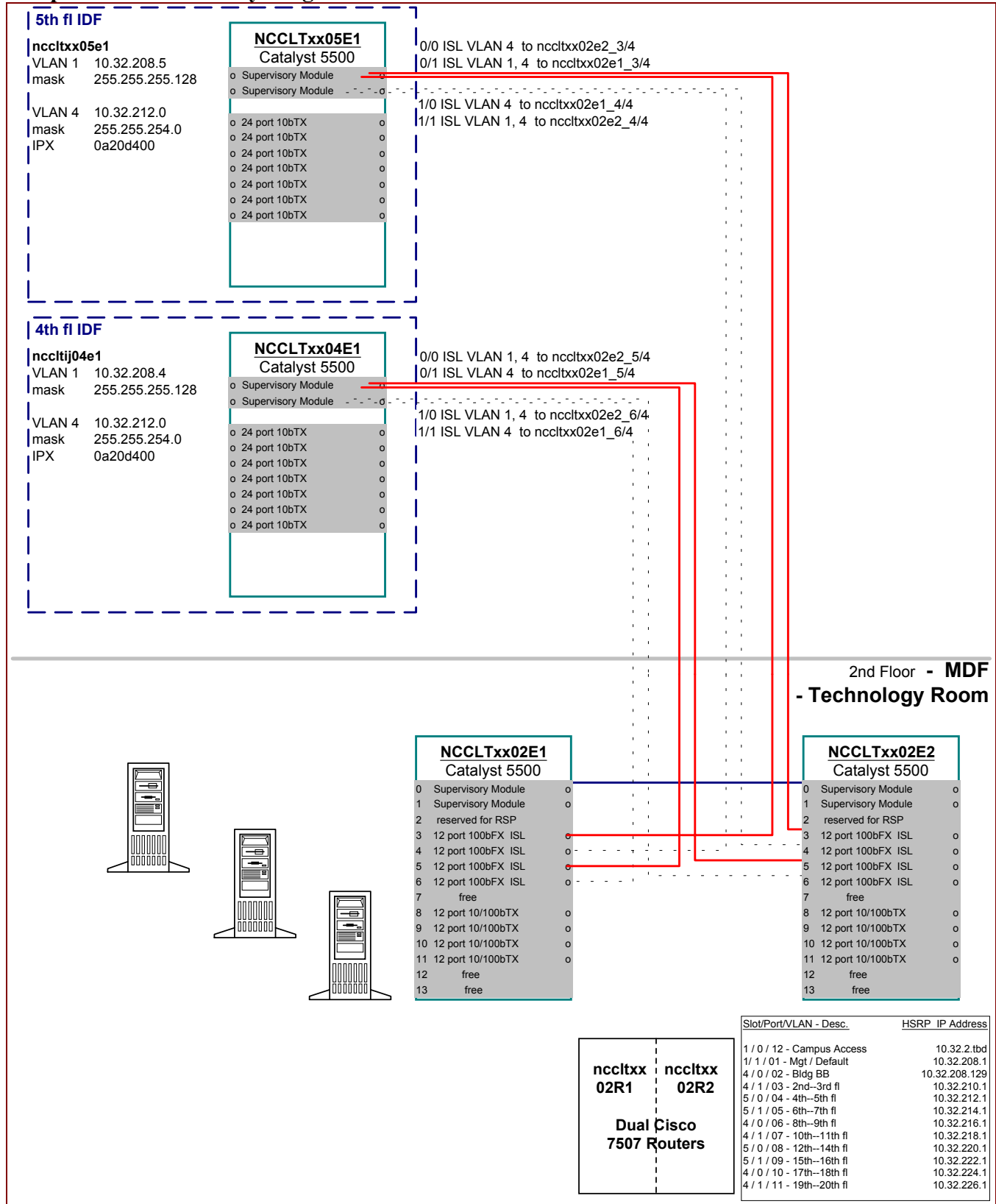
## **VLAN Trunking**

In general, Odd VLANs will carry their primary trunk to MDF switch number 1 (NCCLTIJ02E1). Even VLANs to switch number 2 (NCCLTx02E2). The root bridge for each VLAN should be the primary MDF switch associated with that VLAN. The two MDF switches will have three trunks between them. One for VLANs 1, 2, and 3. One for the remaining even VLANs, and one for the remaining odd VLANs.

Each IDF switch will include a redundant Supervisory Module (SM). Both modules will be configured exactly the same. From each IDF switch Supervisory Module, a fiber port will connect to each MDF switch. The primary trunk for the VLAN assigned to a floor should be dedicated to that VLAN (i.e. no ISL). For trunks that need to carry only a single VLAN, the trunk port should not use ISL, this will

alleviate unnecessary overhead. The second SM port will be defined for ISL and carry VLAN 1 as well as the backup path for the VLAN for that floor.

# Sample IDF Connectivity Diagram:



## **Router Configuration**

Two Cisco 7507 routers will be used at the [building]. Each will have redundant route processors and five Fast Eth. port adapters distributed across three VIP2-40 interface processors. With the exception of VLAN 12, each interface/sub-interface will be configured with IP and IPX as described in the IP Address detail spreadsheet. IPX RIP will be configured on VLAN interfaces (except VLAN 12) with standard (30 second) broadcast interval.

Within the building, EIGRP will be used for IP and IPX routing between routers. IPX RIP is required on each VLAN interface to communicate with Netware servers.

Since no other routers are scheduled to be implemented on any of the subnets in this building, no IP RIP (or RIPv2) is required and should be turned off on VLANs 1—12.

For IP and IPX Campus Fast Eth. connectivity, EIGRP will be used initially. RIP redistribution will be handled by the Core/Policy router(s). In the event that non-Cisco routers are required on the Campus Fast Eth. Backbone, RIP (RIP2) redistribution will be evaluated and addressed at that time.

## **Switch Configuration**

Switch Name is defined in each drawing. They consist of state, city, building, floor number, “E” and switch number. (i.e. NCCLTxx15E1 for North Carolina, Charlotte, [building], 15<sup>th</sup> floor switch 1)

The following is a list of basic criteria.

- VTP Domain is the building prefix. In this case NCCLTxx.
- Campus Backbone VTP Domain will be NCCLTEC
- VLAN names should be defined as VTP Domain\_IP Segment Number/Subnet Mask.(i.e. NCCLTxx\_10.32.222.0/23)
- System Prompt should be the same as the device name.
- All ports (except trunks) in all switches should have PortFast enabled.
- All ports (except trunks) in IDF switches should be set to Auto negotiate.
- In the IDF's the VLAN number (not 1) should be used as the default VLAN for all ports. (Except Trunks)
- The MDF switch will be manually configured, port by port, for each device.