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| Document ID  **ITAD105** | Title  **TCP/IP IMPLEMENTATION STANDARDS** | Print Date  **mm/dd/yyyy** |
| Revision  **0.0** | Prepared By  **Preparer’s Name / Title** | Date Prepared  **mm/dd/yyyy** |
| Effective Date  **mm/dd/yyyy** | Reviewed By  **Reviewer’s Name / Title** | Date Reviewed  **mm/dd/yyyy** |
|  | Approved By  **Final Approver’s Name / Title** | Date Approved  **mm/dd/yyyy** |

**Policy:** All devices attached to the Company network infrastructure shall be assigned TCP/IP addresses that facilitate effective network management.

**Purpose:** To delineate specific conventions regarding the assignment of TCP/IP addresses for equipment attached to the Company network infrastructure.

**Scope:** This standard applies to all Company Wide Area Networks (WANs), Local Area Networks (LANs), and all devices attached to those networks.

**Responsibilities:**

The Network Manager is responsible for managing the Company TCP/IP addressing plan.

Remote Site LAN Administrators are responsible for coordinating TCP/IP addressing with the Network Manager.

**Procedure:**

**1.0 TCP/IP ADDRESS**

Transmission Control Protocol/Internet Protocol (TCP/IP) is the Company primary networking protocol. While other network protocols are in use on company networks, TCP/IP is particularly important since this is the primary protocol of the Internet. Access to any Internet resource, including the World Wide Web (WWW), must use this protocol.

Communication with the TCP/IP software suite depends upon the assignment of unique 32-Bit addresses. These addresses are expressed as a collection of decimal numbers separated by periods such as 132.159.121.16.

There are three classes of TCP/IP addresses:

* Class A addresses are assigned to networks with a very large number of hosts. Addresses in Class A range from 1.0.0.0 to 126.0.0.0 Each Class A address space can have up 17 million hosts.
* Class B addresses are assigned to medium-sized networks. Class B Addresses range from 128.1.0.0 to 191.254.254.0. Class B address ranges can have up to 65,000 hosts per network.
* Class C addresses are usually used for small LANs. Class C addresses range from 192.0.0.0 to 223.254.254.0. There are 2 million Class C networks with up to 254 hosts per network.

**2.0 DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)**

Each node on a TCP/IP network must have a unique IP Address. In previous years this process was accomplished manually and required a significant amount of recordkeeping and coordination to ensure duplicate IP Addresses were not assigned.

DHCP provides a means of automatically assigning IP addresses to network hosts. DHCP removes virtually all the record keeping requirements for managing an IP Address space since the DHCP server maintains a database of all assigned addresses.

All user workstations shall be assigned IP Addresses via DHCP. The only network devices that will not use DHCP are Network Infrastructure Devices (Routers and Hubs), File Servers and Network Printers – all other devices shall use DHCP.

**3.0 NETWORK ADDRESS TRANSLATION (NAT)**

TCP/IP addresses within the Company enterprise use the free subnet 172.16.0.0. This network address space is reserved by the Internet for private internal use only. Addresses from this subnet are not allowed to be directly connected to the Internet.

The Company enterprise is connected to the Internet through a security firewall. In addition to providing security, the firewall is configured to translate addresses from the 172.16.0.0 address space to legal Internet addresses.

**4.0 SUBNET ADDRESSING STANDARDS**

4.1 Headquarters Site

The Company headquarters site shall be assigned TCP/IP addresses in accordance with the following plan. All subnets use a class C subnet mask (255.255.255.0).

Subnet Assignment

172.16.5.0 Main Network Backbone

* + 1. Main Wing
    2. Floor A East Wing
    3. Floor A West Wing
    4. Floor B East Wing
    5. Floor B West Wing

4.2 Remote Site Subnet Assignments

The Company remote sites shall be assigned TCP/IP addresses in accordance with the following plan. All large branch office subnets use a class C subnet mask (255.255.255.0). The Class C subnet provides up to 254 addresses per subnet. Remote Offices with more than 254 network hosts shall use multiple class C subnets.

Virtually all Company satellite sites have networks with not more than 50 hosts. These smaller satellite offices will be assigned subnet address spaces using the subnet mask 255.255.255.192. This network mask provides for up to 62 network addresses.

The following tables detail the Company branch and satellite office IP Address subnet assignments.

Subnet Subnet Mask Remote Site

172.16.20.0 255.255.255.0 Atlanta

172.16.30.0 255.255.255.0 Boston

172.16.40.0 255.255.255.0 Chicago

172.16.50.0 255.255.255.0 Denver

172.16.60.0 255.255.255.0 Houston

172.16.65.0 255.255.255.192 Austin

172.16.65.64 255.255.255.192 San Antonio

172.16.65.128 255.255.255.192 El Paso

172.16.70.0 255.255.255.0 Kansas City

172.16.80.0 255.255.255.0 Los Angeles

172.16.90.0 255.255.255.0 Memphis

172.16.95.0 255.255.255.192 Little Rock

172.16.95.64 255.255.255.192 Nashville

172.16.100.0 255.255.255.0 New York

172.16.110.0 255.255.255.0 Portland

172.16.120.0 255.255.255.0 Seattle

172.16.130.0 255.255.255.0 Washington DC

172.16.135.0 255.255.255.192 Baltimore

172.16.135.64 255.255.255.192 Norfolk

**5.0 WAN LINK ADDRESSING CONVENTIONS**

All Company WAN Links shall be addressed with the smallest possible address space in accordance with the following guidelines:

* The Subnet mask for all WAN Link addresses is: 255.255.255.252
* WAN Links shall be assigned addresses from 172.16.1.0 to 172.16.4.0
* The lowest numerical address in the subnet shall be assigned to the interface on central site end of the link. The highest numerical address in the subnet shall be assigned to the interface on the remote side of the WAN link.

5.1 Addressing Conventions

The following paragraphs detail the specific conventions for assignment of IP Address to hosts within a subnet.

5.2 Class C Sized Subnets

Network subnets assigned a Class C sized address space (254 address numbers) shall follow the following addressing guidelines.

Address Range Host Type

001 Default Gateway

002 to 019 Network Infrastructure Devices

020 to 039 File Servers

040 to 059 Network Printers

060 to 249 DHCP Assignment Pool

250 to 251 Network Management Systems

252 to 254 Reserved for Network Administration Use

Domain name servers (DNS) shall always be assigned an address aaa.bbb.ccc.15. Should both a primary and secondary DNS be located on the same subnet then the secondary shall be assigned the next address: aaa.bbb.ccc.16.

5.3 Variably Sized Subnets

Variably sub netted address spaces are used in Company satellite sites. These remote sites normally have dramatically smaller host address requirements.

These sites have very limited network infrastructure and very few file server assets.

Network subnets assigned an address space of 128 addresses or less shall follow the following addressing guidelines.

**Host Address Host Type**

1. Default Gateway
2. Hub
3. Terminal Server
4. File Server 1
5. File Server 2
6. Printer 1
7. Printer 2
8. Printer 3
9. Printer 4

10 to End Workstations

For example; for the subnet 172.16.65.64 network host TCP/IP addresses would be assigned as follows:

**IP Address Host**

172.16.65.65 Cisco 2501 Ethernet Interface

172.16.65.66 Stackable Hub

172.16.65.68 File Server

172.16.65.70 Printer #1

172.16.65.78 Workstation #4

**Forms:**

* None.

**References:**

**A. SARBANES-OXLEY ACT OF 2002 (or “SOX”)**

In defining an “adequate internal control structure” – one of the most important requirements of SOX – the Act (U.S. law) does not specify information technology. By its ubiquity, however, IT is an integral part of internal controls. Having and adhering to standards gives evidence that internal controls are in place and the Company complies – in part, at least – with the Act.

**Additional Resources:**

A. None.

**Revision History:**

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| **Revision** | **Date** | **Description of Changes** | **Requested By** |
| 0 | mm/dd/yyyy | Initial Release |  |
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