

IN THE NAME OF ALLAH
THE MOST BENEFICIENT,
THE MOST MERCIFUL

STUDY & IMPLEMENTATION OF VLAN

Session 2000 – 2002

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Approved By

DEDICATED TO MY BELOVED PARENTS

For their kind support and prayers that are a great source of strength to me in every noble venture.

And say, “My Lord! Have mercy on them (Parents) both as they did care for me when I was little (Al Quran 17:24)”

"This is an end-to-end strategy and not a point strategy. CISCO believes that customers are looking for ways to adopt virtualization on the route to dynamic systems, and so our strategy is the Dynamic Systems Initiative, with dynamic systems the end game. And the way customers get there is very important."

[Bob Kelly]

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Shahzad Naeem

ABSTRACT

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To support users and meet the business requirements, computer networks are growing at a faster pace and are becoming more complex. The proper design of these networks is therefore becoming ever more crucial to the efficient, optimal operation and management of network. Consider the metaphor of a transportation network (roads, highways, rails, and so on). If any of these conduits were to become suddenly unavailable, our ability to distribute food, clothes and products would be seriously compromised.

The ABC was established in 1956 as a joint venture between the wxy Group of Pakistan, KLM and PIA of Sweden, ABC Limited provides premium packaging solutions for exceptional value to individuals and businesses. It is the only packaging facility in Pakistan offering a complete range of packaging solutions including offset printed cartons, shipping containers and flexible packaging materials to individuals and businesses world-wide. Their clientele includes illustrious names such as Unilever and Pakistan Tobacco Company, who have been our customers for over 50 years. It has employ over 3000 people and had sales of over US \$ 257 million in 2011.

Listed on all three stock exchanges in Pakistan, ABC Limited has maintained a long-time credit rating of AA. Our joint ventures and business alliances with some of the world's biggest names reflect our forward-looking strategy of continuously improving customer value through improvements in productivity.

The ABC has always been at the forefront of new developments in packaging research and has pioneered several innovations, including the use of wheat straw as a raw material

for paper and board manufacture. Its on-site paper and board mill, established in 1968, has constantly increased its production capacity. A new plant with even greater capabilities is planned for the near future.

In this regard, following tasks will be performed.

Current network design (topology)
Existing hardware LAN & WAN (specification)
Current IT staff
Issues faced by IT staff
Network Layer addressing scheme
Identifying the problematic areas
Design Requirements
Design a solution

CASE STUDY

Case Study: ABC Limited

This case study involves ABC, a Pakistan Manufacturing company.

The Client

Mr. xyz Manager ERP Department, of ABC Limited is responsible for updating existing network and address the problem face in daily routine.

Company Background

Company Profile

The ABC was established in 1956 as a joint venture between the wxy Group of Pakistan, KLM and PIA of Sweden, ABC Limited provides premium packaging solutions for exceptional value to individuals and businesses. It is the only packaging facility in Pakistan offering a complete range of packaging solutions including offset printed cartons, shipping containers and flexible packaging materials to individuals and businesses world-wide. Their clientele includes illustrious names such as Unilever and Pakistan Tobacco Company, who have been our customers for over 50 years. It has employ over 3000 people and had sales of over US \$ 257 million in 2011.

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CASE STUDY PHASES

PHASE 1

- *Gather Technical Data*
- *Characterize the Network*
- *Gather Administrative Data*
- *Understanding the Current Network Scenario*

PHASE 2

- *Identifying the Problematic Area*

PHASE 3

- *Proposing the Solution*
- *Proposed Technology over View and Configurations*

PHASE 1

PHASE 1

Gather Technical Data

- *Identifying the applications*
- *Identifying protocols over LAN*
- *Identifying Operating Systems*
- *Network IP Addressing Scheme*
- *Network Hardware*

Characterize the Network

- *Network Utilization*
- *Others*

Gather Administrative Data

- *Determine Technical Expertise*
- *Determine Geographical Structure*
- *Determine Current and Future Staffing*

Current Scenario

Until now, ABC has been able to manage its business with servers located in Lahore Pakistan. It has completely switches gigabit enabled optical fiber network (LAN), with marketing offices in Lahore, Karachi, Islamabad and Manufacturing units in Lahore, Kasur & Korangi. However due to increasing users over LAN ERP Department faces different issues which increase the administrative cost.

The ABC is using ERP (Enterprise Resource Planner) software SAP with Oracle on backend. The capital to cope up with LAN & Server issues has been budgeted, and the time line has been established as a three month project, after which the upgraded system will operate. Management has stipulated that this up-gradation must eliminate the delays and downtime of LAN. The management has stipulated that the new system must reduce the current processing

Client Systems and Applications

There are 450 existing windows PCs & 30 Apple Macintosh computers in Lahore Office. In Karachi Office we have around 50 computers and 20 Computers in Korangi. Islamabad office has 25 computers and Kasur Plant has more than 100 computers. All these machines run different applications along with SAP which is the core business software.

Server Systems and Applications

The business software is SAP with oracle on its backend and running on HP servers. Beside this other services are also provided by ERP department i.e. FTP, Proxy,

Email, DHCP, DNS, Active Directory, IIS and others. Department uses different operating systems.

Goals of the New Network

In the new environment segmentation of LAN is required which will narrow the broadcasts and help in identifying problematic areas/ computer. SAP performance to be checked over LAN.

ABC would like proposal for the turnkey LAN solution.

Executive Summary

Purpose of the Project

ABC Limited wants a proposal for the design and implementation for their LAN in Lahore and Kasur Sites. Lahore has 450 computers and kasur site has 100 computers approximately. Objective for the new network is to provide the technology to do the following:

- Enable its users to be able to share documents and work together as if they were in the same office.
- Make network database software available i.e. SAP along with other services.
- Improve client and internal communication through the use of email and fax.

Strategic Recommendations

In today's fast-paced business environment, immediate access to critical data is the key for small to medium sized businesses to be successful. Bandwidth-intensive applications, more powerful PC's and Servers and large files downloaded from the internet. However all are the contributing to an increase in LAN traffic. These factors along with additional demands placed by multiple office users accessing main LAN services are challenging the performance of 100BaseT networks, slowing response times and productivity.

Implementation Considerations

We are supposed to manage the project for its life cycle, providing product installation, training and configuration and support. After the network is installed and

functioning correctly, we will provide some basic training on how to use Cisco technology.

Benefits of the Solution

The high-performance solutions provided by ABC networks will minimize network congestion and substantially improve the performance to the desktop, server and backbone. The new network will:

- Enable ABC Limited employees to share documents and work together as if they were in same office.
- Make available SAP to all systems in remote site.
- Improve internal and external communication through the use of email and other network services.

Design Requirements

To support users and meet the business requirements, computer networks are growing at a faster pace and are becoming more complex. The proper design of these networks is therefore becoming ever more crucial to the efficient, optimal operation and management of network. Consider the metaphor of a transportation network (roads, highways, rails, and so on). If any of these conduits were to become suddenly unavailable, our ability to distribute food, clothes and products would be seriously compromised.

Existing Network

The primary network application is SAP & Email.

Business Constraints include:

Budget in Limited

Maximize the use of technology.

Provide solution that require minimal computer knowledge

Provide a solution that offers document sharing and timely communications.

CHARACTERIZING THE EXISTING NETWORK

Characterize the Applications:

Identify the current applications and plans for the future applications.

Name of Application	Type of Application	Number of Users	Number of hosts of Servers	Comments
Microsoft Outlook	Email	1000 approx.	3	All 3 server work in close relay, which are responsible for email filtration end to end delivery of email both local and outside company.
SAP	Database	1000 approx	6	There are different modules of SAP which are implemented in organization which run on 5 servers and remaining 1 server is training and testing server.
File Sharing	Windows	100 approx	1	This is dedicated server for green field project. This is the site of Kasur.
Internet Explorer	Internet service	500 approx	1	A proxy server is responsible for the availability of internet.
Web hosting	Web server	50 to 70 approx	2	One web server host global web site which is available to outside world while other is available for local intranet.
DHCP/ DNS/ADS	Windows Server Services	600 approx	2	Active Directory Service and DNS services are provided by two servers, which are replicas of each other. Technically one is PDC and other is BDC. DHCP is provided by one server
Fast look	Network AUTO-CAD file viewer.	600 approx.	1	This is the network software, through which user can watch network diagrams which are updated time to time.

Characterize the Network Protocols:

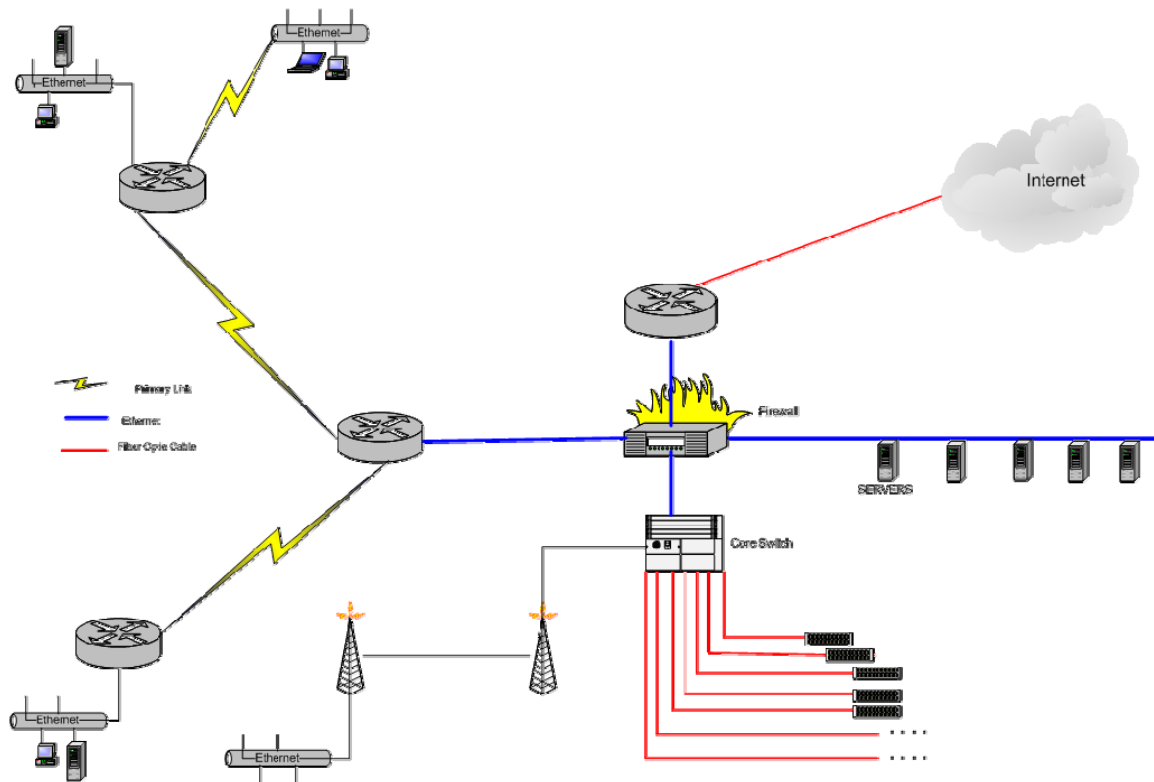
Name of Protocol	Type of Protocol	Number of Users	Number of hosts of Servers	Comments
HTTP	TCP/IP	500 approx	1	
SMTP	TCP/IP	1000 approx	3	
POP3	TCP/IP	1000 approx	1	
IMAP	TCP/IP	Few	1	
SAP	TCP/IP	1000 approx	6	

Operating Systems

Operating System	Type
Windows 2003	Server
Red Hat Linux 8	Server
Unix	Server
Windows 2000, XP, win 7	Client PCs

Current Network:

Network Topology:

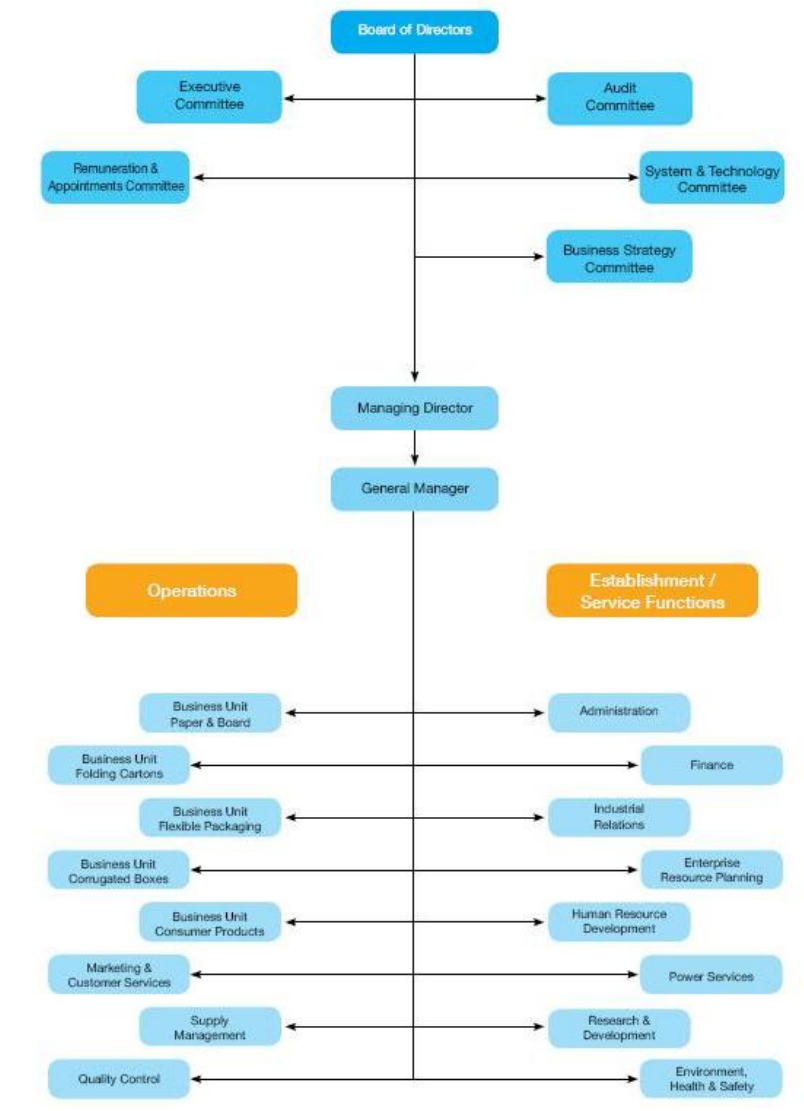


Network Addressing Scheme

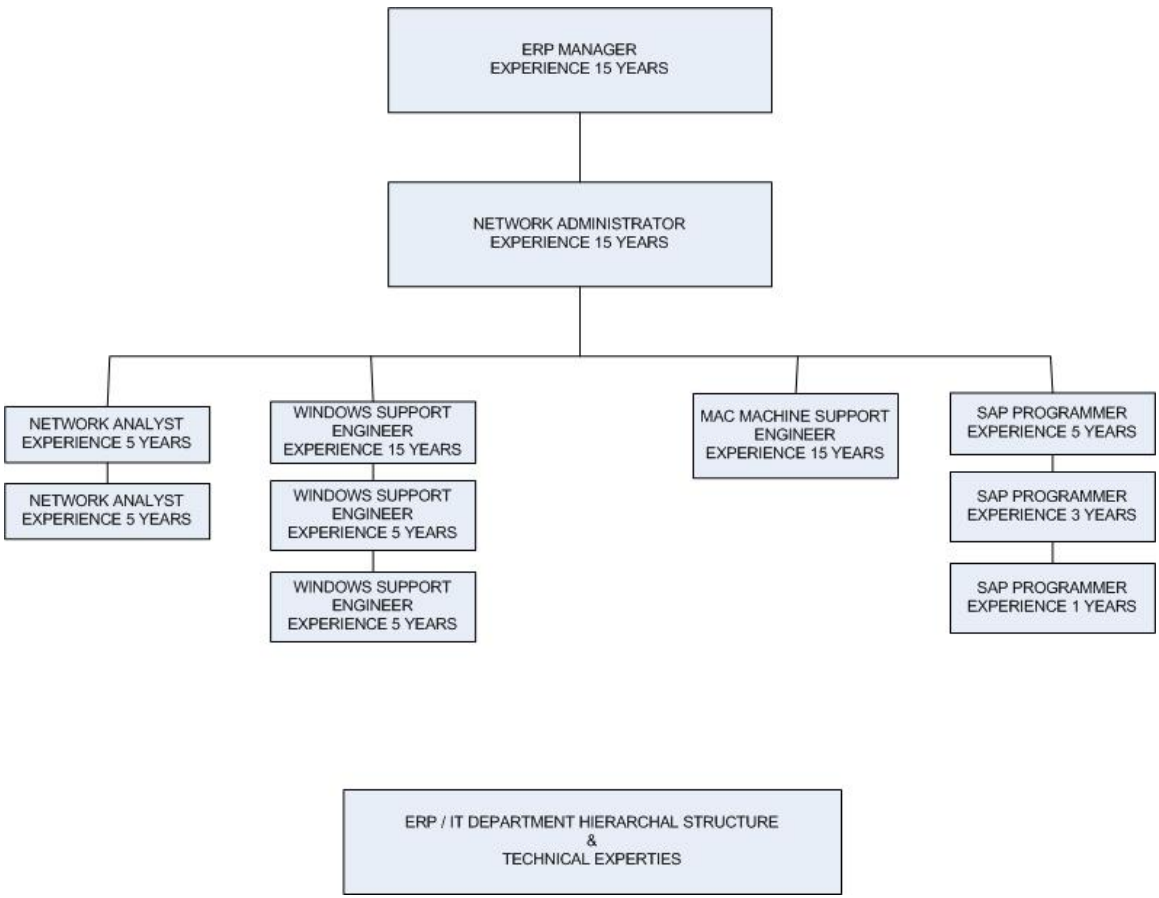
The current network address scheme used by organization is class B with subnet mask 255.255.240.0 i.e. 172.16.0.0/20.

Identify Business Constraints

Corporate Structure

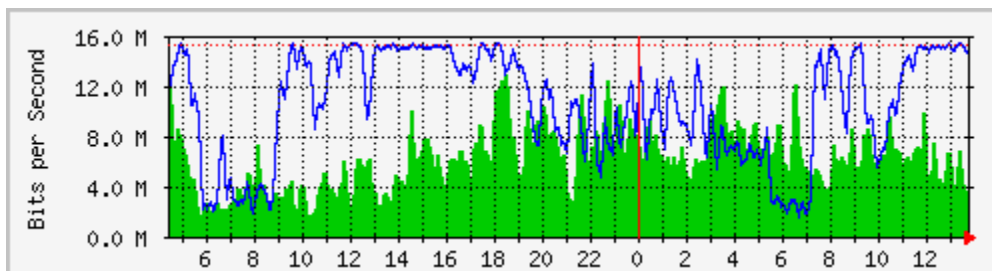


Technical Expertises of ERP Department



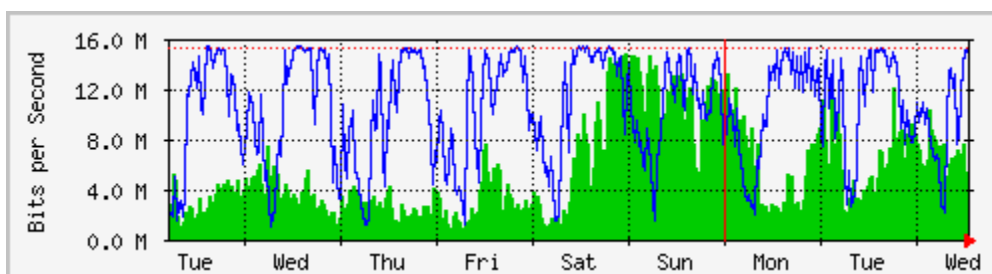
Characterize the Network Utilization:

`Daily' Graph (5 Minute Average)



Max In:12.9 Mb/s (84.2%) Average In:6017.0 kb/s (39.2%) Current In:3556.2 kb/s (23.2%)
 Max Out:15.4 Mb/s (100.0%) Average Out:10.5 Mb/s (68.3%) Current Out:14.9 Mb/s (96.9%)

`Weekly' Graph (30 Minute Average)



14.7 Mb/s (96.0%) Average In:5348.8 kb/s (34.8%) Current In:5182.2 kb/s (33.7%)
 15.3 Mb/s (99.8%) Average Out:10.4 Mb/s (67.9%) Current Out:15.1 Mb/s (98.2%)

Protocol	Relative Network Utilization %	Absolute Network Utilization %	Average Frame Size	Broadcasts/Multicast rate
SMTP	15	15	1024 bytes	-
POP3	30	30	1024 bytes	-
HTTP	20	20		-
SNMP	15	15		-
SAP	10	10	1000 bytes	-
Others	10	10		-