

**NETWORK INFRASTRUCTURE MANAGEMENT AND
MONITORING SYSTEM OF SONALI BANK LIMITED**

BY

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

AUGUST 2019

APPROVAL

This Intern titled “**Network Infrastructure Management And Monitoring System of Sonali Bank Limited**” submitted by Tanjir Ahmed Niloy, ID No: 163-15-8357 to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering (BSc) and approved as to its style and contents. The presentation has been held on date.

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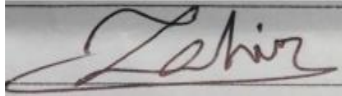
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DECLARATION

It is hereby declared that, the work presented in this internship report is done by me under the supervision of **Mr. Gazi Zahirul Islam, Assistant Professor, Department of Computer Science and Engineering**, Daffodil International University, in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering. I am declaring this report is my original work. I ensure that neither this report nor any part has been submitted elsewhere for the award of any degree.

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ACKNOWLEDGEMENT

At first, I would like to express my heartiest gratefulness to the almighty Allah for His blessing, which makes me possible to complete the internship successfully.

I would like to thanks to my honorable supervisor **Mr. Gazi Zahirul Islam, Assistant Professor**, Department of Computer Science and Engineering, Daffodil International University, Dhaka for his helpful supervision. His thoughtful, reinforcement, direction and advices throughout the progress of the internship and report preparing have provided a decent base for this work.

I would also like to extend my thanks to all others who have encouraged and have provided support directly or indirectly, throughout my internship. I am grateful to Sonali Bank limited for giving me an opportunity to do internship under its IT Department. A lot of supportive member of Sonali Bank Limited helped me during my internship period by providing data, information and material. They made me clear complex and different concept clearly.

I am really grateful to Dr. Syed Akhter Hossain, Head the Department of CSE for his kind help to finish my Internship and also to other faculty member and staff of CSE department of Daffodil International University.

Finally, I want to convey my deepest regard to my parents for their encouragement during all the good, bad and hard times in my life and my career.

ABSTRACT

Sonali Bank Limited (SBL) is the largest state owned commercial Bank in Bangladesh. Sonali Bank Limited have 1215 branch across the country. It provides different banking services like Corporate Banking, Project Finance, SME Finance, Remittance, Lease Finance, Government Treasury Function, Money Market Operation, Rural and Micro credit, Consumer Credit loan etc. All this banking operation are maintain centrally. For this the bank need to collect all of the transaction data, customer information & account information in real time. To make this possible Sonali Bank Limited use a highly secure network infrastructure. The network is use to synchronous and transfer data between branches and data center. The Sonali Bank Limited's Data Centre, which is the heart of Sonali Bank Limited IT Division, The whole operation is maintain by IT department of Sonali Bank Limited. This report will describe how the IT division maintain, monitoring and troubleshoot network problem and data center connectivity. IT division also provide support for different banking functionality. By highlighting all these events, this report delivers a rather composed picture of the huge working process, conducted within a bank's management system using IT infrastructure. During my internship period I earn the fast hand experience about network management.

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CHAPTER 01

INTRODUCTION

1.1 Introduction

Now a days Network infrastructure is a must have element of almost every organization. Banking sector of Bangladesh is already move to digitalize banking system. For digitalization of banking system Networking is must needed element. Sonali bank limited have 1215 branches. To connect all this branches Sonali bank limited use a secure network and maintain a central data centre. The reason behind I took internship at Sonali Bank was to earn experience in practical fields to grow knowledge about networking operations and uses of monitoring tools in NOC (network operation centre) of a bank. Therefore, the vision of earning much needed practical knowledge in the fields of networking, I chose Sonali bank.

1.2 Motivation

As a student of CSE, I found much interest in networking related course. Also the growing demand of network engineer, encourage me in networking profession. Through this profession I can also contribute to my country to build “Digital Bangladesh”. all of this thing works as motivation for me.

1.3 Objective

The main objective of my internship is to learn and gather working experience about LAN, WAN, data center, network infrastructure, network design, firewall, network security, network monitoring. Other objectives are:

- Gain preliminary working experience.
- Earn practical experience in the field of engineering.
- Increase social interaction to a variety of people from different profession.
- Gain an upper hand on job market with an initial job experience.
- Learn how to work in a team and collaborate with team member.
- Beside technical knowledge, get familiar with corporate culture of organization.

1.4 Internship Benefits

Internships is pretty helpful for both the intern and the organization. By internship, an intern can earn practical working skill by linking it to the traditional education and on the other hand, an organization can have man power for a lesser convenient remuneration or even in free of cost. However, additional benefits are, as follows-

- Internship give opportunity to an intern initial working experience
- Internship helps an intern to get a better job with an initial job experience.
- Internship give chance to grow confidents in real life work field.
- During the time of internship a student can learn from his mistake.
- Internship also help to select a correct career path
- During the time of internship an intern can meet a variety of people which is help him to expand social interaction.

1.5 Introduction to the Company

Sonali bank limited is one of the governmental bank of Bangladesh. Just after the independence of Bangladesh Sonali bank arose as the largest and leading nationalized commercial Bank by proclamation of the banks' nationalization order 1972 (Presidential Order-26) by merging national bank of Pakistan, premier bank and bank of Bahawalpur.

From November 15, 2007 Sonali Bank Limited started running as a public limited company. Government hold the 100% ownership of the bank. [1]

1.6 Report Layout

In this report the report layout organized as follows:

Chapter 1: Internship Introduction, Motivation, Internship Objectives, Benefits, Introduction to the Company

Chapter 2: Organization, Introduction, Product and Market Situation, Target Group, SWOT Analysis, Organizational Structure

Chapter 3: Daily Task and Activities, Events and Activities, Project Task and Activities, Challenges

Chapter 4: Competencies Earned, Smart Plan, Reflections

Chapter 5: Discussion and Conclusion, Scope for Further Career of the internship

CHAPTER 02

ORGANIZATION PROFILE

2.1 Introduction

Sonali bank limited is the largest bank in Bangladesh. It have 1215 branches across the country. 100% share Sonali bank limited is won by the government of Bangladesh. All of branches of Sonali bank limited are now connected through network. Sonali bank limited gives different type of banking services to its customer. All most all governmental banking operation are done by Sonali bank limited. As bank of Bangladesh Sonali bank limited obey all the rules and act provided by Bangladesh Bank (central bank of Bangladesh). [2]

2.2 Product and Market Situation

The main activities are:

- Corporate Banking
- SME Financing
- Lease Financing
- Consumer Credit
- Loan Syndication
- Small Special Loan
- Project Financing
- Remittances
- Investment
- Rural and Micro credit
- Capital Market Operation
- Government Treasury Function
- Transactions in foreign currency
- International Trading
- NGO-Linkage Loan
- Trade Financing
- Money Market Operation

Other Business activities are:

- Commercial Banking
- Government Treasury Bonds.
- Ancillary Services
- Collection of Utility bills
- Locker Service
- A.T.M. Card service

2.2.1 Services of Sonali Bank

- NBR-Sonali Bank online e-Payment
- Ancillary Services
- Automation Status
- Online Procedure for payment of taxes
- ATM Services

2.3 Target Group

- Poor people
- Agricultural farm
- Poor energetic youth
- Urban Entrepreneurs
- Rural Entrepreneurs
- Small & Medium Entrepreneurs

2.4 SWOT Analysis of Sonali bank

During my internship I try to find the Strengths Weaknesses Opportunities Threats

Strengths:

- The largest bank with the most number of branches.
- The bank is always getting support from government.
- Variety of services, given the chance to extend its business area.
- The performance of the bank is quite satisfactory.

- Employees are very intelligent and dedicated to the bank.

Weaknesses:

- Lacking of employee.
- Lack of inspiration for workers and low pay structure.
- Marketing is very poor compare to private bank.
- Mobile banking and internet banking are not functional as it is desire.
- Too many services.
- Sometime unable to recover loan.
- Less number of ATM both.

Opportunities:

- Expansion of the new investment zone
- Introduce more automation in workflow.
- Mobile banking.
- Internet banking.
- Integration with e commerce site payment system.
- Integration with different payment gateway system.

Threats:

- Newly designed privatized and foreign banks
- Loan recovery.
- Unreliability of customer.
- Hackers Attack.

2.5 Organizational Structure

Being a large bank, Sonali bank have a multipart and complex organizational structure. Beside Head office and branches it have general manager's office, principal office and regional office. Corporate profile and organogram of Sonali bank is given below. [3]

2.5.1 Corporate Profile

The corporate profile of Sonali Bank is as follows:

Table 2.1: Corporate Profile

Name of the Company	:	Sonali Bank Limited
Chairman	:	Mr. Ashrafur Moqbul
CEO & MD	:	Mr. Obayed Ullah Al Masud
Company Secretary	:	Mr. Hasanul Banna
Legal Status	:	Public Limited Company
Date of Incorporation	:	03 June, 2007
Date of Vendor's Agreement	:	15 November, 2007
Authorized Capital	:	Taka 6000.00 Crore
Paid-up Capital	:	Taka 4130.00 Crore
Number of Employee	:	18,167
Number of Branches	:	1215
SWIFT	:	BSONBDDH

Contact information:

Sonali Bank Limited

Head Office

35-42,44 Motijheel C/A

Dhaka -1000

Bangladesh.

E-mail: itd@sonalibank.com.bd

Website: www.sonalibank.com.bd

Phone-PABX: 9551426-31,33,34,9552924

2.5.1 Organogram of Sonali bank

The organogram of Sonali Bank is as follows: [4]

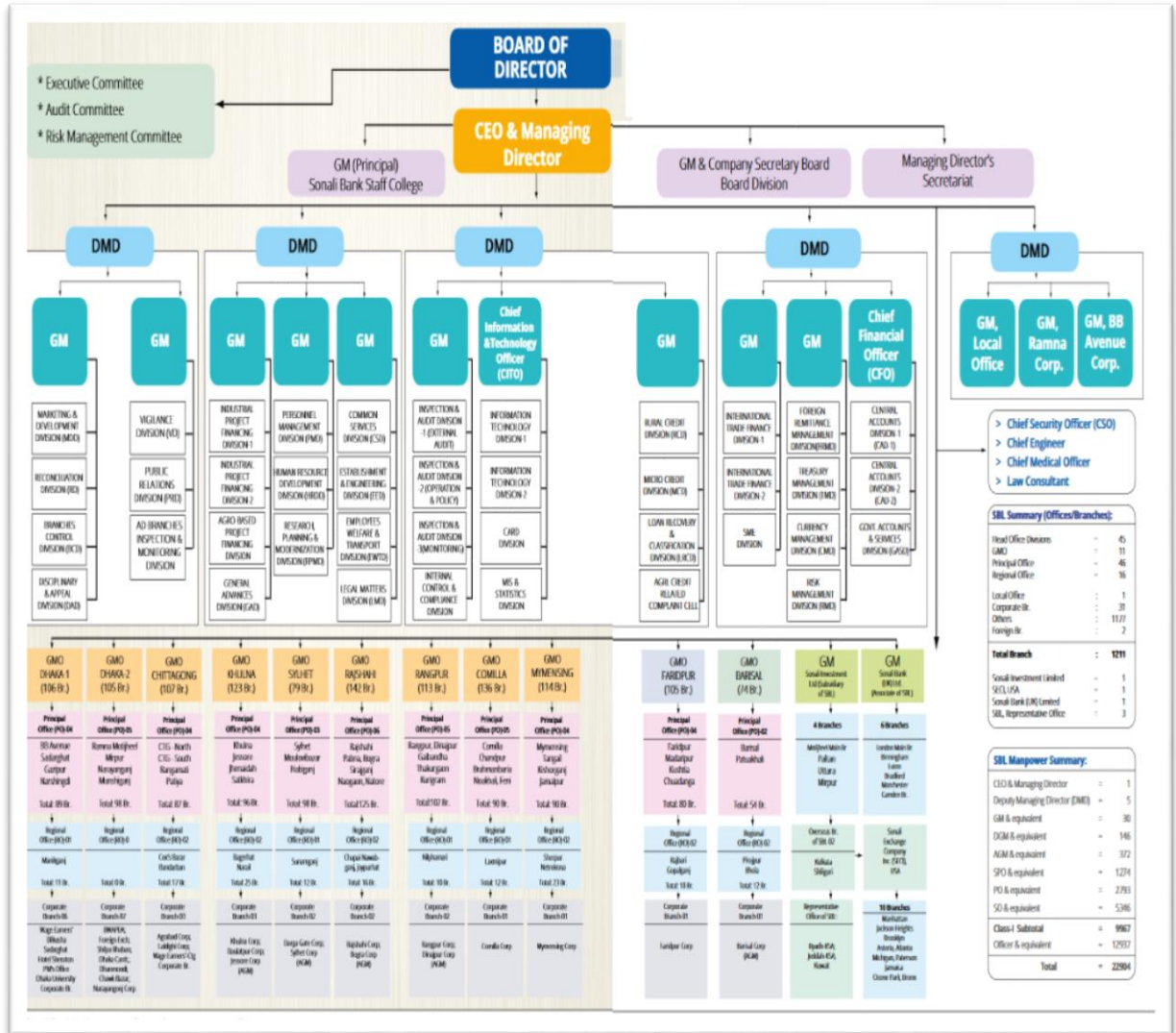


Figure 2.1: Organogram of Sonali bank limited

CHAPTER 3

TASKS, PROJECTS AND ACTIVITIES

3.1 Daily Task and Activities

In my internship period I have worked with different team of IT division. Most of the time I have work with LAN support team, Branch level WAN support team, data center & security monitoring team and server maintenance team.

3.2 Event and Activities

Summary of daily works are given below:

LAN team provide IP to the user manually and they keep a log of IP distribution.

WAN team keep monitoring branch level network, if they found any problem they try to solve it. Sometime branch inform problem then they try to troubleshoot the problem.

Complex problem are forward to the core team.

3.3 Project task and activities

During my internship period Sonali bank have completed two project one is video conference server setup and another one is new virtual server setup. Beside that they also keep performing their daily task. I was involved with their regular activities. The activities at which I was involve are related with LAN WAN and Network monitoring.

3.3.1 Overview of Sonali bank limited network

All of the branches of Sonali bank limited are connected to its data center. This branches connect via seven ISP Company, this are:

1. Agni
2. ADNT
3. Metronet
4. BRAC Net
5. Ranks ITT
6. BD Com
7. Drik ICT

Every branches have at least two link from two different company. If one link gone down, then the second link can keep the branch LAN operational. All the tar

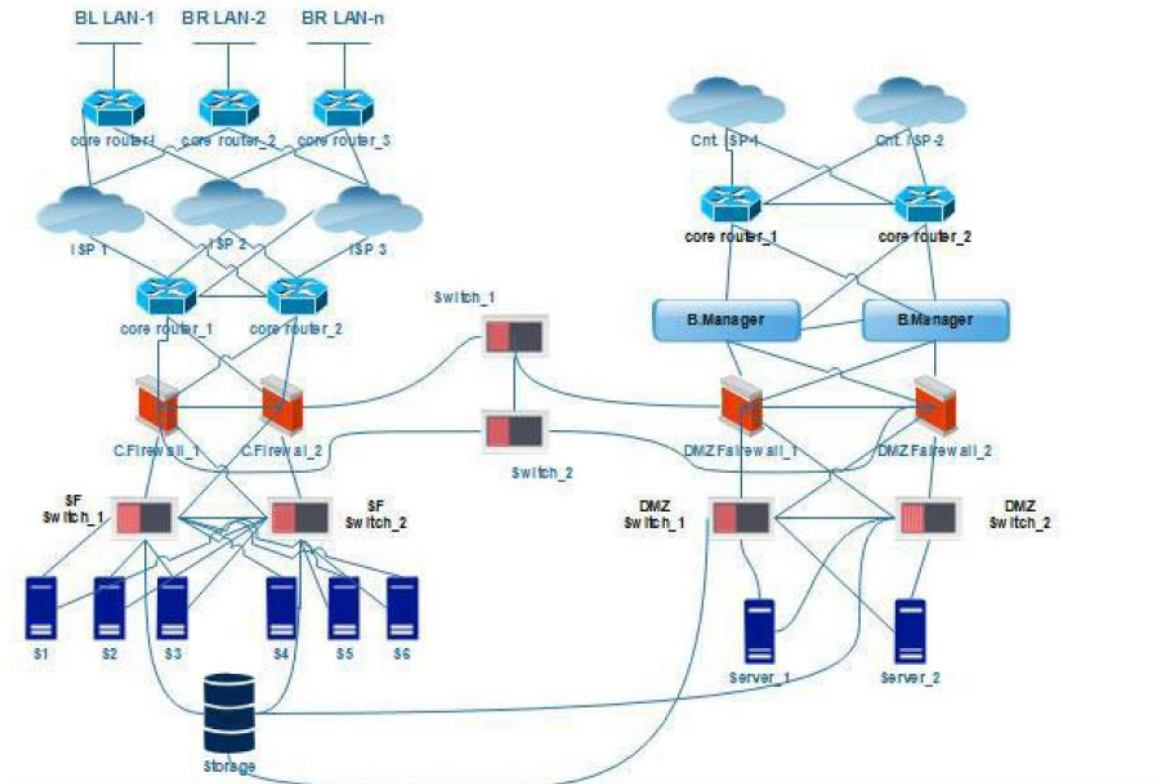


Figure3.1: Overview of Sonali bank limited network

3.3.2 Data Centre

A data center is a complex computing facilities which can contain server, router, switches and firewalls, as well as auxiliary mechanisms like backup equipment. A data center can be simple or complex. Data center's primary objective is to serve one or more service to many user. A data center must have some adequate infrastructure, for example stable power supply, one or more backup power supply for emergency situation. Validation and cooling system is also mandatory for data center. Two or more connectivity is recommended for a data center so that if a link is fail, another one can keep the data center operable. Data center is a highly secure place, because usually data center contain valuable and confidential data. To ensure data security and smooth operation data center usually have one or more back center. Sonali Bank Limited's data center contain customer account data, transection data and other banking document. It also contain different type of service software such as RMS, CBS etc. Active directory

is also maintain from data center. Sonali Bank Limited’s data center work as the heart of its banking operation. To ensure reliable data connectivity of Sonali Bank Limited’s data center, it have two different electricity supplier, two backup ups and two backup generator. Sonali Bank Limited have a backup data center Uattra, Dhaka Bangladesh. They have a plan to make another one backup datacenter outside of Dhaka.

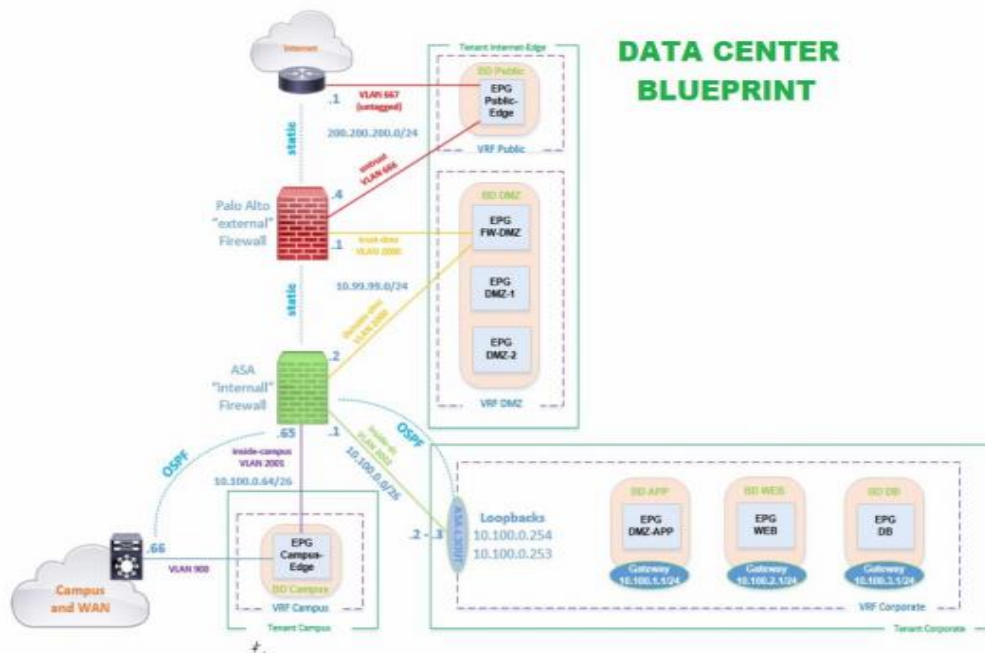


Figure 3.2: Data Center Diagram of Sonali Bank Ltd

3.3.3 Three-layer hierarchical model with data center

A network including data center can be divided into 3 layer this are

- Core layer
- Distribution layer
- Access layer

Core layer: It provide high speed packet transfer facility towards distribution layer. Usually core layer contain most powerful switch and router. Core layer maintain communication between different devices of distribution layer

Distribution layer: It is the clever layer in this three-layer structure. Filtering, routing are overseen at the conveyance layer. Circulation layer gadgets likewise regularly

oversee individual branch-office WAN associations. This layer is additionally called the Workgroup layer.

Access layer: This layer is used to provide connection to the end device such as Computer, CCTV camera etc. because of this Access layer is also named as desktop player. The main target of this layer is to connect end device at minimum cost. [5]

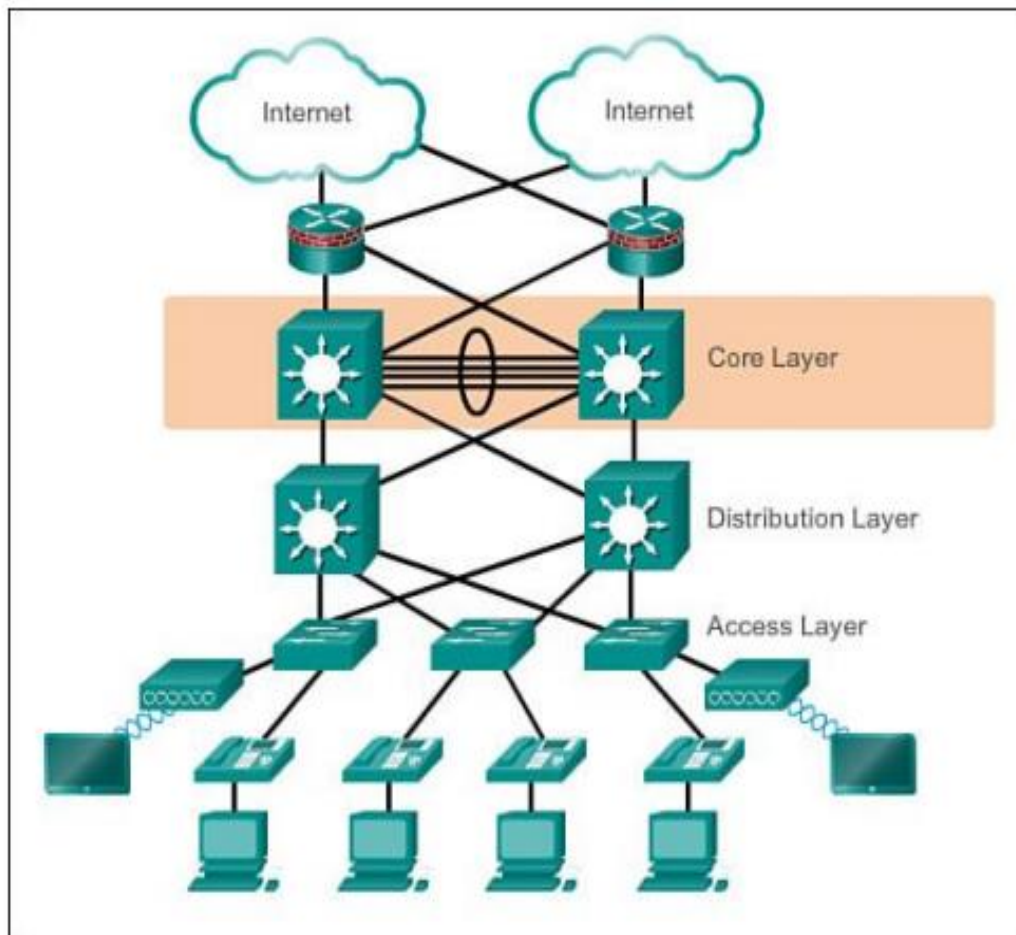


Figure 3.3: 3- layer Architecture

3.3.4 Data center physical architecture and plan

Before setup a data center, chose a perfect place is very difficult. To select a place for build a data center it is mandatory to ensure availability of power supply from two or more source, availability of cooling system. Beside this general condition, geographical location is also important. Data center cannot be built in such place near a volcano which lava can destroy the data center, near by a sea which cyclone or tsunami can flooded the data center or even in an earthquake prone areas. We should chose such a

place where the possibility of natural disaster are very less. At the time of build a data center Sonali Bank Limited build its main data center at Motijheel head office, and a backup data center at Uttara, Dhaka Sonali Bank Limited have plan to build another one datacenter outside of Dhaka. Figure show a typical floor plan of a data center.

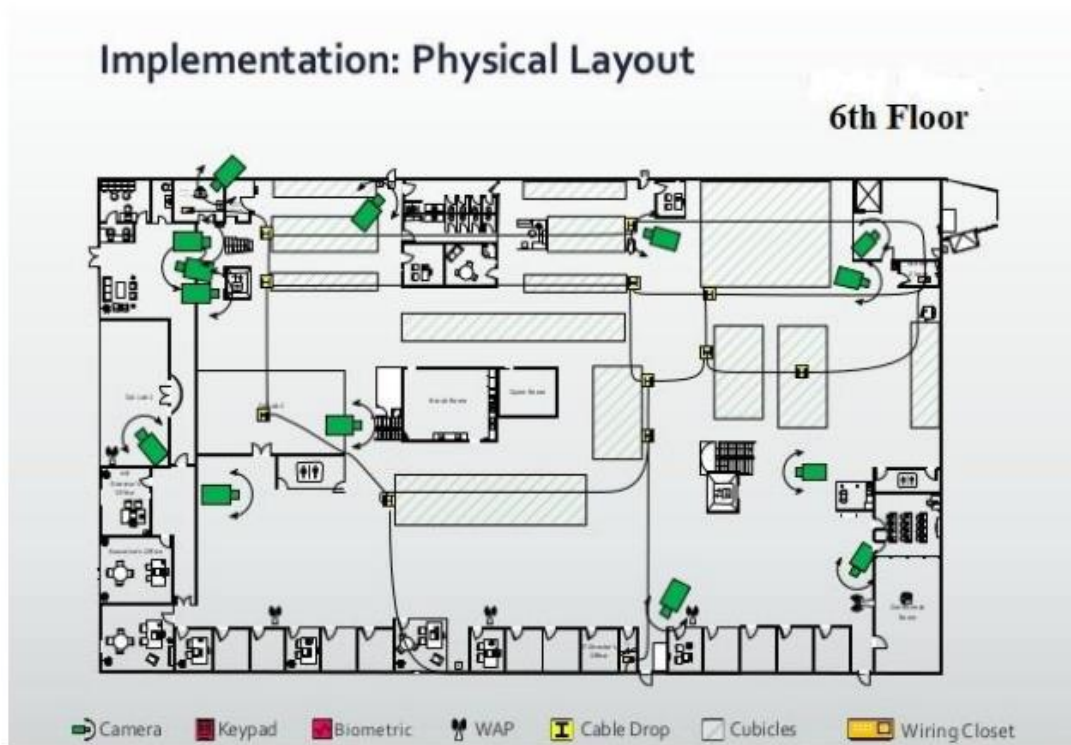


Figure 3.4: Data center floor diagram

3.3.5 Ensuring Data center security and safety

Usually a data center contains confidential and valuable data. In order to keep this data safe a data center must have strict physical and logical security. A data center should be only accessible by a small and trusted group of employee. Two step verification can be implemented for accessing a data center. Biometric verification such as finger print or Iris recognition can be implemented to ensure the security. Also the data center should be placed in such a place where general people are not go easily. For logical security firewall should be deploy in the system. Access can be limited using firewall. Beside this security measure safety measure should be taken.

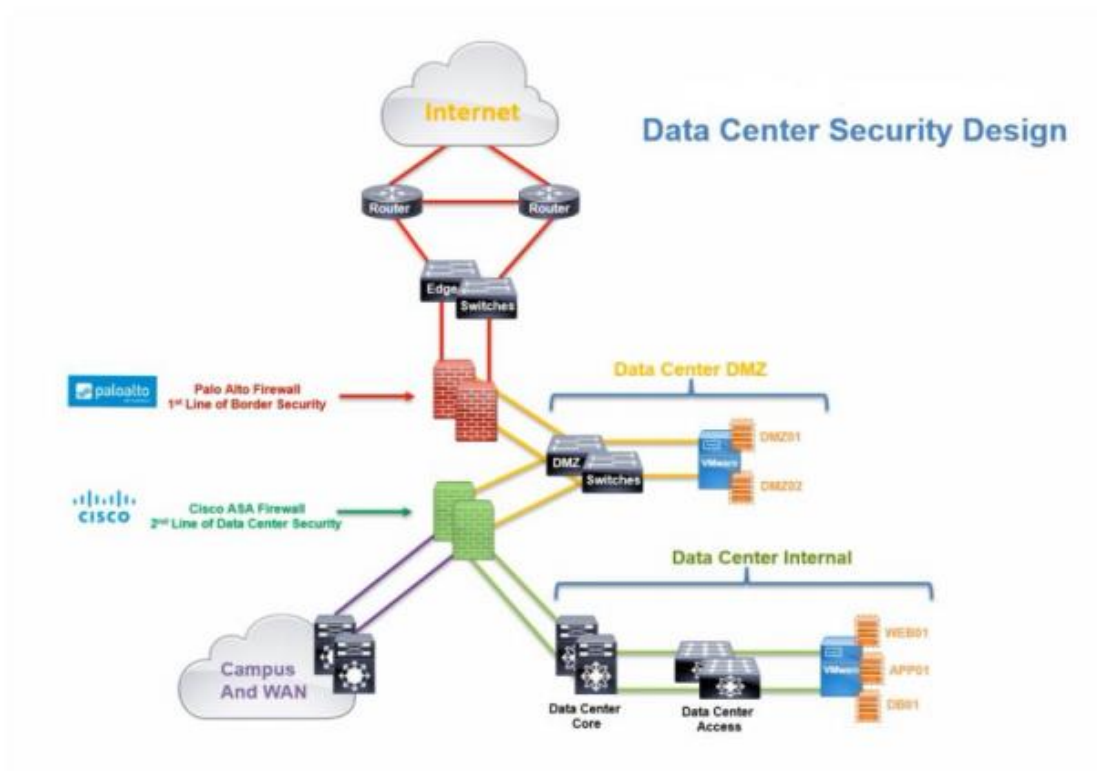


Figure 3.5: Data Centre Security

3.3.6 Data center infrastructure management and monitoring

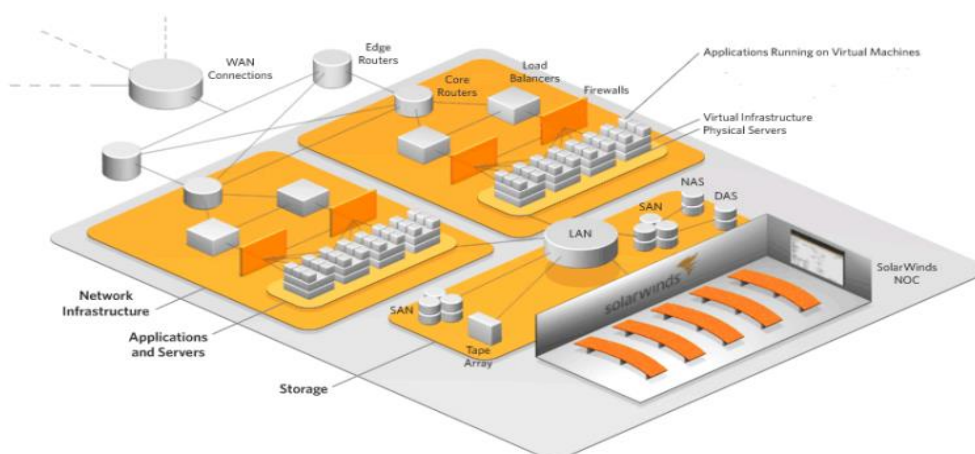


Figure3.6: Data Center Design of Sonali Bank

Maintain and monitoring a data center is not an easy task now a days. Increasing number of equipment make it harder to manage and monitoring the entire system quickly and

efficiently. In order to make the monitoring and management system different monitoring software can be used. Virtualization is also common technique in data center. Virtualization can save a lots of resource, and can ensure efficient use of resource. This is also help to save physical locations. When this virtual resource are no more need, they can be remove just by some click of mouse.

3.3.7 Network Monitoring

One of the most import task of IT department is to make sure that all the branches are connected throw WAN. To ensure this IT division continuously keep monitoring the network of Sonali bank. This task is done by manly two team one in WLAN team and Core team. WLAN team work for primary task and Core team deals with advance and complex task. This two team's daily work are:

- Network monitoring
- Central branch support
- Communicate with vendor
- Regular Security checkup

This task are very difficult. Because the branches are connected over a very complex network. Branches of Sonali bank are connect vie seven ISP Company, this are Agni, ADNT, Metronet, BRAC Net, Ranks ITT, BD Com, Drik ICT. In some branches they also use mobile operator network, radio link, VSAT etc. To monitor this complex network Sonali bank use some tools. Most of this tool are provided by the vendors as par contact.

Monitoring Tools used in Sonali Bank Network:

- Link Vendor Management System -LVMS
- Net flow Traffic Analyzer-NTA
- Network Performance Monitor-NPM
- Server and Application Monitor-SAM

3.3.8 Link Vendor Management System

This is the most used tools in Sonali bank limited for monitoring branch level network.

This application is developed by Sonali bank's software engineer. This software contains IP of all branches against branch name. If any branch link is down it shows the branch name in red color font and show status as down. If the link is ok it shows the branch name in green color font and show status as up. This software can generate

BRANCH NAME	Branch Name	Branch Status	ATM STATUS	MAIN CONNECTION	INTERNET	MEDIA	WAN-IP	ADDITIONAL CONNECTION	INTERNET	MEDIA	WAN-IP	LAN-IP	LAN-IP (2/24/2014)	ATM IP	CONTACT NUMBER	MARKA
1612	KIRON BHABAN BRANCH, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191543530	Metrocast
1616	KAMALAPUR RAILWAY ICD BR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191540460	Metrocast
1616	MCTB BR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191540460	Metrocast
44321	ISZULBAGONA BR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191541904	Metrocast
103	B B NATIONAL STADIUM BR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191540093	Metrocast
112	KAVRAJI BAZAR BRANCH, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191540093	Metrocast
55343	NAZMUDDIN ROAD BRANCH, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			ECCOM	F/GH						0191543455	Metrocast
5519	URDU ROAD BR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			ECCOM	F/GH						0191543455	Metrocast
44492	AGRAWALKA BR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	F/GH						0191543455	Metrocast
16220	SANDHAD BUTTERMILK BR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191543455	Metrocast
55244	NAVABPUR BRANCH, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			ECCOM	F/GH						0191543455	Metrocast
1601	FAKRAPLA BRANCH, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191543455	Metrocast
1184	GLSDIN/NEW NORTH CIRCLE, DHAKA	Khasaker Md Enayt Ullah		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191543455	Metrocast
44596	BEDIM ROKEYA SARANI, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191543455	Metrocast
55236	NAZRA BAZAR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			ECCOM	F/GH						0191543455	Metrocast
55228	NAVABAZAR, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			ECCOM	F/GH						0191543455	Metrocast
16295	MANIK MA AVENEV, DHAKA	Mts Rssi/Pal		Metrocast	Metrocast			RANK/IT	RIT/ FON						0191543455	Metrocast
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Figure 3.7: Live branch summary view

report of down link status. Also mail can be send to the vendor very easily regarding to inform the vendor about the down link information. Month end down time is also count automatically and create bill by LVMS. This application is also named as “Live branch”. A lite version of LVMS is available in MS Excel. Figure is given below.

3.3.9 NetFlow Traffic Analyzer:

NetFlow Traffic Analyzer is used to monitor bandwidth usage by application, software, protocol, user or a group of IP which is very handy to analysis the network traffic. Malicious traffic flow can be detected by NetFlow Traffic Analyzer. [6]

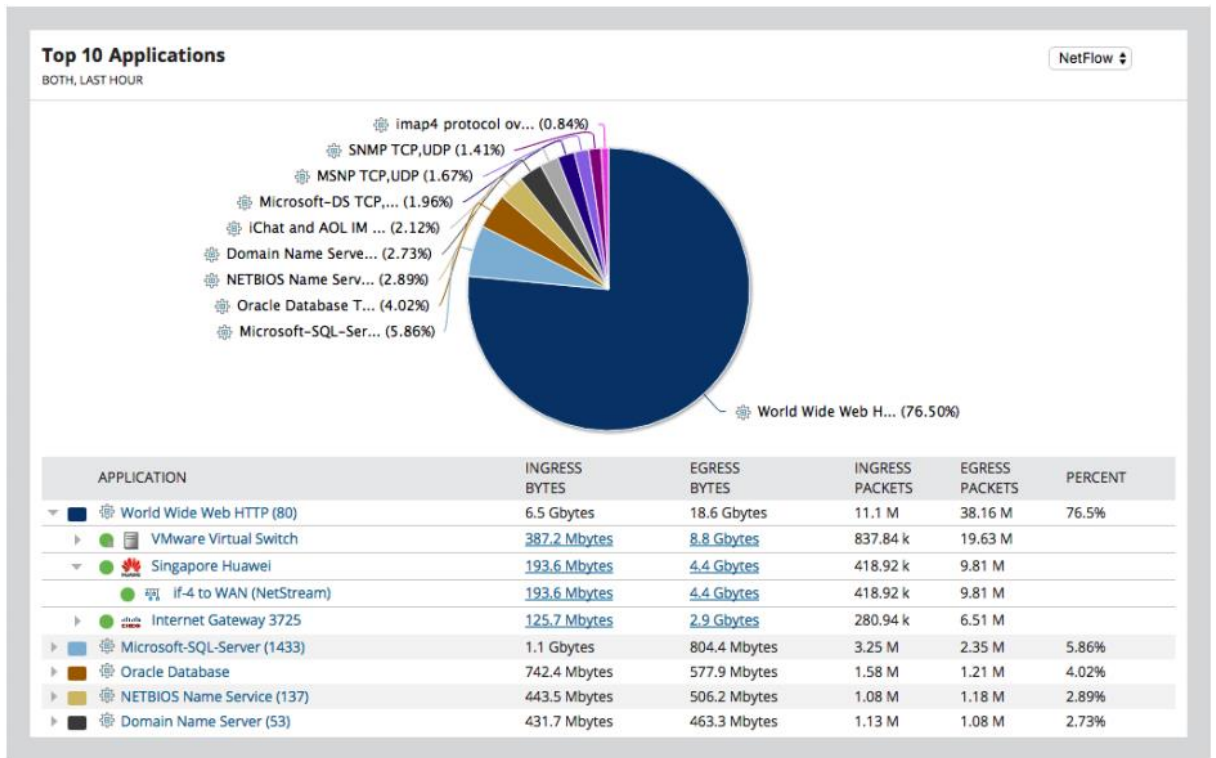


Figure 3.8: Top ten application which are using resource

Key Features:

- Bandwidth monitoring
- Application traffic notifying
- Traffic analysis
- Show Analysis Dashboard
- Malicious traffic flow identification

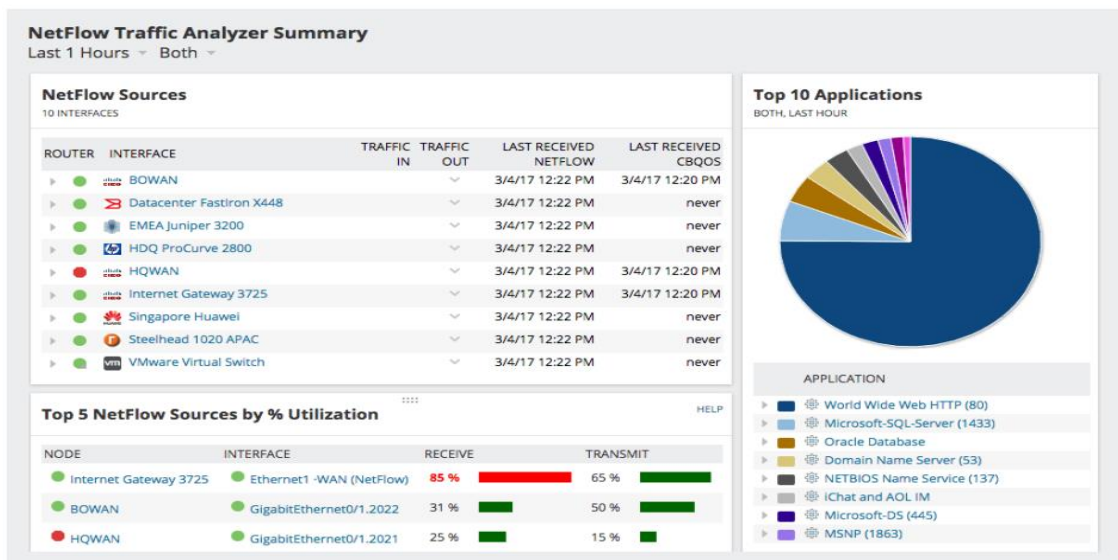


Figure 3.9: Traffic analyzer

Analyses network traffic trends for months, days or minutes by discovering all network elements. NetFlow Traffic Analyzer gathers traffic data, links it in a usable layout and show it as a web interface for monitoring network traffic. Because it contains extremely customizable dashboards, alerts and reports. The software supports over 1,000 different technologies, including hybrid cloud and network devices, to provide granular performance metrics.

CBQoS policies are used to ensure the prioritized data are pass through the network properly. It is very helpful for e commerce web site, VoIP services or any other are sector where prioritized traffic are important. A figure is given below which is showing prioritized traffic statistic. [7]

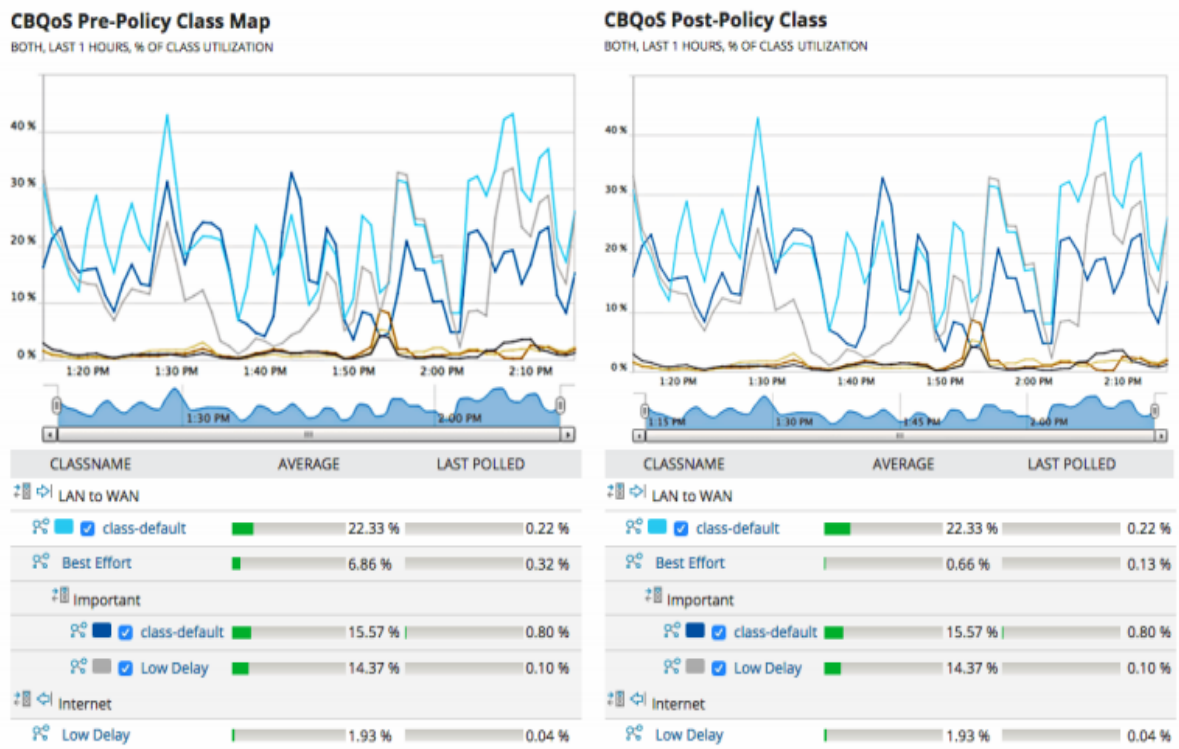


Figure 3.10: CBQoS Policy optimization

NetFlow Traffic Analyzer is also give a customizable interface, a user can customized it's dashboard as he/she wants. A user can view historical data or real time data. Figure

3.11 Is showing custom dashboard.

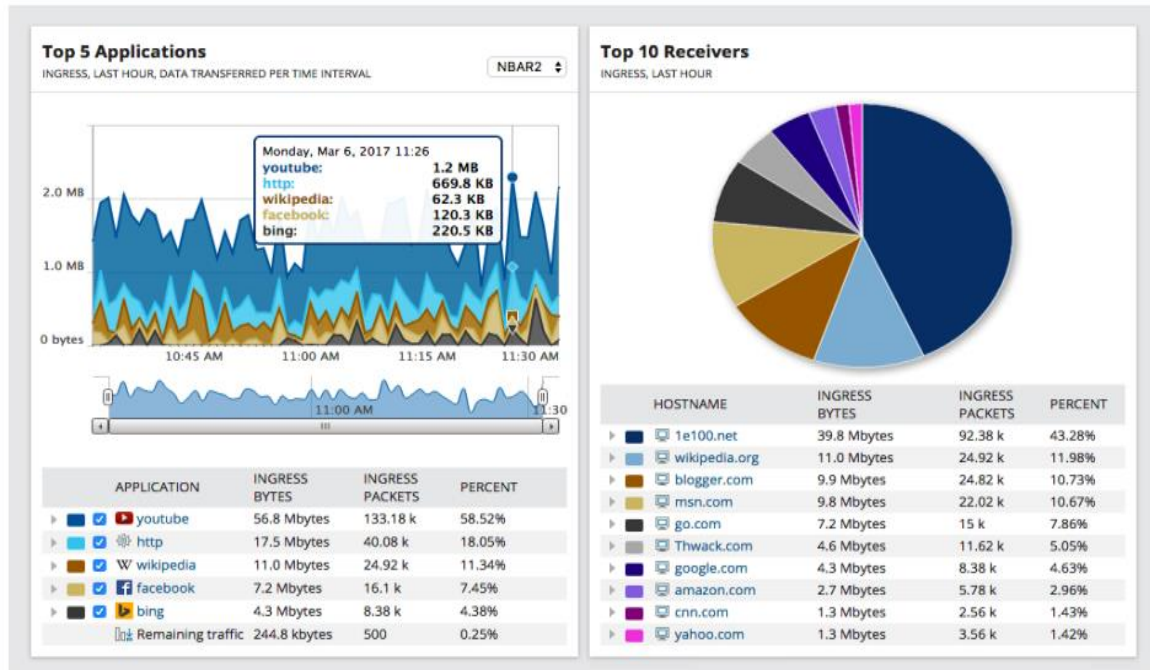


Figure 3.11: Custom dashboard of NetFlow Traffic Analyzer

NBAR2 support is to find which application, software groups are eating up most of the bandwidth. We can observe the traffic of consumption of port 80 and 443

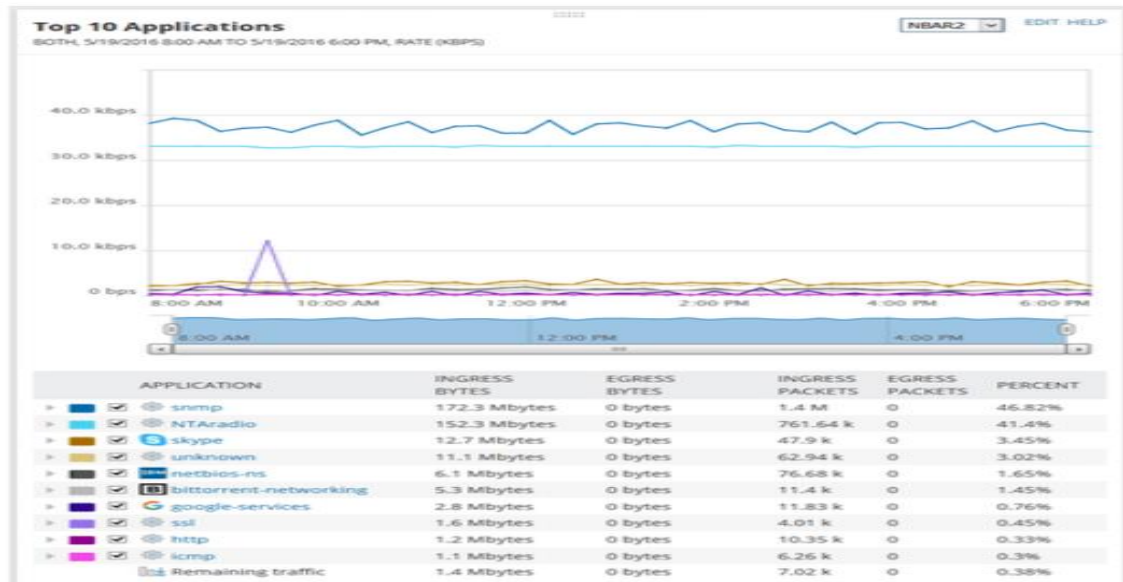


Figure 3.12: NBAR2 support

WLC traffic monitoring allow network administrator to identify which wireless device are consuming the bandwidth. Wireless device are incise day bay. So it is important to monitor wireless device.

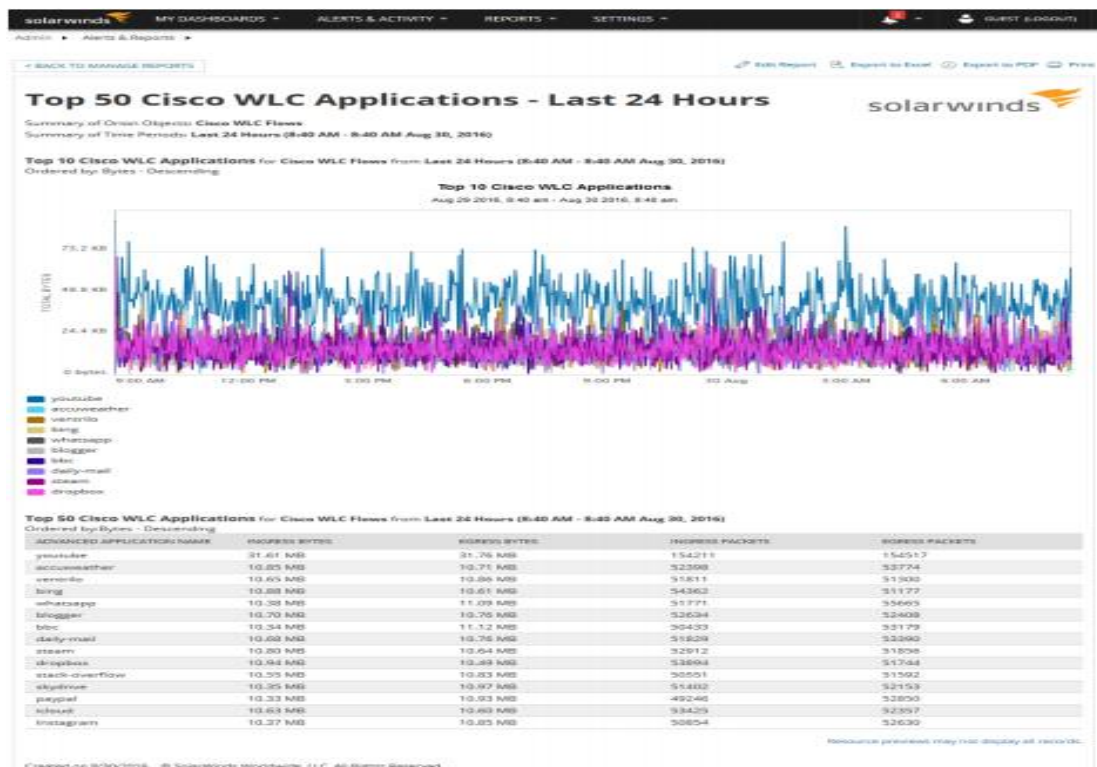


Figure 3.13: Wireless LAN Controller traffic

Combination with SolarWinds User Device Tracker: User Device Tracker (UDT) enables you to recognize transfer speed swine’s hindering the system when coordinated with NTA. UDT gives user contact information and switch port area – enabling you to advise the user to lessen their data transmission utilization or to expel them from the system.

3.3.10 Server and Application Monitor-SAM:

This tools is very useful to monitor server performance. It support various type of server including virtual server and physical server. Using this tool it is easy to find hardware or software related problem. Application can be monitor by this tools. More than 1200 application is supported by SAM. [8]

Key Feature:

- Can start work with in a small amount time.
- Visual representation of application dependence.
- It can monitor virtual server.
- No additional setup is required to start operation.
- More than twelve hundred application templates.

- Can create dependence map of network infrastructure.

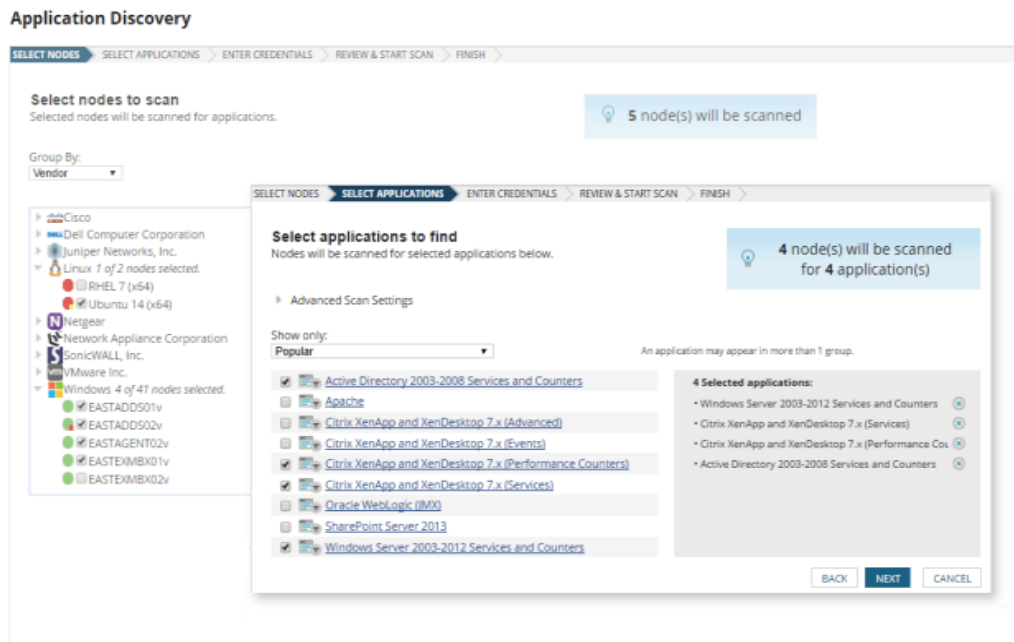


Figure 3.14: Automatic application discovery

SAM can authentically detect application. Download, introduce, consequently find and begin monitoring in about 60 minutes. No expert administrations required.

Beside physical server and virtual server SAM can monitor cloud base server. Observer the PaaS, IaaS, and SaaS services for Microsoft Azure and Amazon AWS.

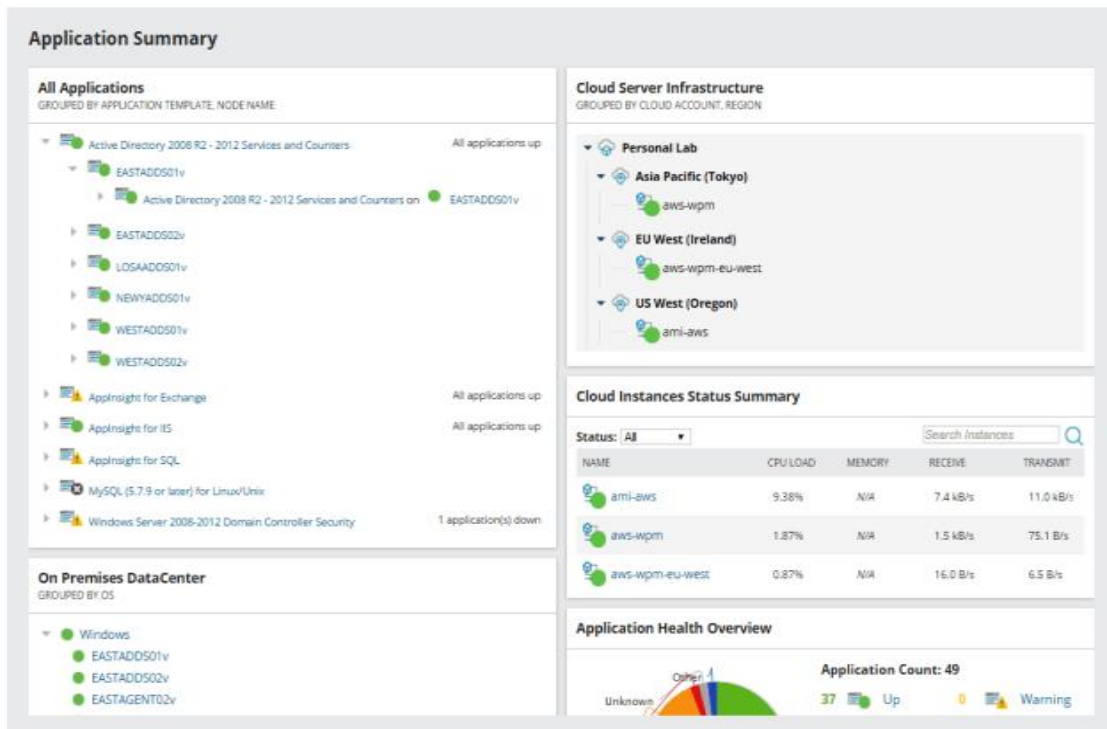


Figure 3.15: Cloud Server monitoring and discovering.

Application Monitoring: Preloaded models are very handy to monitor application more than twelve hundred model are preloaded on Server and Application Monitor (SAM). There is also option for customize templet. For an uncommon application any one can create a customize template. Readymade templet are available for popular servicers such as Java, AD, Microsoft Office 365, PHP server, XenApp, IBM WebSphere etc.

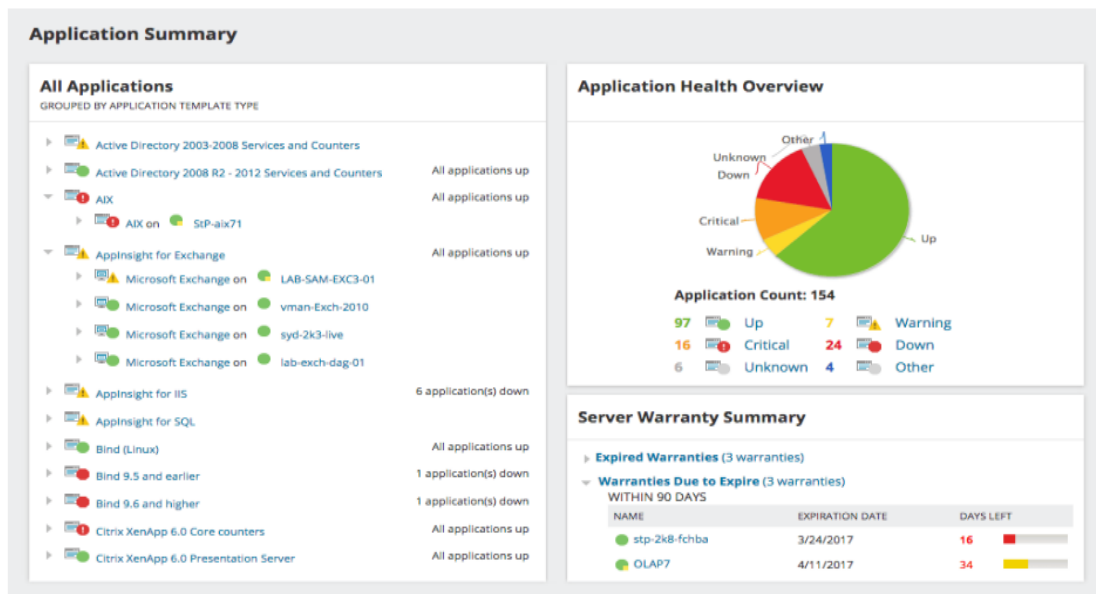


Figure 3.16: Summary of Application

Dependency mapping is use to fiend the root cause of a problem. It can give a quick glance of relevant and inter dependence node of application, it help to point out problem point quickly. It can work with both physical and virtual server.

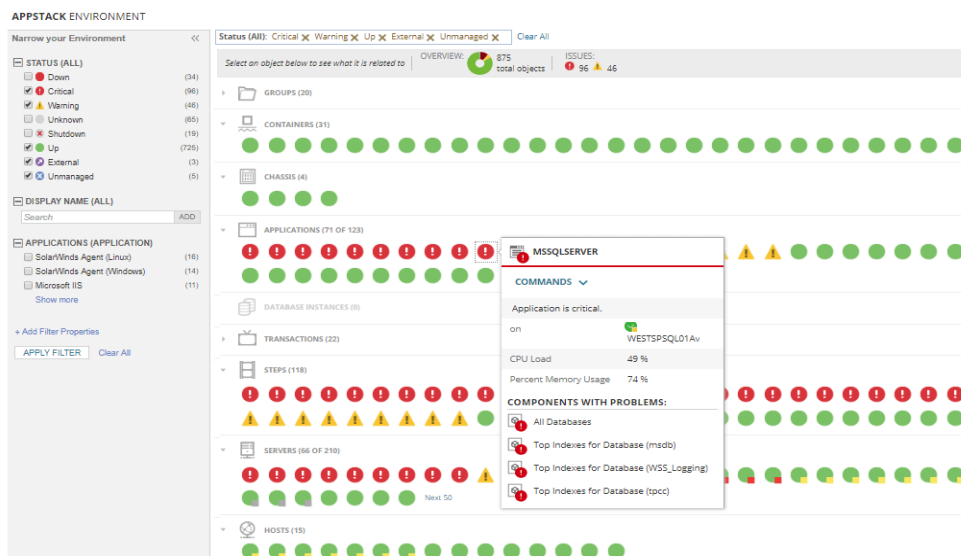


Figure 3.17: Dependency mapping

SAM include built in virtual server monitor, which means to monitor virtual server SAM do not require to install additional software. It can monitor incoming and outgoing network connection in order to check packet loss and latency.

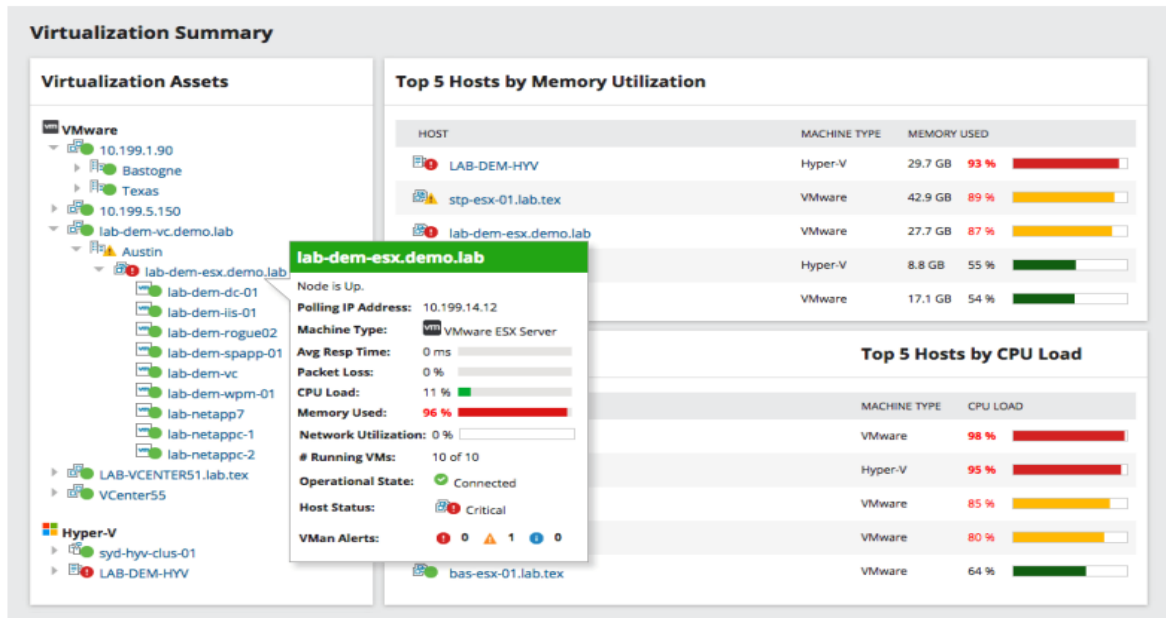


Figure 3.18: Virtualization summary

Another useful tool of SAM is storage performance and health monitoring. It is useful to monitor server storage volumes, disk usage, and size. It can help to make plan of expand network resource.

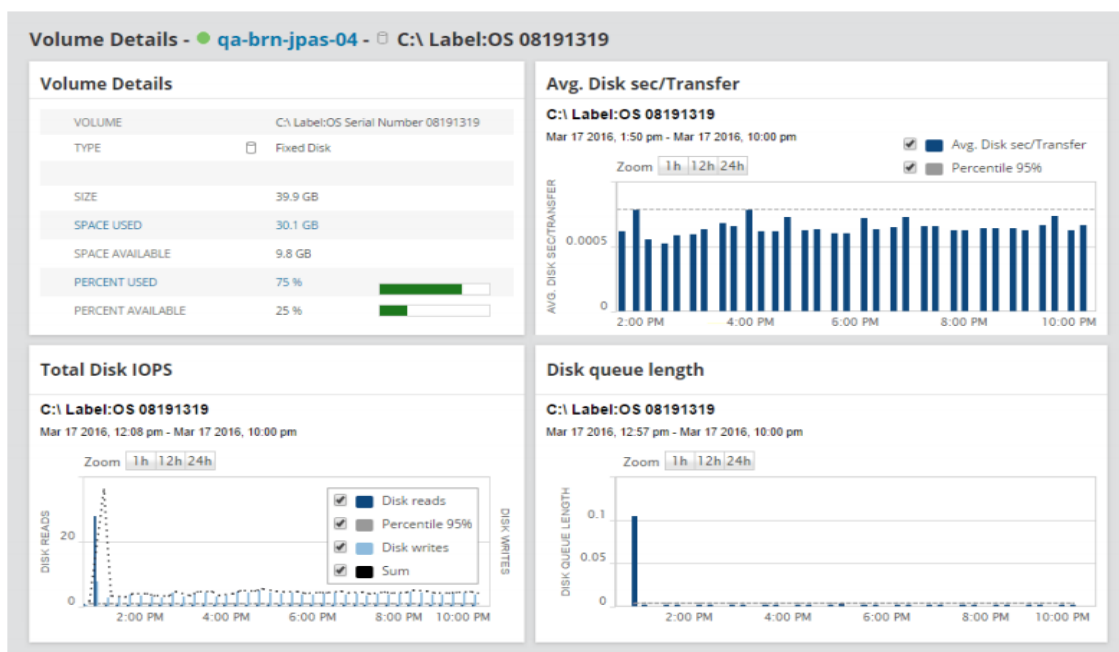


Figure 3.19: SAM-volume monitoring

Minimum System Requirements for SAM

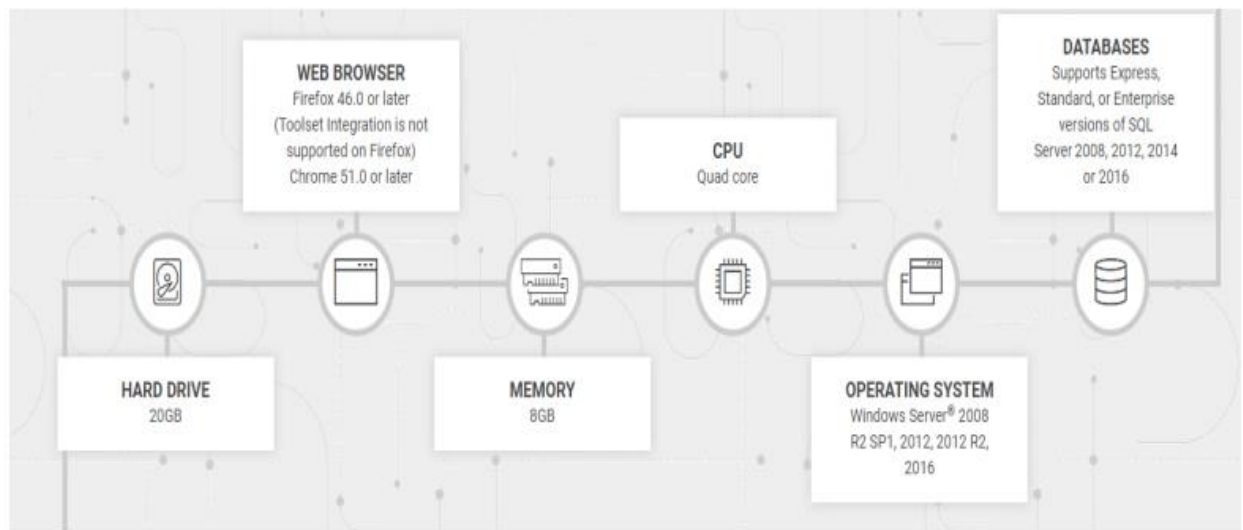


Figure 3.20: System Requirements of SAM

3.3.11 NPM- Network Performance Monitor

Network Performance Monitor is used to monitor multivendor networks. This tool is very nicely designed. Even a non-technical person can easily observe the link states with a few clicks of the mouse. Its customizable dashboard is able to show charts, graphs, or statistical data about network performance. [9]

Key features :

- Multi-vendor network monitoring
- Innovative alerting
- Intelligent maps
- Smoother scalability for large networks
- Network Insights for deeper visibility
- NetPath and PerfStack for easy troubleshooting

1. NetPath™ critical path visualization:

To find out the critical path and for hop-to-hop analysis, it is very useful. It is also used for cloud hybrid services.



Figure 3.21: - Network Performance Monitor dashboard.

2. Intelligent alerts:

Get to the underlying driver snappier with insightful, reliance and topology-mindful network alerts. Lessen the surge of superfluous network alerts. Make alerts dependent on basic or complex settled trigger conditions, characterized parent/kid conditions. Which is appeared in figure 3.22

All Active Alerts Manage Alerts Show in NOC mode More

ACKNOWLEDGE VIEW ALERT DETAILS EDIT ALERT DEFINITION CLEAR TRIGGERED INSTANCE OF ALERT

Alert name	Object that triggered this alert	Active time	Trigger time
High packet loss	R1	1h 14m	1/5/2017 3:51 PM
Alert me when an application goes into warning or critical state	MSSQLSERVER on vman-2008R2-SQL	1h 19m	1/5/2017 3:46 PM
High response time	dev-brn-mkun-01	1h 49m	1/5/2017 3:16 PM
High response time	R1	2h 11m	1/5/2017 2:54 PM
High response time	R9	2h 16m	1/5/2017 2:49 PM
Alert me when an application goes down	Microsoft IIS on adf-web-21.tul.solarwinds.net	14h 14m	1/5/2017 2:51 AM
High Transmit Percent Utilization	Ethernet1 -WAN (NetFlow) on Internet Gateway 3725	16h 58m	1/5/2017 12:07 AM
Alert me when a transaction step goes into warning or critical state	Sign in to Office 365	1d 8h 58m	1/4/2017 8:07 AM
Alert me when a transaction goes into warning or critical state	Office 365 from Austin	1d 8h 58m	1/4/2017 8:07 AM
Alert me when an application goes down	Microsoft IIS on ADF-WEB-03	1d 12h 56m	1/4/2017 4:09 AM
Alert me when a transaction step goes down	Microsoft Dynamics CRM Online	1d 13h 44m	1/4/2017 3:21 AM
Alert me when a transaction step goes down	Log out from Office 365	1d 14h 24m	1/4/2017 2:41 AM
Host memory utilization	LAB-DEM-HYV on lab-dem-hyv.demo.lab	1d 15h 25m	1/4/2017 1:39 AM
Host CPU utilization	SYD-HYV-02 on 10.199.5.109	1d 15h 25m	1/4/2017 1:39 AM
Host CPU utilization	bas-esx-02.lab.tex	1d 15h 25m	1/4/2017 1:39 AM
Host CPU utilization	tok-esx-02.lab.tex	1d 15h 25m	1/4/2017 1:39 AM
Alert me when a transaction step goes down	Navigate to email section	1d 16h 14m	1/4/2017 12:51 AM
NTA: CBQoS Drops	QoS-Ethernet-Shaper/class-default\QoS-WAN-EthernetWeb	1d 16h 42m	1/4/2017 12:23 AM
Alert me when a component goes into warning or critical state	Top indexes for Database (dnn) on LAB-DEM-SQL-02	1d 21h 23m	1/3/2017 7:42 PM
NTA: CBQoS Drops	QoS-Ethernet-Shaper/class-default (Drops)	1d 21h 42m	1/3/2017 7:23 PM
Page me when a Node goes down(2)	Lab/ Samsung	1d 22h 37m	1/3/2017 6:28 PM

Figure 3.22: NPM Active Alerts

3. Wireless network monitoring and management:

Now a days a large number of its equipment and device are use wireless connectivity. It is mandatory to monitor and check the performance of access point, wireless controller. With solar winds network-observing apparatus, you can access out-of-the-container remote reports, including remote accessibility and maverick passageways. This is appeared in figure 3.23.

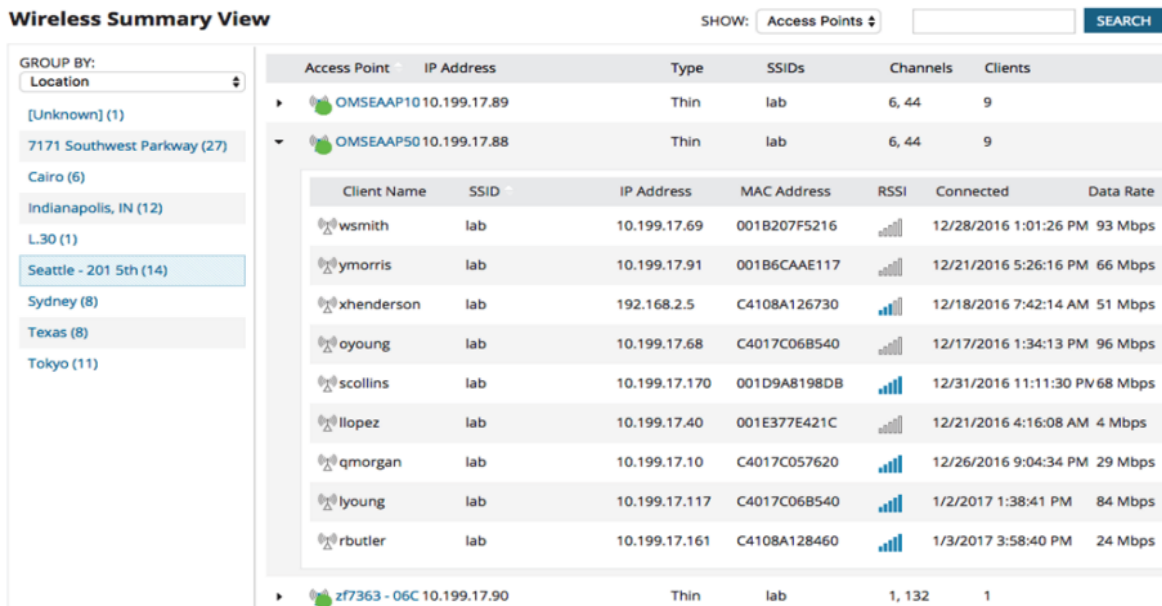


Figure 3.23: Wireless Summary

4. Wireless heat maps

Make custom WiFi heatmaps to recognize inclusion and area of associated customers. Effectively distinguish no man's lands and improve remote inclusion.

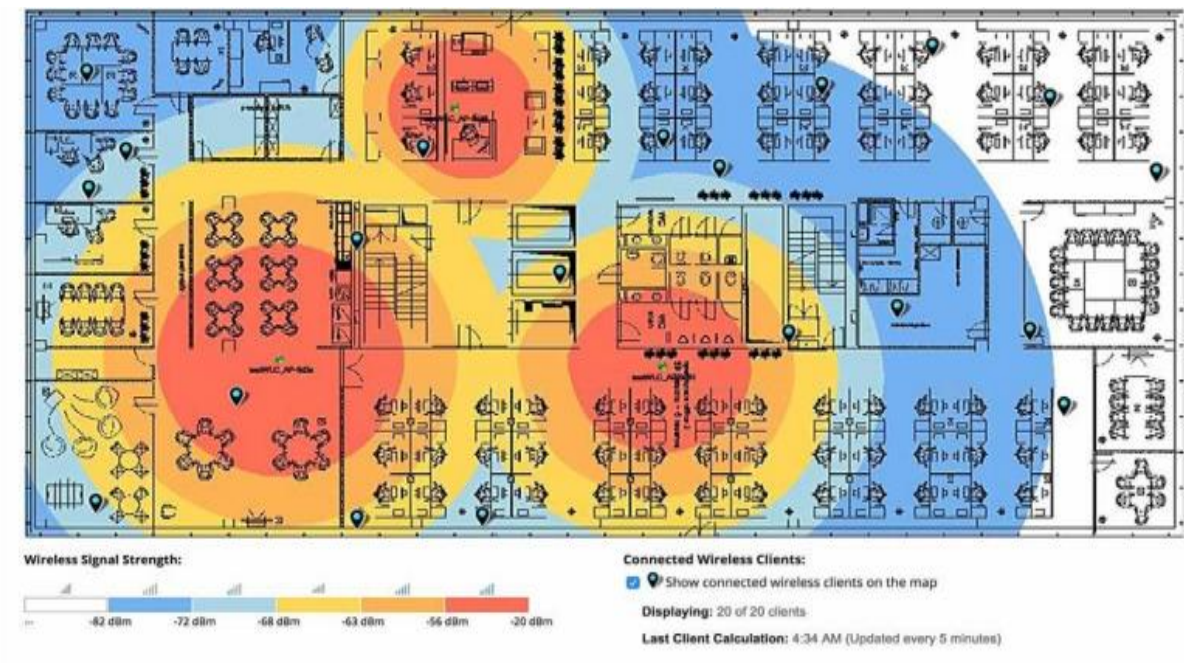


Figure 3.24: NPM WiFi Heat map

5. Network performance baselines:

Powerfully figure benchmark limits from verifiable network execution information. Design alerts precisely by computing dynamic gauge edge information with our network execution checking programming.

6. Integrates with Solar Winds Engineer's Toolset:

Engineer's Toolset's constant monitoring tools begin legitimately from components inside Network Performance Monitor (NPM), empowering quicker critical thinking. Access Response Time Monitor, Memory Monitor, CPU Monitor, Interface Monitor, and Trace Route on any checked component inside NPM. This had appeared in figure 3.25 and figure 3.26 shown the system minimum requirement.



Figure 3.25: ETS Differentiator

3. Minimum System Requirements:



Figure 3.26: System requirements of NMP

3.3.12 Network Monitoring Center of Sonali Bank Ltd

Sonali bank limited have a network operation center in short it is also called NMC. The monitoring task is operate from here by network engineers. Network monitoring System of Sonali bank limited is divided into three division. This are Downstream, vendor, and upstream.

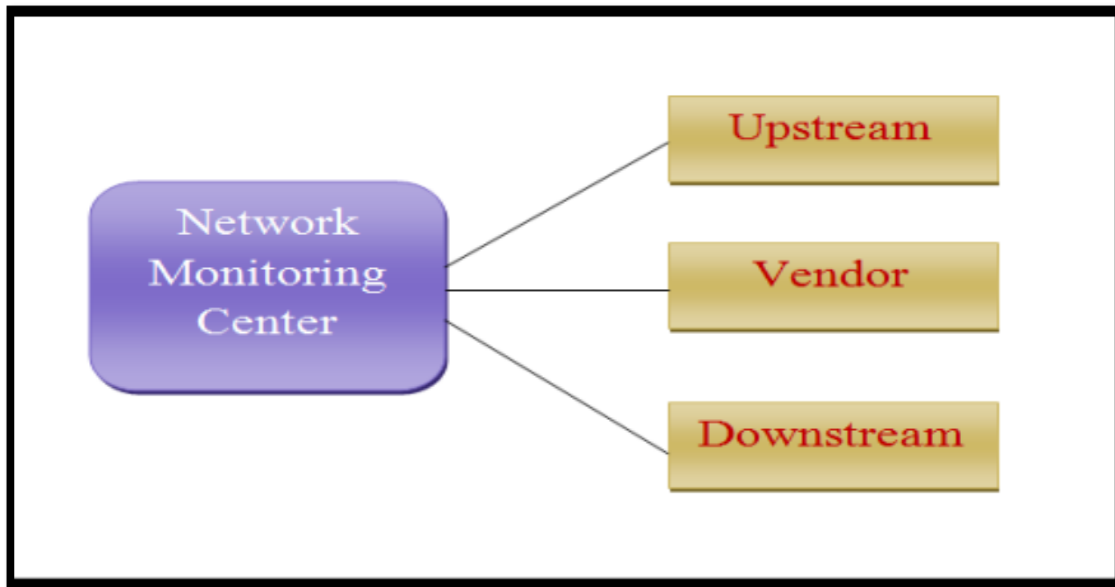


Figure 3.27: Organizational Hierarchy of Network Monitoring System of Sonali Bank

3.3.13 NOC (Network Operation Center)

NOC, is the essential work space architects use to monitor, oversee and investigate issues on a network. The NOC offers oversight of issues, arrangement and change the executives, network security, execution and strategy monitoring, announcing, quality affirmation, booking, and documentation by using modern network the board, monitoring and investigation apparatuses. The NOC gives an organized situation that adequately facilitates operational exercises with all members and sellers identified with the capacity of the network. The NOC professionals regularly offer help twenty-four hours every day, seven days in a week.[10]

3.3.14 Sonali Bank Limited's Network Operation Center statistic

Being a large bank with the complex and huge network Sonali bank limited have to face a lot of problem every day. Sonali bank limited have more than 1215 branches all

over the country, complain are keep arriving from random branches. Technicians and engineers of NOC tem have to solve this problem as quickly as possible. If a branch failed to communicate with the data center for a little time many of the customer at that branch have to suffer. Beside this NOC team also face core system related problem. NOC maintain a log book of complain. I have try to gather this data to find out which Problem are happening most. Below tables data are applicable for from January 2019 to July 2019. [11]

Table 3.1 Statistic of Sonali Bank NOC Data.

No	Interruption Issue	Rate
1	Problem at Vendor end	386
2	Backbone down	25
3	Power Problem	20
4	Maintenance work	20
5	Others	34
6	UPS faulty	48
7	Trouble shooting	13871
8	POP down	40
9	Patch cord	571
10	Wrong port	1378
11	Mail server problem	19
12	Backbone down	13
13	Poor battery	17
14	Link shift	13
15	MC adapter replace	22
16	Fiber stolen	42
17	Fiber Bend	578
18	Pigtail broken	56
19	Fiber Burn	618
20	Core bend	506
21	Fiber cut	853

22	Speed slow	711
23	Core broken	42
24	Not Browsing	67
25	Switch down	433

After my inspection, I have attempted to discover the real interruption issue. As indicated by the quantity of recurrence, I have made a table. At that point I have given my inspection report to the NOC division. The office valued me for doing this work which is appeared in table 3.2.

Table 3.2: Issues are Occurred Most of the Time in the Network

No	Major Problem	Rate
1	Not Browsing	67
2	Switch down	433
3	Core bend	506
4	Patch cord	571
5	Fiber Bend	578
6	Fiber Burn	618
7	Speed slow	711
8	Fiber cut	853
9	Wrong port	1378
10	Trouble shooting	13871
	Total	1947

3.3.15 Graph of Service Interruption rate

From the statistic, I have made a diagram where I feature the initial 10 noteworthy disturbance issues. From the diagram, we can see that 71% interruption happened on account of the Troubleshooting, which is appeared in figure 3.28.

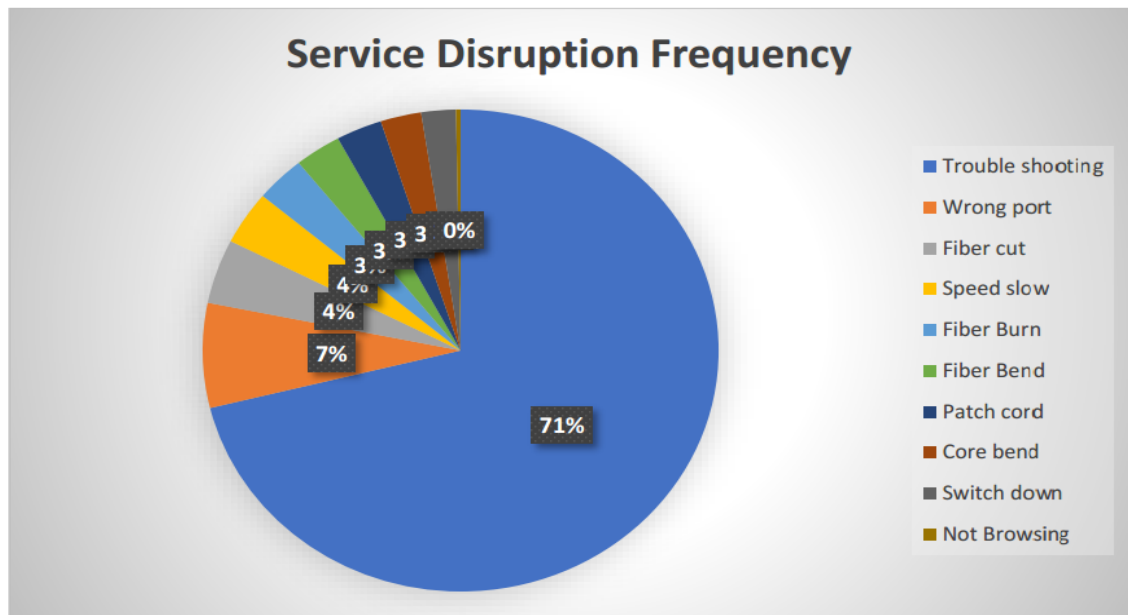


Figure 3.28: Graph of Service Disruption Frequency

3.3.16 Solution of some network Interruption

I have to solve some of the problem when I was worked for WAN support team.

The procedure of solving this problem is given below.

1. **Wrong port:** The connector need to be plug in to the correct port as it was before. Because in branch level , router are configured to serve in specific port
2. **Speed slow:** Check if any pc is taking too much bandwidth. If not make complain or inform to internet provider.
3. **Switch down:** Check for power related issue. If there is no power related issue then ask to the supplier of the switch for support, and temporary change the faulty switch with another switch to minimize the down time.
4. **Problem at Vendor:** Place a mail to the vendor to trouble shoot the problem as quickly as possible.
5. **Unable to Browsing the web:** Some time user face problem to browse the web site. It happen because of firewall setup. If I found it is necessary to browse the web then I forward the query to security & firewall team.
6. **Patch cord:** If the connector is broken change the connector else change the patch cord.

- 7. Link shift:** If link of any branch is changed, it needs to adjust with core network. Such as new link has to give access to the server of Sonali bank. In order to do that new IP address, have to add in “allowed” list in firewall.

3.4 Challenges

Despite all of the staff are too busy, they gave me wholehearted participation in my internship period. They also help me to prepare this internship report. While gathering information, I had not get access to certain information for privacy reason. Be that as it may, I confronted the accompanying issues during the investigation:

- I. Restricted time to manage all exercises
- ii. Deficiency of information
- iii. Dread of exposure
- iv. Access to data center is very limited
- v. Network security related data are not sheared.

Due to the govt. bank rules and their security reason they didn't give me the authorization to take a shot at all of their monitoring tools. The majority of the task were illustrated by them. The time is also very short to learn about the IT technology of a bank.

CHAPTER 04

COMPETENCIES AND SMART PLAN

4.1 Competencies Earned

During my internship period I have learn about LAN, WAN, data center, network infrastructure, network design, firewall, network security, network monitoring. I think this will give a little bit advantage in my future career. Beside technical knowledge I have also get familiar with corporate culture of a bank. I also learn how to work in a team and collaborate with team member.

4.2 Smart Plan

The type of task I was involved at Sonali bank limited, is usually done by a network administrator. In future I will try to enrich my knowledge in network administration. I have plan to complete a course on CCNA or RHCSA and get certified. Beside CCNA I will keep learning about other popular networking equipment vendor such as Juniper, Mikrotik etc. In one sentence I will try to stablish myself as a professional network administrator.

4.3 Reflections

The reflections of the internship is took place in my knowledge. The internship give me a lot of experience which can be reflected through my work. All of the lessons I've learned from my internship period can be used in all of my future challenges, and I feel so glade and blessed to have this all experience in earlier stage of my career.

CHAPTER 05

CONCLUSION

7.1 Discussion and Conclusion

In my internship period I have try to give my best effort to learn new thing. I use my theoretical knowledge in my internship task which I learn in my university. Despite all of the staff are too busy, they gave me wholehearted participation in my internship period. The time duration of the internship was very short. It is hard to learn something perfectly with in this short time, but what I have learn and which experience I have gather is good enough for to build my foundation for my network administration career. I want to place my heartiest thank to Sonali bank for giving me the chance to do internship at their organization

7.2 Scope for Further Career

This internship give me a solid foundation for networking based profession. Beside to be a network administrator, I have good chance to work with IoT (internet of things), Virtualization and cloud computing. All of this will be very demandable and secure career in future.

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