Network Operation Center
NOC

Eng. Ali Munir Al-Mudhafar
I.C.T Center
Network Systems Division
After Continuous and widespread use of Network system in many organizations, companies, government agencies, educational institutes, etc. It’s became essential to monitor, Follow-up and maintain these networks to provide the best performance & efficiency for all clients, so that the **NOC** concept is established.
What Is NOC?

A Network Operations Center (NOC) is a facility that can offer performance monitoring features that can manage to exceed the organization’s network performance goals and increase customer satisfaction with the services provided with the organization’s network.

NOC (Pronounced as “knock”) is established and began to be used widely in many aspect in purpose of Monitoring, Maintaining, Firewalling the network.
History of NOC:
The early Version of NOC have been around since the 1960’s a network control center was opened in New York by AT&T that used status boards to display switch and route information in real-time from the most important toll switches and this center developed till they got the current NOC facility concept.
At **2008** the internal network division in I.C.T center established the installation process of central UOT network infrastructure. It’s main purposes was providing 24/7 high speed internet & intranet services to all university’s formations.

Since that time the internal network division played an Internet Service Provider (ISP) role for the university of technology. And it became responsible for configuring, maintaining, monitoring and upgrading the network to provide high performance network and high quality services. The UOT network started with **4Mb** internet bandwidth and increased till it’s get to **45Mb** internet bandwidth currently.
The UOT network infrastructure is Mikrotik based and it’s depend mainly on Mikrotik O.S. for network configurations & monitoring.
The university of technology has a huge network infrastructure that provide many network services to a large number of beneficiaries such as:

- Providing internet & intranet service for all university’s departments, centers and other university’s formations 30 wireless network nodes distributed around the university, the total lines number are 641 wired internet connection line.
- Providing internet & intranet services for university’s professors and lecturers) the total lines number 565 wireless (Wi-Fi) internet connection lines.
- Providing internet & intranet service for Students Dormitories 10 wireless network nodes, the total lines number are 300 wired & wireless internet connection lines.
Providing internet & intranet services for university’s employees and lecturers on range of 3 KM the total lines number are **144** wireless internet connection lines.
Providing internet & intranet services for university’s arenas, 11 Hot zone's distributed around the university’s arenas with capacity of 254 wireless internet line.
As a result of continuous expansion of the university’s Network infrastructure and the continuous increase in the number of beneficiaries of the services provided by the network it’s become essential to provide our network with NOC that responsible of monitoring the university’s networks for fault that require special attention to maintain it immediately without degrading services provided to the clients.
UOT’s NOC

A UOT NOC include many servers that capable of monitoring the whole network infrastructure in our university as a part of providing services that offer full range of network fault and performance monitoring features with connection services for transport data network elements inside university of technology.

UOT NOC also offer performance management services, reporting capabilities on network effectiveness and equipment’s performance based on quality of service (QoS).
UOT’s NOC Servers

UOT’s NOC mainly depend on The Dude server application for configuring servers and providing many features.

The Dude server: it is a free application by MikroTik, which can dramatically improve the way you manage your network environment. The dude provide the ability of drawing and layout a map of your networks, monitor services of your devices and execute actions based on device state changes. Not only can you monitor your devices, you can also manage them, configure them right from within the Dude interface, run network monitoring tools etc. the most important features that the Dude server can provide are:

- Status monitoring (Green colored Online, Red Colored offline).
- Sub map which gives the ability to interact with each network inside any building.
- Remote configuration ability for any router which provide variety of wireless and wired network configurations abilities.
The Dude server provide NOC server infrastructure the ability to Configure all Mikrotik Router OS. Devices remotely and it can check or configure many options such as:

- Maximum round-trip time.
- Changing channel width and frequencies of Access points & stations.
- Checking CCQ values for the stations.
- Checking wireless registration table.
- Changing Data rates for Access points and clients.
- Controlling connect list, access list.
- Controlling PPPoE server, PPPoE clients.
- Controlling Queue and bandwidth limits.
- Managing Firewall, Mangle, etc.
- Web proxy
UOT’s NOC Servers

UOT NOC include the following servers:

- **Network Site map server:**
  it is an interactive virtual network that can provide the ability of interaction between the I.T. Engineers and the UOT network. This server configured to have 3 main sites. **University Site**, **Dormitories Site** and **Access Point site**.
Network Site Map Server

I. **University Site:** Include all university’s departments, centers and other formations inside the university
II. Dormitories Site: Include all university’s students Dormitories, 10 wireless network nodes distributed among the Student Dormitories buildings.
III. Access Points Site: Include all wireless transmitting access points such as all departments PTP access points, all dormitories PTP access points and all Homes access points.
Network Site Map Server

The sitemap server is connected to a projector and a smart board to increase the interaction between the responsible I.T. engineer & virtual network environment which increase the network infrastructure understanding and make it easy to access & configure.
Network Site Map Server Interaction
Gateway Server

Gateway Server: is a rack mounted map layout that provide remote monitoring and configuring all UOT’S main routers that have a public IP addresses through using its virtual environment.
Gateway Server

This video shows remote real-time interaction with the network
Departments Server

- **Departments Server**: is a rack mounted map layout that provide remote monitoring and configuring of all departments point to point access points and all university’s formations stations through using it’s virtual environment. This server check the departments wireless network performance depending on UOT network QoS values. It’s help to immediately maintain any fault or degrade in provided service With this server you can configure routers remotely.
Departments Server

This video shows remote real-time interaction with the network
Departments Wi Fi Server:

- **Departments Wi Fi Server**: it is a rack mounted map layout that provide remote monitoring and configuring of all departments Wi Fi access points inside all university’s building using it’s virtual environment. This server check the departments Wi Fi network performance depending on UOT network QoS values. It’s help to immediately maintain any fault or degrade in provided service With this server you can configure routers remotely.
Departments Wi-Fi Server

This video shows remote real-time interaction with the network.
Dormitories Server: it is a rack mounted map layout that provide remote monitoring and configuring of all Dormitories point to point access points and Dormitories stations using it’s virtual environment. This server check the Dormitories network performance depending on UOT network QoS values. It’s help to immediately maintain any fault or degrade in provided service With this server you can configure routers remotely.
Dormitories Server

This video shows remote real-time interaction with the network
Homes Server:

Homes Server: it is a rack mounted map layout that provide remote monitoring and configuring of all Homes access points through using it’s virtual environment. This server check the Homes network performance depending on UOT network QoS values. It’s help to immediately maintain any fault or degrade in provided service. With this server you can configure routers remotely.
Recommendations & Suggestions

- Providing the NOC with 20 KVA UPS to provide continuous electricity power 24/7 and prevent power failure.

- Providing the NOC with touch screens and interactive tools to increase the interaction between the I.T. engineer and the virtual network.

- Providing the NOC with high performance workstation to provide stable network monitoring efficiently.

- Including the NOC as a part of e-campus project.

- Upgrading the NOC to Monitor and configure VOIP, Video Teleconferencing, FTP and IP Camera services.

- Upgrading the NOC to be run on smart devices to make it more easy to monitor and configure network remotely.
Finally
Thank You for your time