

# Hardware and Network Servicing

## Level-III

Based on Nov, 2023, Curriculum Version - II



**Module Title: Identifying and Resolve Network Problems**

**Module code: EIS HNS3 M05 1123**

**Nominal duration: 30Hour**

Page 3 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

# Prepared by: Ministry of Labour and Skill

November 2023

Addis Ababa, Ethiopia

## Table Contents

Acronym .....	<b>Error! Bookmark not defined.</b>
Introduction to the Module.....	<b>Error! Bookmark not defined.</b>
Unit One: Implementing Network Monitoring .....	<b>6</b>
1.1. Setting up log to monitor network activity .....	<b>7</b>
1.2. Using network tools .....	<b>8</b>
1.3. Reviewing documents and logs .....	<b>11</b>
1.4. Making recommendations for improving network performance.....	<b>12</b>
Self-check 1 .....	<b>14</b>
Unit Two: Troubleshooting Network Problems .....	<b>15</b>
2.1. Addressing help desk and other support services .....	<b>16</b>
2.2. Using network tool, network topology and protocols .....	<b>18</b>
2.3. Identifying and solve network problems .....	<b>21</b>
2.4. Providing timely advice for users and clients .....	<b>22</b>
2.5. Completing support documentation .....	<b>23</b>
Self – Check 2 .....	<b>24</b>
Unit Three: Carry Out Maintenance Support .....	<b>25</b>
3.1. Conducting diagnostic tests .....	<b>26</b>
3.2. Completing maintenance .....	<b>28</b>
3.3. Storing or disposing components .....	<b>29</b>
Self-Check 3 .....	<b>31</b>
Operation Sheet 3.1 .....	<b>32</b>
LAP Test.....	<b>35</b>

References ..... **Error! Bookmark not defined.**  
 Reference Books..... **Error! Bookmark not defined.**  
 Developer’s Profile..... **Error! Bookmark not defined.**

Page 5 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## Unit One: Implementing Network Monitoring

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Setting up log for Network Activities
- Using network tools
- Reviewing documents and logs
- Making recommendations for improving network performance

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Set up log for Network Activities
- Use network tools
- Review documents and logs
- Make recommendations for improving network performance

Page 6 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## 1.1. Setting up log to monitor network activity

- Network monitoring refers to the practice of overseeing the operation of a computer network using specialized management software tools.
- Network monitoring systems are used to ensure availability and overall performance of computers (hosts) and network services.
- A network monitoring system is capable of detecting and reporting failures of devices or connections. It normally measures the processor (CPU) utilization of hosts, the network bandwidth utilization of links, and other aspects of operation.

### 1.1.1. Monitoring network activities

- Monitoring network activity is a vital task for any IT professional who wants to ensure the performance, security, and reliability of their network.
- Network activity refers to the traffic, events, and status of the devices and connections that make up a network.
- By monitoring network activity, you can identify and troubleshoot issues, optimize resources, detect anomalies, and prevent threats.

### 1.1.2. Producing a management information base (MIB)

- A Management Information Base (MIB) is a collection of manageable network objects.
- These objects are a logical representation of physical networking components that are SNMP-enabled (such as computers, hubs, routers, switches, and networking software).
- MIBs contain information about the configuration of these networking components, such as the version of the software running on the component, the IP address or port number, and the amount of available disk space for storage.
- MIBs function as a kind of directory containing the logical names of the network resources and their configuration parameters that are managed by SNMP.

Page 7 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## 1.2. Using network tools

### 1.2.1. Network Monitoring Tools

- The first step to monitor network activity is to select the right tools for your needs and goals.
- There are various types of network monitoring tools available, each with distinct features and functions. Some network monitors tools are including:
  - **Network analyzers or sniffers**, for example, allow you to capture and decode packets that travel across the network. This enables you to inspect data and protocols in detail, diagnose problems, analyze performance, and audit security.
  - **Network mappers or scanners** can be used to create a visual representation of your network topology, inventory your assets, and detect unauthorized or vulnerable devices.
  - **Network performance monitors or testers** measure and report speed, latency, bandwidth, and availability of the network and its components.

Finally, network security monitors or detectors monitor and alert of any suspicious or malicious activity on the network, such as intrusions, attacks, or breaches. This helps protect your network from threats, enforce policies, and comply with regulations.

### 1.2.2. Benchmarking and Establishing reference point for network performance

- As organizations come to rely more on network performance for daily business functions, it's essential to know how well your network is performing.
- A simple network test or ping test can tell you what your upload and download speed is at a given moment. However, without a baseline or benchmark to compare it to, you won't know whether it's faster or slower than usual.
- Your network benchmark is the standard against which other network speed tests can be measured.
- Benchmarking is a crucial part of network performance testing because it tells you what "normal" is or should be. For example, a network benchmark gives you a

Page 8 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

point of comparison to the test results you get as you're troubleshooting a network issue.

### how do you find your benchmark?

- A benchmark should indicate the norm, so benchmark testing should be done under normal conditions.
- This is most likely when employees are working and using the network as part of their day-to-day activities.
- You may also want to consider running benchmark testing during peak hours and during off-peak hours to see the impact of high usage on the network. or, do the testing at the same time throughout the week to get a true average.

There are several ways to measure network performance; they include:

- Network Availability Testing
- Network Speed Testing
- Bandwidth Usage Testing

By performing the following kinds of network performance testing, you can find your network performance benchmark.

- **Network Availability Testing**

Network availability testing may be as simple as running a ping test that requests responses from your network devices to ensure that everything is connected and operational.

Availability testing should be part of your network monitoring tools, or if you're looking for a free option, WireShark and NTOP offer free downloads.

- **Network Speed Testing**

A network speed test will check the network upload and download speeds. This is done by sending and receiving data and measuring the rate of transmission. A speed test may also look for throughput and packet loss.

There are several free network speed tests available online. If you want a tool that looks for packet loss, *Paessler* offers a free download of their packet loss tool.

- **Bandwidth Usage Testing**

- By configuring the network, you may have identified how much bandwidth can be used at once.
- Determining bandwidth allocation can show you whether resources are being used effectively, which may impact Quality of Service (QoS).

There are many tools available to help you measure and optimize bandwidth usage. CompariTech put together a great list of bandwidth optimization tools, some of which offer free downloads or trials:

- SolarWinds Tools
- SolarWinds Engineer’s Toolset
- Paessler PRTG
- ManageEngine Tools
- ManageEngine OpManager Plus
- Ipswitch WhatsUp Gold

- **Documenting Your Network Benchmark**

Once you’ve completed your network testing and have identified your network benchmark, make sure it’s documented and easy to find.

Your network benchmark should be used as a guide to help identify network slowdowns or troubleshoot network issues, but if it’s not documented somewhere, it won’t be beneficial.

Page 10 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023



### 1.3. Reviewing documents and logs

- Remember that just collecting the logs is not enough. You need to periodically review logs for unusual behavior, which can come from a combination of automatic and manual efforts.
- Your logging/alerting/correlation system, for example, can be configured as a first-level triage for alerting on unusual behavior. But don't rely on tools to be the be-all, end-all of your log review.
- You should configure log summary reports that are automatically emailed periodically and then assign resources to review them monthly.
- During the manual review, you can ensure the endpoints you are collecting logs from match up with what is in your inventory and configure any new endpoints to generate logs as needed.
- You can also figure out if one or more log sources are failing collection for any reason, and/or if log disk space for the next month will be sufficient.
- It's also a good idea to schedule regular simulations of events to make sure the proper logs are generated. For instance, you could create a test account on the network, adjust its rights and permissions, and then log into it with the wrong password enough times to force a lockout. Ensure that logs were generated for each of these key events, and give you enough information to answer the questions above.

Page 11 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## 1.4. Making recommendations for improving network performance

Network performance can be boosted in several ways, both major and minor; depending on your company's needs, you'll want to focus on improving specific aspects of network performance. Below, seven ways listed that any company can enhance the performance of its networks.

- **Eliminate performance bottlenecks**

Bottlenecks are some of the most common network performance problems that businesses encounter. Even if one device is lagging behind the others, it can cause a wave of slow performance that reaches several areas of the network.

- **Reconfigure your network hardware**

Whenever you install or update a device onto your network, your company needs to ensure that it configures the device correctly.

- **Communicate with your users on proper network usage**

Your employees could be draining network performance without even realizing it. If your employees are using bandwidth-heavy applications, streaming video or music, or downloading several large files via your network, there'll be much less traffic available for critical business tasks.

- **Focus on problematic metrics**

The specific performance problems that affect your business network will vary depending on how your network is built and the tasks you need your network to perform.

- **Provide a separate guest network**

Guests that visit your enterprise will want to access the Internet, but they can use valuable bandwidth that your company could be using elsewhere. Ideally, your company will deploy a separate network for guests to access so they can connect to the web while your business resources are kept separate.

- **Compress data and network traffic**

Companies are transmitting large quantities of data across their network every day, and the amount of work a network needs to do to get that data where it needs to go increases alongside it.

Page 12 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

- **Ensure quality of service (QoS) is working**

Quality of service (QoS) ensures that high-performance applications and services have enough resources to operate properly. Your network should reserve bandwidth for critical business applications for when they need them, allowing you to prioritize important tasks even when your network performance dips down.

Page 13 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## Self-check 1

### I. Say True if the statement is Correct and False if the statement is incorrect

1. A network monitoring system is capable of detecting and reporting failures of devices or connections.
2. The first step to monitor network activity is to select the right tools for your needs and goals.
3. After we finished network testing and have identified your network benchmark, documentation is not required
4. A Management Information Base (MIB) is a collection of manageable network objects.

### II. Choose the correct answer

1. Among the following which one is not networking monitors tool?
  - A. Network analysers or sniffers
  - B. Network mappers or scanners
  - C. Network performance monitors or testers
  - D. None of the above
2. A network speed test will check:
  - A. Network upload
  - B. Download speeds.
  - C. Network Configuration
  - D. A and B
3. Network security monitors or detectors monitor and alert of any suspicious or malicious activity on the network, such as:
  - A. Intrusions
  - B. Attacks
  - C. breaches.
  - D. All

### III. Answer the following questions accordingly

1. List the different ways to measure network performance:
2. List the tools used to measure and optimize bandwidth usage:
3. network security monitoring is helps to protect your network from:

Page 14 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## Unit Two: Troubleshooting Network Problems

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Addressing help desk and other support services
- Using network tool, network topology and protocols
- Providing timely advice for users and clients
- Completing support documentation

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Address help desk and other support services request
- Use network tool, network topology and protocols
- Provide timely advise for users and clients
- Complete support documentation

Page 15 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## 2.1. Addressing help desk and other support services

### 2.1.1. The Most Common IT Help Desk Problems and Solutions

The most common IT help desk problems typically sit in one of these areas:

- **User-Induced Problems**

The inability to login to a device or application or accidentally deleting files on the hard drive, end user-induced problems are frequently occurring IT help desk issues.

In most of these situations, the root cause is usually:

- the lack of end-user training for using the device or application in question.
- It could also be a lack of internal processes, such as the lack of policy for governing the use of the applications and devices at the office.

Because of these gaps, you will have staff who will visit websites with malware downloads in order to stream the NBA Playoffs for free, or click attachments from phishing emails.

In any case, as the number of employees at your company grows, these individual issues will eat up the time and focus of your IT help desk. In turn, it will take your help desk longer to get through these issues, which will slow your workforce and your operations.

- **Network & Shared Device Problems**

IT help desk often requests to fix the Wi-Fi, printers, and other shared or common devices in the office. A down network or printer could bottleneck your operations, so solving them is usually an urgent issue for IT help desks.

- **Application Issues**

Applications such as MS Excel, or web-based software as a service (SaaS) platform, like JIRA; users will forward error messages, login problems, and other issues to tech support as well.

Page 16 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

- **Virus Remediation**

Generally, a result of downloading malware through unapproved web browsing or from phishing emails, virus remediation is also a major task for IT help desks. In some cases, the IT team will only discover the virus after basic troubleshooting, i.e., the employee who brought the device in (complaining about computer problems) didn't know about the virus.

- **Missing Files**

It may a result of a cyber breach or an employee error (or both), IT help desks will also receive complaints about missing files.

- **Disaster Recovery**

Finally, a critical error or cyber breach could completely compromise your IT system and drive your business operations to a halt. In such situations, you'll likely call on your IT help desk for support in restoring the system, including your applications and data.

Page 17 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1 November, 2023
---------------	--	--	------------------------------

## 2.2. Using network tool, network topology and protocols

### 2.2.1. Network Troubleshooting Tools

In addition to user reports and firsthand experience on the network, there are a number of tools available for you to use when it comes to diagnosing and treating network issues. These tools may exist in the computer’s operating system itself, as standalone software applications or as hardware tools that you can use to troubleshoot a network.

- **Command-Line Tools**

On Windows PCs, the command prompt can be accessed by searching for it in the start menu or by typing “cmd” into the Run window. On a Linux system, you can press Ctrl + Alt + T to open the command line.

The following commands can be entered into the command prompt one at a time to reveal specific information about the network status:

- **ping** — A TCP/IP utility that transmits a datagram to another host, specified in the command. If the network is functioning properly, the receiving host returns the datagram.
- **tracert/traceroute** — A TCP/IP utility that determines the route data takes to get to a particular destination. This tool can help you to determine where you are losing packets in the network, helping to identify problems.
- **nslookup** — A DNS utility that displays the IP address of a hostname or vice versa. This tool is useful for identifying problems involving DNS name resolution.
- **ipconfig** — A Windows TCP/IP utility that verifies network settings and connections. It can tell you a host’s IP address, subnet mask and default gateway, alongside other important network information.
- **ifconfig** — A Linux or UNIX TCP/IP utility that displays the current network interface configuration and enables you to assign an IP address to a network interface. Like ipconfig on Windows, this command will tell you vital information about the network and its status.

Page 18 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023



- **iptables** — A Linux firewall program that protects a network. You can use this tool if you suspect that your firewall may be too restrictive or too lenient.
- **netstat** — A utility that shows the status of each active network connection. This tool is useful for finding out what services are running on a particular system.
- **tcpdump** — A utility that is used to obtain packet information from a query string sent to the network interface. It's available for free on Linux but can be downloaded as a command for Windows.
- **pathping** — A TCP/IP command that provides information about latency and packet loss on a network. It can help you troubleshoot issues related to network packet loss.
- **nmap** — A utility that can scan the entire network for various ports and the services that are running on them. You can use it to monitor remote network connections and get specific information about the network.
- **route** — A command that enables manual updating of the routing table. It can be used to troubleshoot static routing problems in a network.
- **arp** — A utility that supports the Address Resolution Protocol (ARP) service of the TCP/IP protocol suite. It lets the network admin view the ARP cache and add or delete cache entries. It can be used to address problems having to do with specific connections between a workstation and a host.
- **dig** — A Linux or UNIX command-line tool that will display name server information. It can be used to troubleshoot problems in DNS name resolution.

Page 19 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

- **Network Troubleshooting Applications**

In addition to command-line tools, there are also a number of standalone applications that can be used to determine the status of a network and to troubleshoot issues. Some of these applications may be included in the system that you are working with, while others may need to be installed separately.

- **Packet Sniffer** — Provides a comprehensive view of a given network. You can use this application to analyse traffic on the network, figure out which ports are open and identify network vulnerabilities.
- **Port Scanner** — Looks for open ports on the target device and gathers information, including whether the port is open or closed, what services are running on a given port and information about the operating system on that machine. This application can be used to figure out which ports are in use and identify points in a network that could be vulnerable to outside attacks.
- **Protocol Analyzer** — Integrates diagnostic and reporting capabilities to provide a comprehensive view of an organization's network. You can use analyzers to troubleshoot network problems and detect intrusions into your network.
- **Wi-Fi Analyzer** — Detects devices and points of interference in a Wi-Fi signal. This tool can help you to troubleshoot issues in network connectivity over a wireless network.
- **Bandwidth Speed Tester** — Tests the bandwidth and latency of a user's internet connection. This application is typically accessed through a third-party website and can be used to confirm user reports about slow connections or download speeds.

Page 20 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1 November, 2023
---------------	--	--	------------------------------

### 2.3. Identifying and solve network problems

There are many problems that can affect network performance, and some of them are very complex to identify and understand.

Intermittent network issues frustrate users, affect business productivity, and are a nightmare for all IT administrators because they are the most difficult to solve.

#### Diagnosing the Most Common Network Issues

Navigating the intricate realm of networking involves mastering the art of diagnosing and resolving a variety of challenges that can disrupt the seamless flow of data and communication.

Network performance issues related to resource issues can mean different things, from equipment problems to high CPU usage. Let's break down some of the most common resource issues:

- **Network Equipment & Devices:** Sometimes, network issues occur within network equipment or devices like Firewalls, Routers, Switches, Wi-Fi APs. Problems can be due to bad configurations, faulty connections, and even packet loss. Obkio's network device monitoring solution easily monitors any SNMP-enabled network devices to ensure performance and diagnose network issues affecting network devices.
- **High CPU Usage:** The most common cause of high CPU usage is when your network becomes bogged down by enormous amounts of traffic. CPU usage can increase drastically when processes require more time to execute or when a larger number of network packets are sent and received throughout your network. High CPU usage can bog down your network, or leave not enough CPU for other processes.

Page 21 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

- **High Bandwidth Usage:** When someone or something on your network begins monopolizing bandwidth by downloading gigabytes worth of data, possibly by video, it creates a congestion in your network. Network congestion due to high bandwidth usage leaves not enough bandwidth for other parts of your network — which is when you can start experiencing problems like slow download speed over the internet.

## 2.4. Providing timely advice for users and clients

Providing accurate and timely information to customers is a key skill for any support role. It can help you build trust, loyalty, and satisfaction among your clients, as well as improve your own efficiency and productivity. To do this;

- **Use the right tools and resources**

One of the first steps to provide accurate and timely information to customers is to use the right tools and resources for your support role. This can include software platforms, knowledge bases, FAQs, manuals, guides, and other sources of information that can help you find the answers to customer queries quickly and reliably.

- **Communicate clearly and empathetically**

Another important aspect of providing accurate and timely information to customers is to communicate clearly and empathetically. This means using simple and concise language, avoiding jargon and technical terms, and confirming that the customer understands your message.

- **Follow up and ask for feedback**

A final way to provide accurate and timely information to customers is to follow up and ask for feedback. This means checking in with the customer after you have provided them with the information they requested, to see if they have any questions, concerns, or issues.

Page 22 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## 2.5. Completing support documentation

The importance of support documentation becomes very clear when you have to sit down and troubleshoot a network from top to bottom. Or when there's a changing of the guard at your company. New management wants to see what you're doing with your network. Or new IT staff need to be brought up to speed quickly.

Page 23 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## Self – Check 2

### I. Say True if the statement is Correct and False if the statement is incorrect

1. A down network or printer could bottleneck your operations, so solving them is usually an urgent issue for IT help desks.
2. Packet Sniffer Provides a comprehensive view of a given network.
3. Protocol analyzer Looks for open ports on the target device and gathers information,

### II. Choose the correct answer

1. \_\_\_\_\_ Detects devices and points of interference in a Wi-Fi signal.
  - A. Protocol Analyzer
  - B. Wi-Fi Analyzer
  - C. Bandwidth Speed Tester
2. \_\_\_\_\_ may a result of a cyber breach or an employee error or both.
  - A. Missing Files
  - B. Network Troubleshooting
  - C. Bandwidth Speed Tester

### III. Explain the following Terms accordingly

1. ping
2. tracert/traceroute
3. nslookup
4. ipconfig

Page 24 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

### Unit Three: Carry Out Maintenance Support

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Conducting diagnostic tests
- Completing maintenance
- Storing or disposing components

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Conduct diagnostic tests
- Complete maintenance
- Store or dispose components

Page 25 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

### 3.1. Conducting diagnostic tests

- **Diagnosing network problems**

- In cases of application failure, slow system response, the potential cause might be a network problem.
- It might be difficult to determine that the cause of these issues is a network problem because the symptoms might manifest on one node when they are caused by a failure or error on another node.
- It might also be difficult to isolate the cause of the network problem to a specific hardware component or configuration setting.

The potential source of a network problem can be classified into one of three main categories:

- Hardware failure
- Configuration error
- Traffic overload

A general diagnostic method can be used to determine the potential source of a network problem:

- Check for connectivity between all IP addresses in the network using the **ping** command.
- If there are IP addresses that fail the connectivity test it might be a hardware failure or configuration error that is causing the network problem.
- Check for hardware errors on the devices assigned to those IP addresses. You can use the **errpt -a** command on each node suspected of network issues to view the system error log.
- Correct the errors and perform the connectivity test again.

Page 26 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023



- If the test fails after correcting hardware errors, it might be a configuration error causing the network problem.
- Check all of the configuration settings on the failed devices and verify that they have been set correctly.
- If the connectivity test is successful, the network problem might be caused by traffic overload. To diagnose this problem, you need to perform a network performance test.



Figure 3.1. image that shows during Network Diagnosis

Page 27 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

### 3.2. Completing maintenance

Because it's so critical to supporting network performance, you should integrate maintenance into your services instead of offering it as an add-on.

Offering network maintenance services not only ensures that systems, equipment, and applications always run at peak efficiency and security, but it also can save clients time and money by:

- Supporting continuous operations and productivity
- Preventing unexpected and expensive repairs or downtime
- Ensuring cybersecurity measures are working as intended to stop and mitigate breaches and leaks

Complete coverage of all network support and maintenance tasks requires a range of expertise and skills. While there may be some overlap in responsibilities, typical key IT roles that handle maintenance include:

- **Network technician.** These professionals are typically responsible for installing, configuring, and troubleshooting network devices and hardware, as well as for checking physical connections and cables.
- **Network engineer.** Engineers tend to focus on maintaining network architecture as a whole, addressing specific aspects or devices as needed to ensure smooth operations.
- **Network administrator.** People in this role manage the complete infrastructure of a network, including maintenance. They may create or oversee maintenance checklists and schedules.

Page 28 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

### 3.3. Storing or disposing components

Whether you are upgrading your network, replacing faulty devices, or consolidating your infrastructure, you need to dispose of the obsolete equipment in a safe and responsible way.

some of the best practices for disposing of old network hardware, including data security, environmental impact, and legal compliance.

- **Data security**

One of the most important aspects of disposing of old network hardware is ensuring that the data stored on it is erased or destroyed. Network devices such as routers, switches, firewalls, and servers may contain sensitive information such as passwords, configurations, logs, and user data. If this data falls into the wrong hands, it could compromise your network security and expose you to legal risks.

- **Environmental impact**

Another aspect of disposing of old network hardware is minimizing the environmental impact. Network devices contain various materials and components that can be harmful to the environment and human health if they are not disposed of properly.

- **Legal compliance**

A third aspect of disposing of old network hardware is complying with the legal requirements and standards for data protection and waste management. Depending on your industry, location, and type of data, you may have to follow certain laws and regulations that govern how you handle and dispose of old network hardware.

- **Inventory management**

A fourth aspect of disposing of old network hardware is managing your inventory and assets. Disposing of old network hardware means that you have to update your records and documentation to reflect the changes in your network infrastructure.

- **Cost optimization**

A fifth aspect of disposing of old network hardware is optimizing your costs and budget. Disposing of old network hardware can have both positive and negative impacts on your network expenses.

Page 29 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

- **Security testing**

A final aspect of disposing of old network hardware is testing your network security and performance after the disposal. Disposing of old network hardware can affect your network functionality and reliability in various ways. It can improve your network speed, efficiency, and stability by removing outdated or faulty devices.

Page 30 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

### Self-Check 3

#### I. Say True if the statement is Correct and False if the statement is incorrect

1. One of the most important aspects of disposing of old network hardware is ensuring that the data stored on it is erased or destroyed.
2. A general diagnostic method can be used to determine the potential source of a network problem.
3. Network technicians are only responsible for Network installation.

#### II. Choose the correct answer

1. \_\_\_\_\_ are focus on maintaining network architecture as a whole.
  - A. Network Admin
  - B. Network Engineer
  - C. Network Technician
2. The best practices for disposing of old network hardware is :
  - A. Data security
  - B. Environmental impact
  - C. Legal compliance.
  - D. All

#### III. Explain the following Terms accordingly

1. Diagnosing network problems
2. Storing or disposing components
3. Inventory management

Page 31 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## Operation Sheet 3.1

### Operation Title: Diagnosing Network Problem

**Purpose:** To acquire the trainees the skill to diagnose network problems

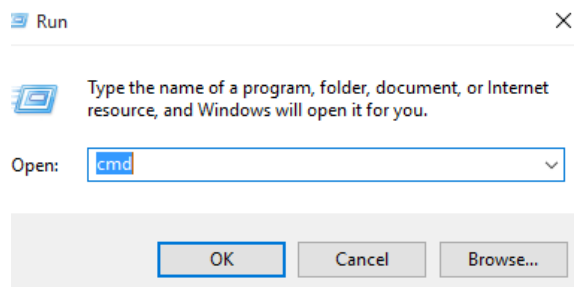
**Equipment, tools and materials required:** Computer installed with Network operating system

#### Procedures:

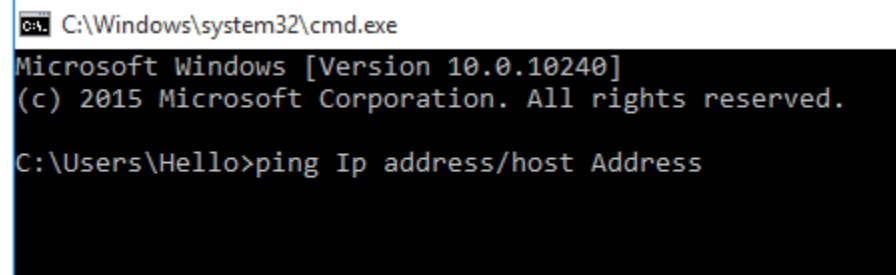
Use the following Procedures:

**Task 1.** check basic connectivity to other devices on the network Using *ping* command

Step 1. Open Command prompt



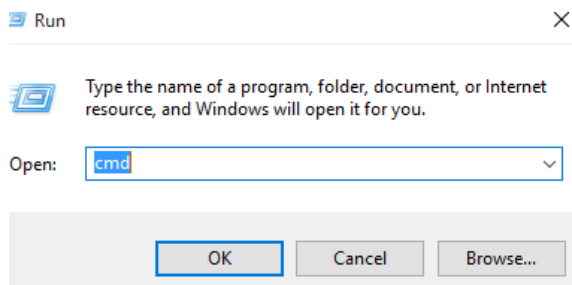
Step 2. ping [IP address or hostname]



Page 32 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023

## Task 2 : Check IP Configuration

### Step 1. Open command prompt



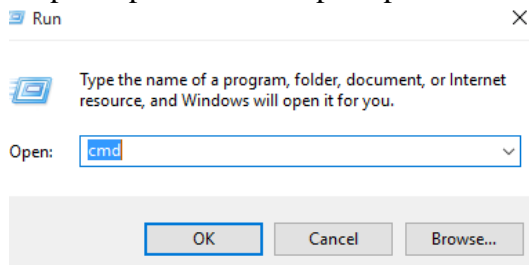
### Step 2. ipconfig /all

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\Hello>ipconfig/all
```

## Task 3. DNS Resolution

### Step 1. Open command prompt



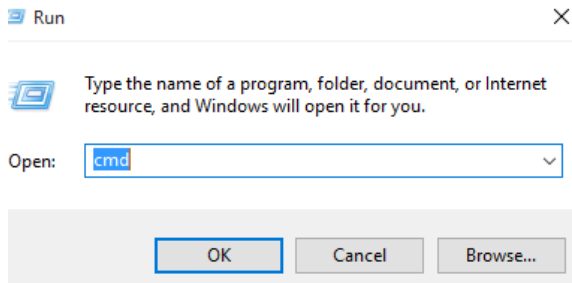
### Step 2. nslookup [domain name]

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\Hello>nslookup Domain name
```

## Task 4. Trace Route

### Step 1. Open command prompt



### Step 2. tracert [destination]

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\Hello>tracert Domain name
```



## LAP Test

### Do the Following Tasks

**Task 1:** check basic connectivity to other devices on the network

**Task 2.** Check IP Configuration

**Task 3. DNS Resolution**

**Task 4. Trace Route**

Page 35 of 33	Ministry of Labor and Skills Author/Copyright	Hard Ware and Network Servicing Level III	Version -1
			November, 2023