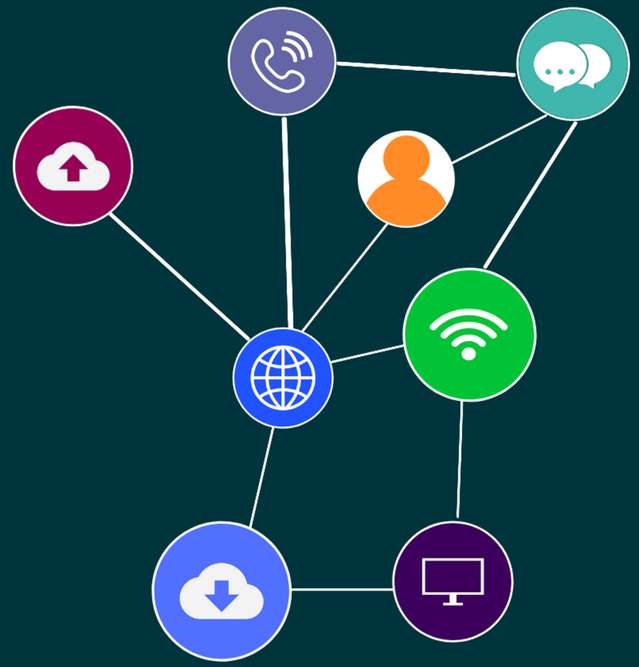
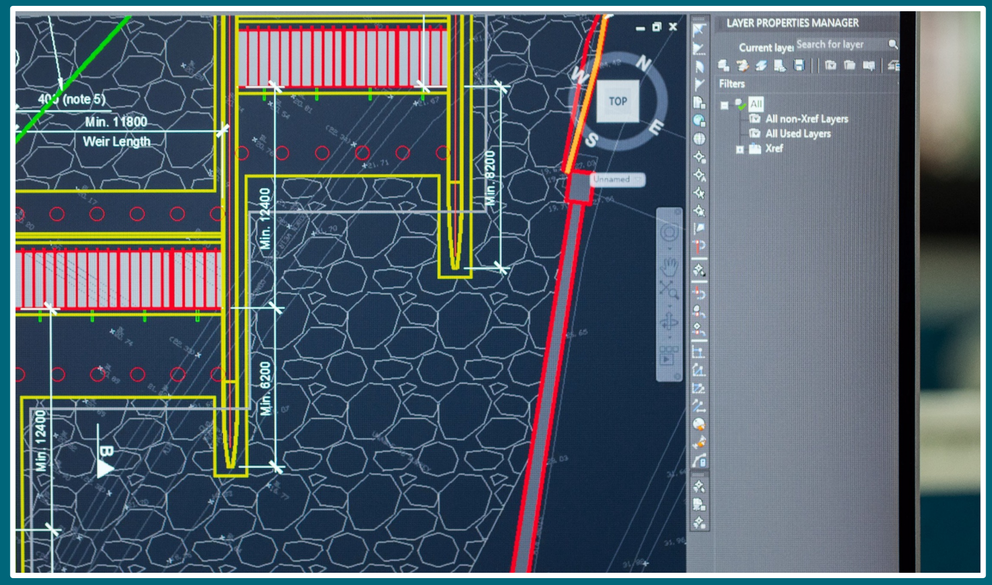
ICTNWK612

Plan and manage troubleshooting advanced integrated IP networks



MILESTONES
International College

Topic 1: Strategies to troubleshoot and monitor advanced integrated IP networks



ACTIVITY: BRAINSTORM

Threats and risks that can occur if an integrated network is not continually tested and monitored.

Your trainer/assessor will facilitate a discussion.

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INTRODUCTION

Integrated IP networks can include:

- Data
- Voice
- Video

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IP NETWORK TOPOLOGIES, ARCHITECTURES, AND ELEMENTS

- Understanding networks is important to manage network performance.
- There are many types of networks such as LAN, WAN and the Internet.
- The type of network used by a business will depend on the type and size of the business, as well as how data is used.

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ACTIVITY: READ

- Read about types of networks and topologies.
- Read more on network architecture.
- Read the article explaining the TCP/IP model, layers and protocols used in networking.

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ACTIVITY: WATCH

Watch the following video explaining mesh networks.

Video: https://www.youtube.com/watch?v=8UZlwhiWKmA (01:38)

Write down any key takeaways.

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NETWORKING STANDARDS AND PROTOCOLS

Network standards that are related to security for applications include the different layers in the Open System Interconnect (OSI) model it defines a networking framework to implement protocols in seven layers.

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ACTIVITY: READ

IBM has produced documentation listing common networking standards relating to both LAN, WAN and VPN networks.

Website: https://www.ibm.com/docs/en/i/7.3?topic=communications-common-networking-standards

Website: https://www.ibm.com/docs/en/i/7.3?topic=networking-concepts

Read more about the OSI model.

Website: https://www.imperva.com/learn/application-security/osi-model/

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ADVANCED NETWORK SOLUTIONS

The network solutions chosen for an organisation should be of high performance and scalable.

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OPERATING SYSTEMS

- You may be working with several different operating systems during your working life.
- Each operating system will have its own associated hardware and software used in integrated networking systems, as well as tools, configurations, protocols and networking performance tools.

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ACTIVITY: DEVELOP

For this first activity, provide some background on the network infrastructure that you will be using. Include any available network diagrams, maps and information provided by your trainer/assessor.

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OPTIMISING PERFORMANCE AND RELIABILITY

To optimise the performance and reliability of an IP network, you can develop a plan to monitor and manage the network.

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ACTIVITY: READ

Read more about the importance of network management here:

https://blog.gigamon.com/2019/03/21/what-is-network-management/

Make notes for future reference.

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OPTIMISING PERFORMANCE AND RELIABILITY

An important part of network management is performance management and fault analysis. This is usually carried out by network monitoring software included as part a network management system.

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NETWORK SEGMENTS

- Network segmentation is the approach used to divide a network into multiple subnets (sub networks, each acting as its own smaller network).
- When you segment the network, you can better prevent unauthorised users and protect critical assets.

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ACTIVITY: READ

Read more on network segmentation:

https://www.varonis.com/blog/network-segmentation/

Implementing network segmentation:

https://hitinfrastructure.com/features/how-network-segregation-and-segmentation-can-stop-ransomware-attacks

Read some best practices to improve security.

Website: https://www.spamtitan.com/web-filtering/network-segmentation-best-practices/

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TESTING SEQUENCES AND SCENARIOS

It is important to plan for testing, including testing sequences and scenarios to address changes in the network, security issues, emergencies impacting business operations, a planned expansion, or possible situations that could occur.

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NETWORKING TESTING AND MONITORING TOOLS

“Network performance monitoring is the process of visualising, monitoring, optimising, troubleshooting and reporting on the health and availability of your network as experienced by your users.”

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ACTIVITY: READ

Review the following IP monitoring tools.

Website: https://solutionsreview.com/network-monitoring/the-8-best-ip-monitoring-tools-for-enterprises-and-it-teams/

Take any notes to summarise what you have read and keep for future reference.

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NETWORKING TESTING AND MONITORING TOOLS

Network testing tools can also be used to understand the state of the network, ensure that any changes to configurations are correct, detect any attacks and can add toward an overall quality user experience.

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ACTIVITY: READ

Review the following network latency testing tools.

Website: https://www.tek-tools.com/network/top-network-latency-testing-tools

The following website provides a list of network testing tools.

Website: https://www.manageengine.com/network-monitoring/network-testing-tools.html

Read about expert IP test tools from a software provider.

Website: https://www.exfo.com/en/products/expert-ip-test-tools/

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ACTIVITY: DEVELOP

Review the following sites, evaluating different software tools.

Monitoring: https://www.comparitech.com/net-admin/network-monitoring-tools/

Testing: https://www.guru99.com/best-network-testing-tools.html

Compare two software tools that can be used for monitoring and testing.

Provide a brief summary of each, a few important specs and a link to the source of information.

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ACTIVITY: DEVELOP

List down what needs to be monitored and tested for the network to optimise its performance and reliability.

How can you segment the network?

What testing sequences and scenarios could you use?

Include this information in your portfolio document.

Topic 1: Strategies to troubleshoot and monitor advanced integrated IP networks

Topic 2: Troubleshooting strategies

ACTIVITY: READ AND DISCUSS

Review networking monitoring in the following article.

Website: https://www.cisco.com/c/en_au/solutions/automation/what-is-network-monitoring.html#~benefits

Note down the main benefits.

What are mission critical applications?

Topic 2: Troubleshooting strategies

STRATEGIES FOR NETWORK MONITORING STRUCTURE

We have talked about monitoring and managing the IP network, but you need to implement strategies for the network monitoring structure to be effective.

Topic 2: Troubleshooting strategies

ACTIVITY: RESEARCH AND DISCUSS

Research best practices, tools and techniques used for a network monitoring strategy.

Write these down in a professionally structured and presented document.

Discuss with your trainer/assessor and submit for further feedback.

Topic 2: Troubleshooting strategies

INTERNETWORK OPERATING SYSTEM (IOS) DEVICE MAINTENANCE PLAN

An internetwork is a collection of individual networks, connected by devices, to function as a singular larger network.

Topic 2: Troubleshooting strategies

ACTIVITY: WATCH

Watch this short video explaining the Cisco Internetwork Operating System.

Video: https://www.youtube.com/watch?v=NBuVNzbFqW4 (03:02)

Write down any key takeaways.

Topic 2: Troubleshooting strategies

INTERNETWORK OPERATING SYSTEM (IOS) DEVICE MAINTENANCE PLAN

The routers typically run in three operating environments:

- ROM monitor
- Boot ROM
- Cisco IOS.

A maintenance plan should cover tasks that are going to support keeping systems running effectively.

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ACTIVITY: READ

Read more on CISCO’s Internetwork Operating System (Cisco IOS).

Website: https://www.cisco.com/c/en/us/support/docs/ios-nx-os-software/ios-software-releases-110/13178-15.html

Read the following article on further information on routing protocols.

Website: https://www.guru99.com/routing-protocol-types.html

The following website provides information on router operation and routing.

Website: https://www.cloudflare.com/en-au/learning/network-layer/what-is-routing/

Topic 2: Troubleshooting strategies

ACTIVITY: DEVELOP

Produce a routine internetwork operating system (IOS) device maintenance plan for one device.

List the routing protocols and router configurations for one device.

Include this information in your portfolio document.

Topic 2: Troubleshooting strategies

ISOLATING SUB-OPTIMAL INTERNETWORK OPERATIONS

The OSI model can be used to troubleshoot and isolate internetwork operations that are performing at a sub-optimal level.

Topic 2: Troubleshooting strategies

ACTIVITY: READ

The following overview provides some background information on internetworking technology, the Open Systems Interconnection (OSI) model and its protocols.

Website: https://userpages.uni-koblenz.de/~ros/Rechnerorganisation/internetworking.pdf

Take any notes to summarise what you have read and keep for future reference.

Topic 2: Troubleshooting strategies

PLANNING FOR MISSION CRITICAL APPLICATIONS

Mission-critical applications are those which are essential for an organisation, if they fail, or are interrupted it could be detrimental as business operations can be significantly impacted.

Topic 2: Troubleshooting strategies

ACTIVITY: DEVELOP

- List the mission critical applications.
- Produce an outline plan that could be used for troubleshooting and monitoring security issues related to one IOS service for related mission critical applications.

Include this information in your portfolio document.

Topic 2: Troubleshooting strategies

INTERNET PROTOCOL VERSION 6 (IPV6) AND VERSION 4 (IPV4) INTEROPERABILITY

The two versions of internet protocols commonly used today are Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6).

Topic 2: Troubleshooting strategies

ACTIVITY: READ

Read the websites for further information on troubleshooting and monitoring IPv6 and IPv4.

Topic 2: Troubleshooting strategies

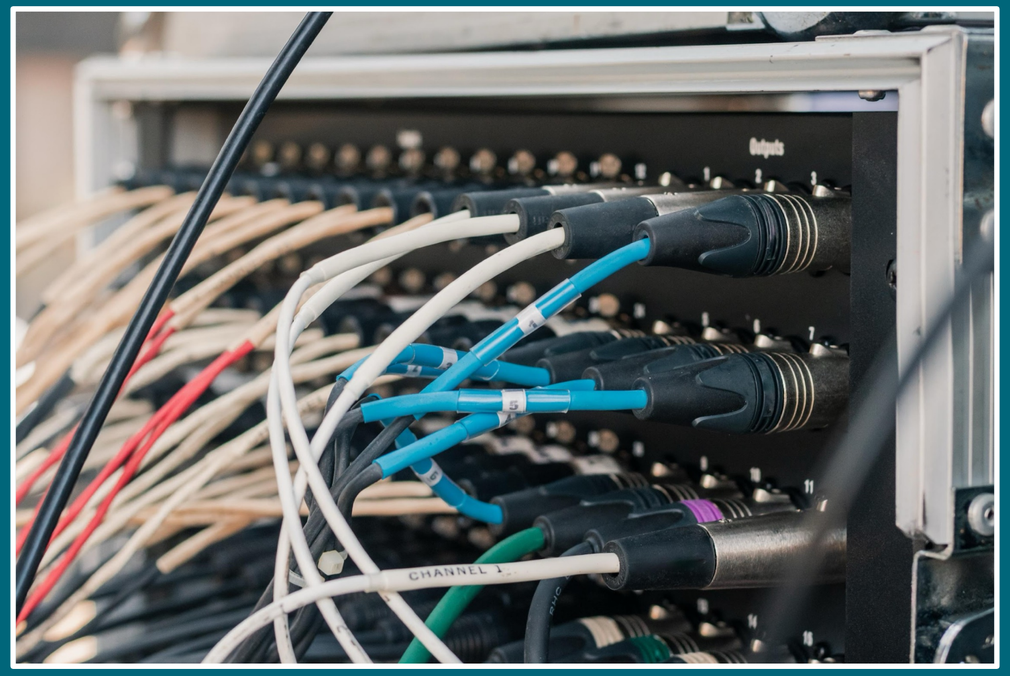
ACTIVITY: DEVELOP

Outline a plan that could be used for troubleshooting and monitoring internet protocol version 6 (IPv6) and version 4 (IPv4) interoperability.

Include this information in your portfolio document.

Topic 2: Troubleshooting strategies

Topic 3: Testing



ACTIVITY: BRAINSTORM

List all areas of a network that you would need to test for performance and reliability.

Your trainer/assessor will facilitate a discussion.

Topic 3: Testing

TESTING VLAN SOLUTIONS

In today’s current technological climate, virtualisation is a common approach to lowering costs, creating more optimised solutions, moving to more sustainable practices, increasing efficiency and productivity, managing cybercrime and is a platform for using cloud services.

Topic 3: Testing

ACTIVITY: DEVELOP

Firstly, read more about VLAN technologies.

Website: https://planetechusa.com/vlan-technology/

Draw a diagram to represent a VLAN segment, include different device connections.

Check with your trainer/assessor, what VLAN technologies are used at the college you are studying?

Topic 3: Testing

ACTIVITY: READ

- The provided article provides an explanation of switch-to-switch connectivity.
- The provided article discusses configuring, verifying and troubleshooting a VLAN for Cisco.
- The provided is an example of loop prevention for VLAN based solution.

Topic 3: Testing

TESTING PRIVATE VLANS

Otherwise known as port isolation, private VLANs segments a VLAN domain into two or more subdomains. Each is defined by a primary and secondary VLAN.

Topic 3: Testing

ACTIVITY: READ

Read more on private VLANS from Cisco.

Website: https://www.cisco.com/en/US/docs/general/Test/dwerblo/broken_guide/pvlans.html#wp1134140

The following article provides a good overview of configuring private VLANS.

Website: https://packetlife.net/blog/2010/aug/30/basic-private-vlan-configuration/

Topic 3: Testing

TEST SWITCH VIRTUAL INTERFACES (SVI)

A switch virtual interface (SVI) is the logical interface that is configured on a layer 3 switch; where SVI has no physical interface, providing layer 3 processing of packets from all switch ports associated with the VLAN.

Topic 3: Testing

ACTIVITY: WATCH

Watch the following video on switch virtual interfaces.

Video: https://www.youtube.com/watch?v=eWtwsX9AS6w (01:38)

Take down any key takeaways.

Topic 3: Testing

TEST SWITCH SUPPORT OF ADVANCED SERVICES

It is important that you test switch support of advanced services such as for video, VoIP or wireless connection.

Topic 3: Testing

ACTIVITY: READ

This article explains traceroute for response delays and loops presented across switched nodes.

Website: https://www.thousandeyes.com/learning/glossary/traceroute

Here is a simple guide to troubleshooting common VoIP connection issues.

Website: https://getvoip.com/blog/2016/10/19/troubleshooting-voip-connections/

Topic 3: Testing

TROUBLESHOOT SWITCH CONFIGURATION

It is important that you keep hold of all documented configurations when you first set up switches. If things go wrong, then you have a point of reference and at least an idea of what was done previously.

ACTIVITY: READ

Follow the Cisco troubleshooting LAN switching environments to gain further understanding of troubleshooting switch configurations.

Website: https://www.cisco.com/c/en/us/support/docs/lan-switching/ethernet/12006-chapter22.html#topic1

Write any notes on key information or to summarise what you have read. Keep the link for future reference.

Topic 3: Testing

ACTIVITY: DEVELOP

- Create a test plan.
- Write a procedure that you could use to troubleshoot switch configuration for one device.
- Seek feedback and support from your trainer/assessor.

Topic 3: Testing