ICTTEN622

Produce ICT network architecture designs

MILESTONES
International College

Topic 1: Preparing an ICT architecture design

INTRODUCTION

ICT network architecture designs are vital for an effective and network system.

An ICT network architecture design generally includes:

- A map of the network
- Details of the cabling required
- The number, type and location of all network devices
- The IP addressing structure
- Details of the network security architecture and processes

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NETWORK TECHNOLOGIES

- Access networks
- Core networks
- Network topologies
- Mobile cellular networks
- Network protocols and operating systems
- Optical networks and principles
- Radio frequency (RF) technologies and principles

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WORK DETAILS, SPECIFICATION AND SCOPE

- Full information about the client's requirements must be sourced and understood.
- This can be at a strategic and operational level.

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ACTIVITY: RESEARCH AND DISCUSS

Work in small groups and outline the desktop applications and operating system being used in your classroom or at the closest ICT lab or facility.

Discuss your findings.

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ACTIVITY: RESEARCH AND DISCUSS

An example problem statement:

The organisation has connectivity and performance issues, creating issues with production and disengaged employees.

- What further information would you need to ask the client to gain a full understanding of their requirements?

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SITE ACCESS

If you need to visit a client's site there are some requirements that you should know about. This includes knowing about legislation, standards, regulations, procedures and codes of practice.

REVIEWING SPECIFICATIONS AND REQUIREMENTS

Once the specifications and requirements have been obtained from the client then it must be reviewed to identify the type of ICT network and network specifications required.

ACTIVITY: READ

The following example for the university of York is a requirements document for project managers and contractors for IT services network infrastructure specification:

https://www.york.ac.uk/it-services/downloads/net/IT%20Services%20Network%20Infrastructure%20Specification.pdf

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

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CONSULTING WITH KEY STAKEHOLDERS

Consultation with key stakeholders to identify their requirements involves communicating the desired solution, gaining feedback and information to help with the implementation of the solution.

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ACTIVITY: READ

Top five effective communication skills for project managers.

Article: https://www.projectsmart.co.uk/communications-management/top-five-communication-skills-for-project-managers.php

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

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ASSESSMENT OF BUSINESS PROBLEMS, OPPORTUNITIES AND OBJECTIVES

The business problem provides an overview and basis for finding a solution.

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ACTIVITY: READ

Objectives should be SMART! Read this article on SMART project management.

Article: https://www.wrike.com/project-management-guide/faq/what-is-smart-in-project-management/

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

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ACTIVITY: READ

Read the article below on tools and techniques for problem solving.

Article: https://www.educational-business-articles.com/problem-solving-strategies/

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

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ACTIVITY: WATCH

Watch the video about network architecture design.

Article: https://www.youtube.com/watch?v=sckuGYiHYRA

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

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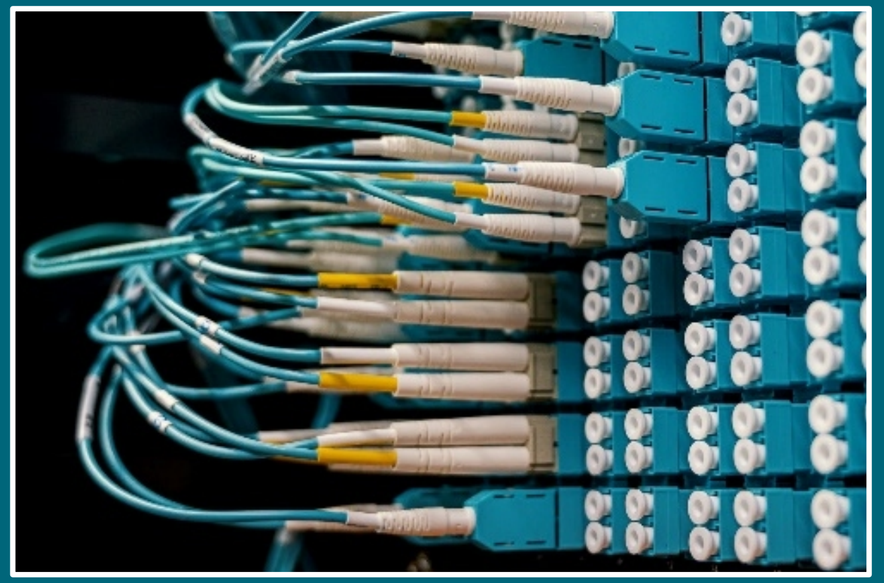
Topic 2: Producing a preliminary ICT network architecture design



TECHNICAL REQUIREMENTS ACCORDING TO SPECIFICATIONS

Once a client has confirmed that the requirements have been correctly identified and a solution has been approved, then the next step will be to ascertain the technical requirements, according to the specifications.

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SELECT SOFTWARE SOLUTIONS TO SUIT BUSINESS PLATFORM

The selected software solution will be specific to the client and would need to suit the business platform.

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ACTIVITY: READ AND DISCUSS

Read this brief definition of compatibility.

Article: https://whatis.techtarget.com/definition/compatibility

Consider why compatibility is important in terms of software solutions for a business and do some research too to find out some common approaches for resolving compatibility issues.

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DEVELOP PRELIMINARY PHYSICAL NETWORK DIAGRAMS

A physical network diagram provides a visual representation of the IT environment and can be used to make decisions for modifications upgrades or expansions as well as providing a preface for the architecture blueprint.

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ACTIVITY: RESEARCH AND DISCUSS

What is the current Local Area Network layout at your RTO's learning centre or room that you are using to study?

Discuss this as a group.

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NETWORK LAYOUT DIAGRAMS

Network diagrams can be drawn using software to provide a visual understanding and record of how the network is connected.

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ACTIVITY: READ

- Top 10 Network diagram, topology and mapping software.
- A tutorial which can be used to learn Visio.
- Creately is an editable online program that can be used to draw a diagram and then export into Viso or Word for example.

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ACTIVITY: PRACTICAL

Compare at least two different network diagram software tools that can be used to create a schematic diagram of a network. Sign up for a free trial for one of the software and review the functions and tools for creating a network diagram.

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CONFIGURATION OF IP ADDRESSES

An IP address uniquely identifies a device on an IP network and an IP addressing plan is vital to ensure there is an effective system in place for allocating, recycling, and documenting IP addresses and subnets in a network.

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ACTIVITY: PRACTICAL

Configure an IP address on an IP network. Your trainer/assessor will provide you with an activity.

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POSSIBLE IMPACTS OF THE NETWORK DESIGN ON THE BUSINESS REQUIREMENTS

Produce a document on the possible impact of the network design on the business requirements.

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ACTIVITY: WATCH

Watch the following videos about security protocols and data encryption techniques:

https://www.youtube.com/watch?v=VYRPDmBaGcA (7:58)

https://www.youtube.com/watch?v=UJiLgUtddIM (8:31)

Consider the security protocols, standards and data encryption techniques used in a small local area network such as a home office network. Make notes on your answers and discuss your findings as a group.

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ACTIVITY: GROUP WORK

Divide into small groups. Ensure you divide the work equally.

Your group is to draw a network diagram using one of the software researched.

Topic 2: Producing a preliminary ICT network architecture design

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

PREDICT FORECAST TRAFFIC DEMANDS AND IMPACTS

When planning to change any ICT infrastructure, the current and future demand requirements of the client and their business must be taken into consideration.

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

ACTIVITY: READ

The next generation functionality for the local area network.

Article: https://planetechusa.com/blog/local-area-network-lan-next-generation-functionality/

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

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

PREDICT FORECAST TRAFFIC DEMANDS AND IMPACTS

Traffic forecasting tools can be used to plan and estimate for future traffic based on the projected growth of the current measured or simulated traffic. This can help determine the impact of the new traffic on the network and plan for future demands.

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

ACTIVITY: READ

Cisco Visual Networking Index: Forecast and trends 2017-2022 White paper.

Article: https://twiki.cern.ch/twiki/pub/HEPIX/TechwatchNetwork/HtwNetworkDocuments/white-paper-c11-741490.pdf

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

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

ACTIVITY: REPORT

- Select one of the free downloads, or use the network monitoring tools available on your own computer.
- Run some tests to analyse the network traffic. Make a note of the number of users.
- Document and record your results in the form of a report with structured headings for each test and the results.
- What would happen if the number of users in the room trebled? Provide a clear explanation with examples and justified reasoning.

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BENCHMARK THE DESIGN USING EXPECTED PERFORMANCE PARAMETERS

Network performance metrics can be used to benchmark the design using expected results or parameters.

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MEASURING LATENCY

For a planned install of voice or an application that relies on real time video transmission, the current performance can predict if this would be possible or if an upgrade is required.

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ACTIVITY: READ

Measure network latency.

Article: https://au.pcmag.com/it-watch/57995/measure-your-network-latency-before-it-becomes-a-problem

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

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BANDWIDTH AND THROUGHOUT

To measure the data transferred over a network. This can be used to ascertain the amount being used and how future growth in say number of users or use of the network will be affected.

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ACTIVITY: READ

What is network throughput and how to measure and monitor it.

Article: https://www.ittsystems.com/network-throughput/

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

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UPTIME

Hardware and software metrics such as CPU utilisation, memory use, remaining hard drive space, using the network monitor to track services and software.

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

ACTIVITY: READ

Use IPconfig on your computer to look at connectivity issues:

https://docs.microsoft.com/en-us/windows-server/administration/windows-commands/ipconfig

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

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

ACTIVITY: READ

Find out more about performance parameters at:

https://solutionsreview.com/network-monitoring/network-performance-metrics-7-essential-network-metrics-to-monitor/

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

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

ACTIVITY: WATCH

Summarise the security protocols, standards and data encryption techniques used in a small local area network such as a home office network.

The trainer/assessor will facilitate a discussion about the outcomes from the research.

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

ACTIVITY: GROUP WORK

Using the website, test your own computer for packet loss.

Undertake the tasks that follow.

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REVIEW THE DESIGN'S LIKELY PERFORMANCE PROFILE

Once the predicted forecast traffic demands and impacts have been made, along with the benchmarks for expected performance parameters then these should be reviewed to provide a likely performance profile.

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

DETERMINE THE SUPPLIER COSTS

Determining the costs involved with purchasing supplier products will be dependent on a number of factors:

- The client budget.
- The current infrastructure.
- If the client specifies the vendor to be used.
- The quality of supplier products required.
- When the supplier products are needed.

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

ACTIVITY: GROUP WORK

Divide into small groups. Ensure you divide work equally.

Research at least two suppliers that could be used to purchase equipment for building a new WLAN for a client.

Undertake the tasks that follow.

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

EVALUATION ON PREDICTED PERFORMANCE AND COSTS OF THE NETWORK ARCHITECTURE DESIGN

Finally, an evaluation report should be written to outline the information gathered on the predicted performance and costs of the network architecture design.

Topic 3: Evaluating the preliminary design and likely performance using forecast demands

Topic 4: Finalising the network design and obtaining approval

REVIEWING BENCHMARKS, REQUIREMENTS AND FINAL DESIGN PROPOSED

The final stage for producing a network architecture design is to begin with a review the benchmarks, requirements and final design proposed.

Topic 4: Finalising the network design and obtaining approval

DETERMINING SUPPORT AND TRAINING

Any changes to the network, including upgrades, new components, systems or installation of further equipment may require support and training for staff and users of the system.

Topic 4: Finalising the network design and obtaining approval

ACTIVITY: READ

Read the best change management tools of 2022.

Article: https://thedigitalprojectmanager.com/change-management-tools/

Read the article below on skills gap analysis.

Article: https://www.cleverism.com/lexicon/skills-gap-analysis/

Topic 4: Finalising the network design and obtaining approval

ACTIVITY: RESEARCH AND DISCUSS

What training would each member of the class require if a new WLAN were to be installed?

The trainer/assessor will facilitate a discussion about the outcomes from the research.

Topic 4: Finalising the network design and obtaining approval

OBTAINING THE LATEST TECHNICAL SPECIFICATIONS AND PRICING

It is important to ensure that the latest technical specifications and pricing has been sourced to ensure the most up-to-date information on hardware and software being purchased.

Topic 4: Finalising the network design and obtaining approval

ACTIVITY: REFLECT AND DISCUSS

Visit a supplier website and look at the technical specifications for three network components for purchase. What is the process for contacting the vendor? What are the specs and pricing? Now look at another vendor and make a comparison. What sets the two vendors apart? Is it the shipping, time to ship, guarantee/warrantee, price or features of the components?

Topic 4: Finalising the network design and obtaining approval

DOCUMENTING THE NETWORK DESIGN AND PRESENTING DOCUMENTATION

Documenting the network design and presenting the documentation for approval should be done so according to the project management guidelines, organisational requirements/policies and procedures or in a professionally structured format that is clear and easy to understand for the client.

Topic 4: Finalising the network design and obtaining approval

OBTAINING SIGN OFF ON FINAL BUSINESS SOLUTION

Signing off on a business solution will involve meeting with the client, presenting the designs and gaining approval.

Topic 4: Finalising the network design and obtaining approval

ACTIVITY: READ

See the Australian Government Contract Management Guide for an idea of what is contained in a typical contract.

Guide: https://www.finance.gov.au/sites/default/files/2020-12/Contract%20Management%20Guide%20December%202020%20-%20Master.pdf

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

Topic 4: Finalising the network design and obtaining approval

ACTIVITY: RESEARCH AND DISCUSS

Source a contract template that could be used for a client to approve an ICT network architecture design.

The trainer/assessor will facilitate a discussion about the outcomes from the research.

Topic 4: Finalising the network design and obtaining approval