

# HDSE/BDSE - IT Systems & Networks

## Project Planning

# Project Scenario

---

You are a Junior Network Administrator at Swift & Bacon Publishers (SBP) Ltd, a medium sized company that deals with the publication of books and journals for the scientific and technical community. Books are published both as physical and electronic copies.

SBP Ltd is currently situated in two office buildings and contains four Publishing Teams that deal with subject-specific material: a team for Computer Science and Engineering, a team for Maths and Physics, a team for Biological and Chemical sciences and a team for the Biomedical Sciences.

Each Publishing Team has a Publishing Team Leader (PTL), and up to 20 Publishing Editors (PE). Each team has their own secured area on the network. Each PE has access to their own content only, as well as any shared team documentation, but they do not have access to any other documentation.

The PTL can access all material for that team. There is an area for SBP company documentation that anyone can view.

SBP receives manuscripts securely from their authors into an encrypted Public Repository Server (PRS) located on the premises. The manuscripts are then extracted from this repository by one of the four PTLs, who then assigns the manuscript to the PE.

# Project Scenario

---

All documentation and office software are located on a company file server.

Once a manuscript has been reviewed, it is uploaded to the Secure Publishing Server (SPS) where the content is either sent electronically to an external printing company or is available for download by paying customers.

SBP also maintains a team of three Network Administrators who have full admin access to the entire network.

There is also a Senior Publishing Manager and CEO who have access to all company documentation.

Since the 2020 pandemic, the company has realised that a hybrid working model is now most effective for their employees. SBP is planning to close one office building completely to allow staff to work from home if they choose.

# Project Scenario

---

SBP wants to set up their remaining building in the following physical configuration.

- The PRS and SPS servers are in a data centre on the top floor
- The middle floor is a suite of five public meeting rooms with full wired and wireless access
- The Network Server Room containing the company network and email servers is on the middle floor
- The network administrators are also located on the middle floor
- One network administrator must be present in the building each day. The on-site network administrator uses a desktop machine for server administration
- The ground floor is to be a collection of 20 open-plan 'hot desks' where employees who choose to come into work can go to any desk, plug their laptop into the cabled network and begin working.

# Project Scenario

---

To facilitate working from home the company wants the following.

- Each employee is to be issued with a company laptop
- The laptop will contain a software firewall, as well as VPN client
- Employees will store company data on the company file servers
- A high-throughput VPN server will need to be installed and configured to allow secure connectivity for all remote working employees
- The security model of all company data must be preserved
- All office software must be accessed using a cloud-based delivery model, e.g. Google Docs, Office 365
- Each employee is to be based in mainland UK.

SBP also wants to explore moving the company data located on the file server to a cloud-based offering such as SharePoint or Google Workspace, but they are also happy to maintain a file server within the data centre if necessary.

# Project Scenario

---

The SBP network requirements are that:

- the data centre can handle high-volume traffic of data from inside and outside the organisation
- the ground and middle floors have a mixture of wired and wireless connectivity
- all Publishing Teams are isolated from each other
- there is proper consideration given to network security to minimise a data breach
- a firewall will need to be installed and configured to allow inbound and outbound traffic
- there is no lag of data traffic between floors and no connectivity 'dead spots'
- any data sent to a cloud server or stored on the RPS server is encrypted
- there are robust backup facilities in place for the SBP data in case of a data loss or security breach
- the current network security model for teams and employees is preserved even though employees are working from home.

The SBP CEO and Senior Network Administrator has asked you to design and build a virtual network solution that will fulfill the company requirements. This will help SBP to identify any potential issues in the requirements before spending money on closing a building and reorganising the remaining building layout and employee requirements.

In addition, SPB wants you to create a presentation for them, showing the range of available networking topologies, protocols, hardware and software, to demonstrate that you have the breadth of knowledge available to you before you begin the design task.

# Project Activity 1

---

**Document to be produced: A formal presentation (with supporting notes)**

## **Content:**

Produce a formal presentation (with supporting notes) for the CEO and Senior Network Administrator of SBP Ltd that explains the core principles of networks and networking protocols. The presentation will also include a discussion of the range of network hardware and software available to the systems developer.

## **Your presentation should include:**

- a discussion of the benefits and constraints of different network types, e.g. wired, wireless, hybrid (\*)

Network Types	Benefits	Constraints	Example
Wired			
Wireless			
Hybrid			

- a discussion of the benefits and constraints of different network standards, e.g. OSI, TCP/IP, 802.x (\*)

Network Standards	Benefits	Constraints	Purpose	List of layers
OSI Model				
TCP/IP Model				
802.x				

# Project Activity 1

---

**Document to be produced: A formal presentation (with supporting notes)**

**Content:**

Produce a formal presentation (with supporting notes) for the CEO and Senior Network Administrator of SBP Ltd that explains the core principles of networks and networking protocols. The presentation will also include a discussion of the range of network hardware and software available to the systems developer.

**Your presentation should include:**

- an explanation of the impact of network topology, communication and bandwidth requirements, identifying the advantages and disadvantages of each to a network design (\*)
  - Explain the impact of network topology, advantages and disadvantages of each type of topology (star, bus, tree etc.)
  - Explain the impact of communication on network design, the advantages and disadvantages (wired and wireless communication)
  - Explain the impact of bandwidth requirements on network design, the advantages and disadvantages (high and low bandwidth)



# Project Activity 1

---

**Document to be produced: A formal presentation (with supporting notes)**

**Content:**

Produce a formal presentation (with supporting notes) for the CEO and Senior Network Administrator of SBP Ltd that explains the core principles of networks and networking protocols. The presentation will also include a discussion of the range of network hardware and software available to the systems developer.

**Your presentation should include:**

- an assessment of common networking principles and how network protocols, e.g. IPv4, IPv6, HTTPS, can enable an effective networked system
  - Common networking principles
  - How network protocols can enable an effective networked system – explain on the function or purpose of each protocol (IPv4, IPv6, HTTPS) , advantages, disadvantages and its impact on networked system.

# Project Activity 1

---

**Document to be produced: A formal presentation (with supporting notes)**

## **Content:**

Produce a formal presentation (with supporting notes) for the CEO and Senior Network Administrator of SBP Ltd that explains the core principles of networks and networking protocols. The presentation will also include a discussion of the range of network hardware and software available to the systems developer.

## **Your presentation should include:**

- a discussion of the operating principles of networking devices and network server types, e.g. routers, switches, firewalls, repeaters, bridges, IoT gateways, domain, web, file and database servers, access permissions (\*)

Network Server Types	Operating Principle	Function	Impact
Routers			
Switches			
Firewalls			
...			

- a discussion of how workstation hardware and the relevant networking software depend on each other. (\*)
  - Explain the dependencies of workstation hardware and networking software from the aspects of Network Interface Card (NIC), storage, network topology and infrastructure, bandwidth and latency.

---

Thank you