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Abstract

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400IT - Networking

Network Infrastructure Report



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400IT – Networking

# Introduction

This report will detail the design of the network infrastructure spanning three locations, with a head office in London and two branch offices in Wroclaw and York. for the Green Wood Company. The report shall elaborate crucial points such as topology, security and schemes for IP addresses in different departments.

## Tools and method

Cisco Packet Tracer was utilised to develop a virtual network framework to display the design in relation to the expectations for the Green Wood Company’s infrastructure.

Network segmentation is the action of dividing a network into smaller isolated sections and was done via VLSM. This segmentation was used to control the traffic, this allowing the network to be limited by traffic type source, destination, etc (Cisco, 2025), reducing the stress on the network.

Variable Length Subnet Mask (VLSM) is a technique used in Ip network design to create subnets with different subnet masks (GeeksforGeeks, 2018). This was utilised to create subnets allowing less waste of IPs and efficient use of network resources.

Finally, Open Shortest Path First (OSPF) was utilised, which is a type of link-state routing protocol, helping to calculate the best path for the packet to be forwarded to its destination via mathematical algorithms.

# Topology

Network topology is the name used to define “the physical and logical structure of a network.” (cisco, 2023)

The topology of the infrastructure developed is a hybrid topology, meaning it a combination of two or more topology structures. In this case it is a union of the Star and a central topology which is partially ring and mesh together.

A diagram of a computer network

AI-generated content may be incorrect.

Figure 1 - Green Wood Company Network

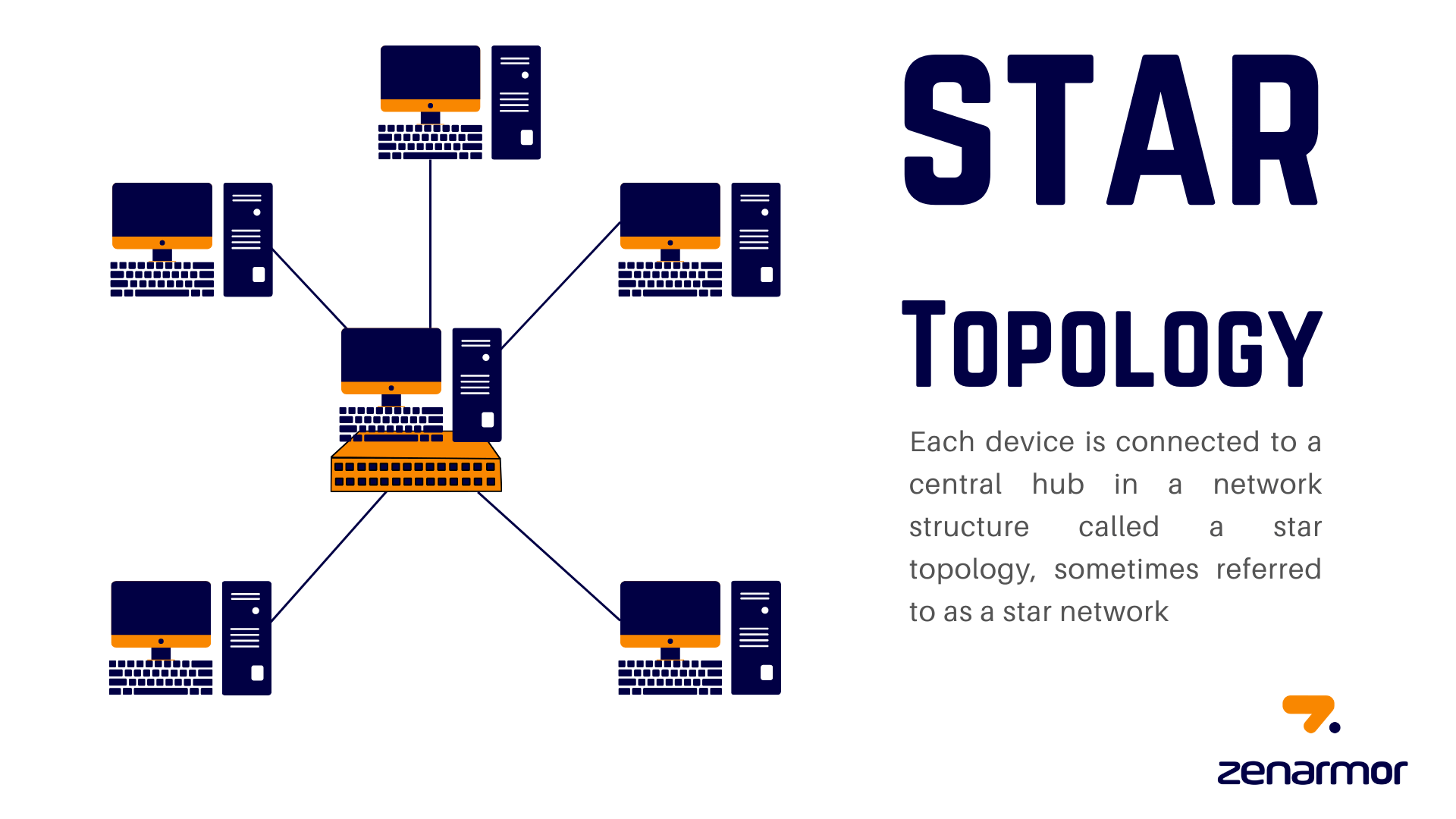
Figure 1 displays the infrastructure developed, showing 3 separate offices consisting of a router, switch and 6 workstations. These offices follow a star topology meaning each device/node (the 6 workstations) is connected to a central hub or switch (in this case a switch) (Network Encyclopedia, 2024). This was chosen due its efficiency and scalability, this structure minimises data collisions as each workstation is directly connected to the central switch. The star topology also allows easy expansion, being able to add more workstations without disrupting the current network.

Figure 2 - Star Topology

(Sourced from : (Zenarmor, 2024) )

Connecting the 3 star topology offices is a topology structure of 4 routers in a ring, however unlike the typical ring topology, traffic is bidirectional without having 2 links between the nodes. This gives the topology a characteristic similar to a mesh, giving the network a failsafe in case of a failure of one of the central router’s links. Overall this topology has the structure of a ring topology, whilst holding the function of most similar to a mesh topology. This structure gives the network a high degree of tolerance in cases of faults, as well as this, the partial nature (meaning the routers are not all directly connected to each other) allows a higher degree of scalability, however in compensation of this benefit it is less reliable than a full mesh as it has a much more limited redundancy.

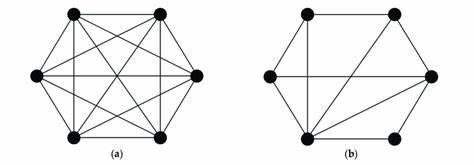


Figure 3 – Mesh Topologies (a – Full Mesh, b – Partial Mesh)

(Sourced from : (Paszkiewicz et al., 2019) )

# Security

Encrypted passwords restricting access to higher privilege modes (privileged (#) and configuration ((config)#) )

Network segmentation

# Addressing Schemes

The method used to develop ip addressing schemes for different departments

How you ensured efficient ip allocation

Network segmentation

# Reliabilty

# Network testing

# Conclusion

# References