Planning For A Scalable Network

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Outline

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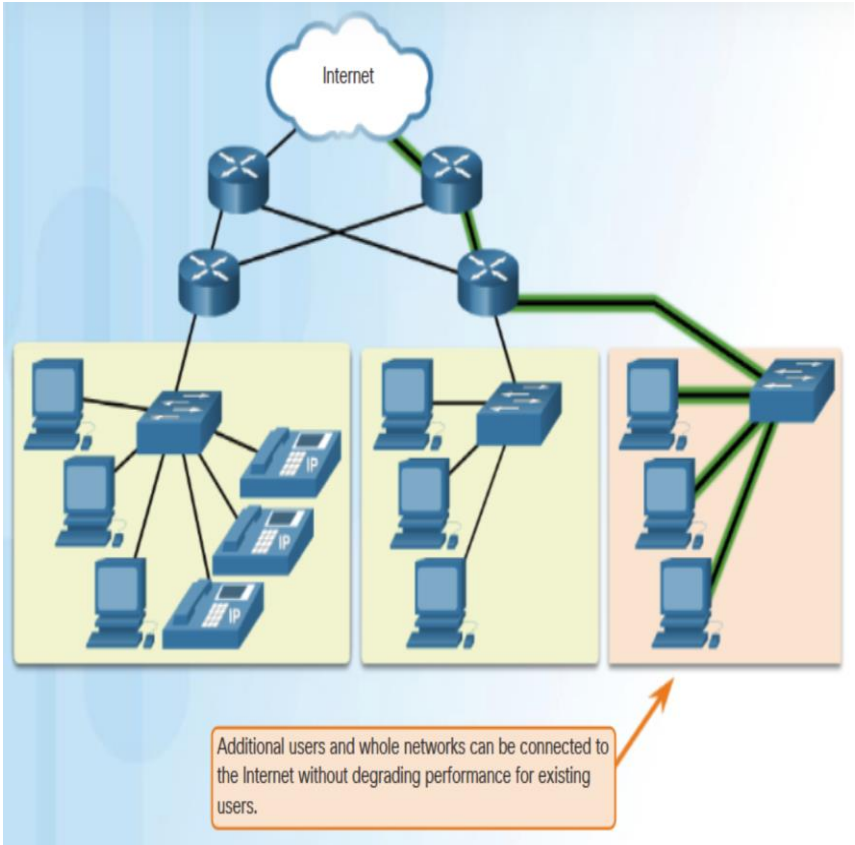
- Introduction
- Key Considerations
- Best Practices
- Case Studies/Examples
- Q&A Session

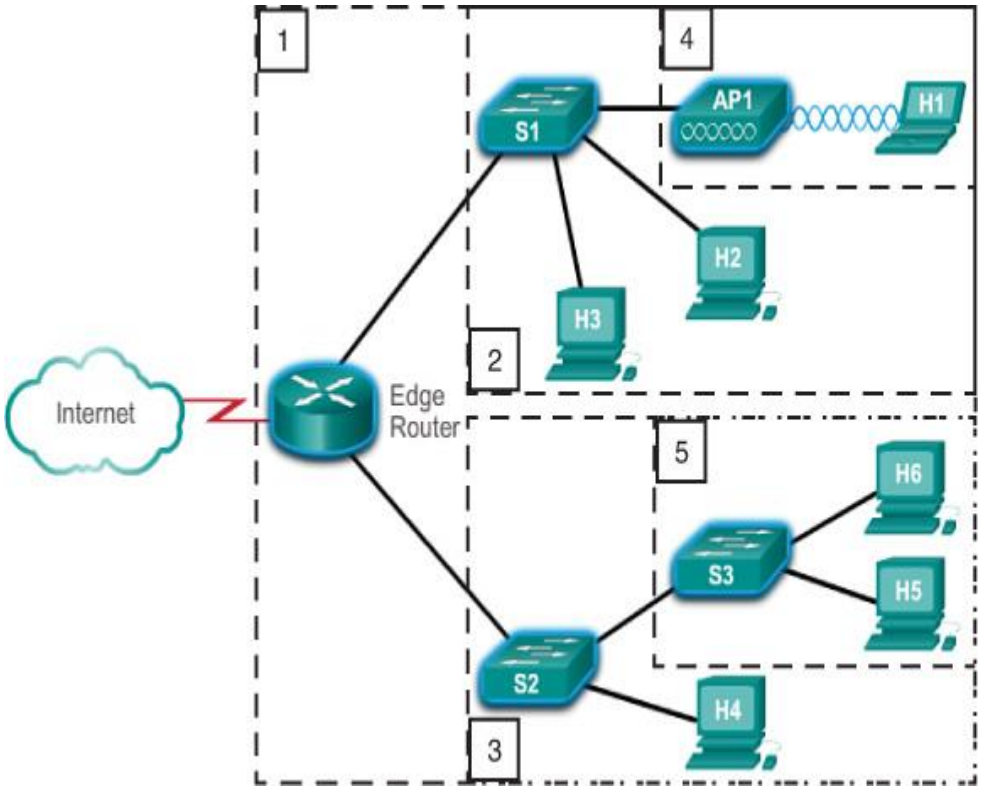
Introduction

- Institutions increasingly rely on their network infrastructure to provide mission-critical services.

- More employees, opening of branch offices, and expansion into global enterprises = direct impact on the network.

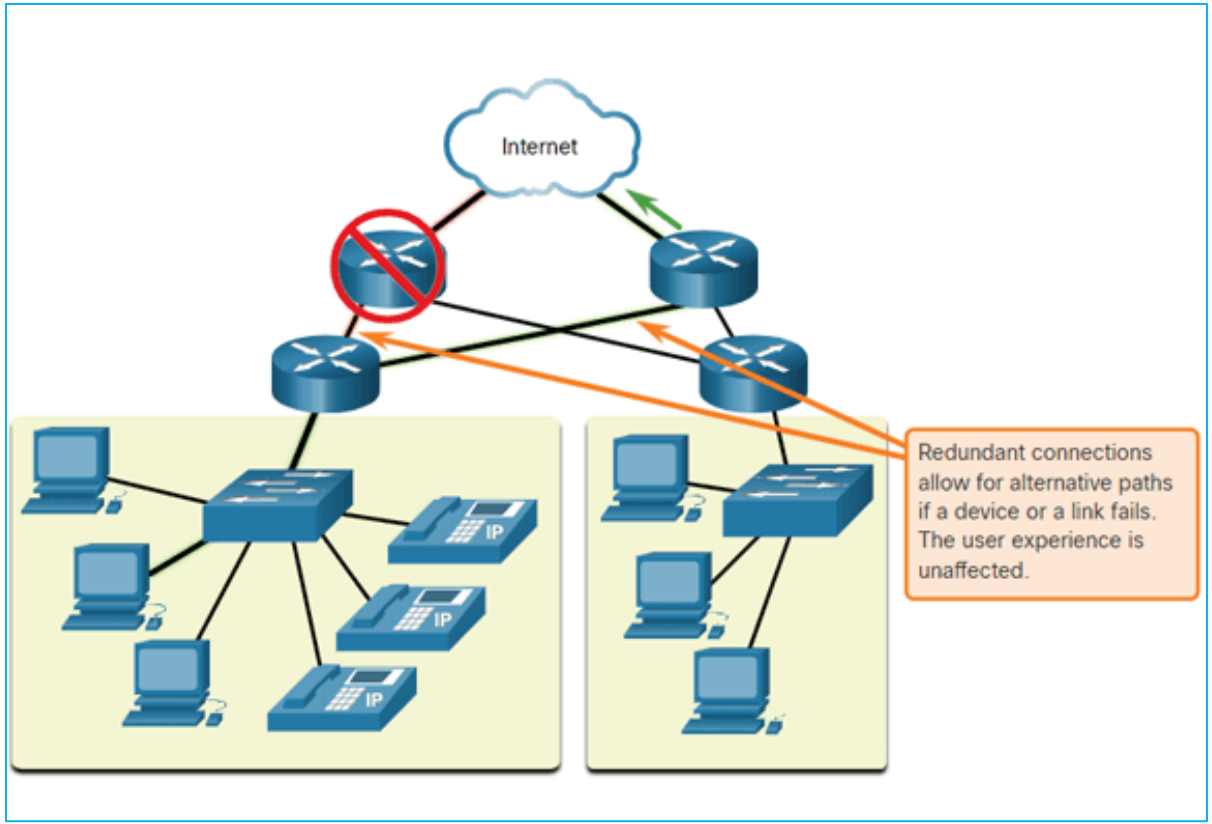


Unreliable Network Architecture



- If the Edge Router fails, it will impact every connected device.
- If S1 fails, it will impact H1, H2, H3, and AP1.
- If S2 fails, it will impact S3, H4, H5, and H6.
- If AP1 fails, it will impact H1.
- If S3 fails, it will impact H5 and H6.

Reliable Network Architecture



Network Scalability

Is the ability of a network to grow and handle increasing amounts of traffic or data without experiencing a significant drop in performance or stability

The aim

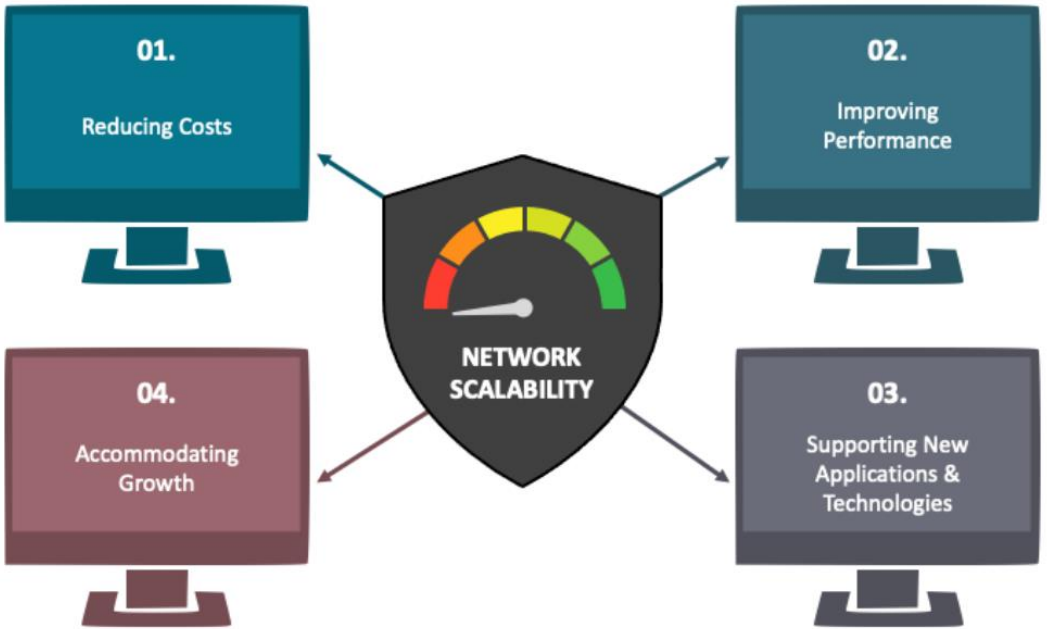
- To ensure a network can grow seamlessly and efficiently to meet increasing demands for connectivity, data transfer, and services.

The goal

- To ensure that a network can expand.
- Handle increased demands effectively.
- Without sacrificing performance, reliability, or security.

Reasons for Scaling

- Handling Growth
- Flexibility
- Performance
- Cost Efficiency
- Resilience
- Future-proofing



Approaches to Network Scaling

- **Vertical Scalability (Scale-Up)** - Upgrading a server from 16GB to 64GB of RAM.

- **Horizontal Scalability (Scale-Out)** - Adding more servers to a web farm to distribute the load.

Planning for Scalable Networking

Effective planning lays the foundation for scalable networking.

- Assess your current network infrastructure.
- Identify areas that need improvement.
- Align networking goals with your institution's objectives.
- Estimate your projected growth and select networking solutions that can accommodate future expansion

Key considerations for network scalability

- **Performance Requirements -** network meets current and future performance requirements.

- **Security -** Implement scalable and effective security measures

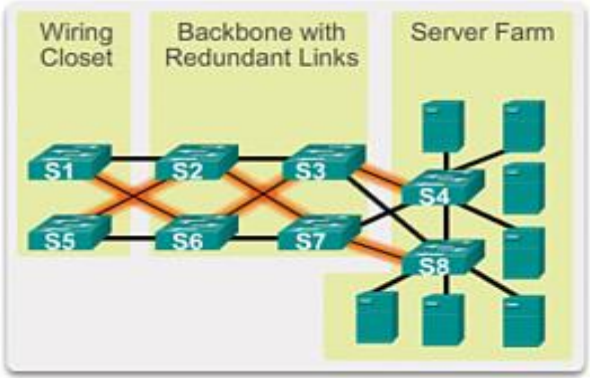
Key considerations for network scalability

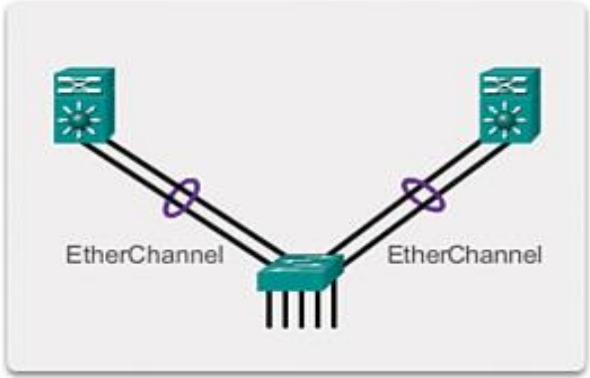
- Vendor Support and Ecosystem – Vendor-neutral.
- Compliance and Regulations - industry regulations and standards
- Hardware and Infrastructure - ease of integration.
- Cost Management – maintenance, power, cooling.
- Management and Monitoring – network visibility.
- User Experience – quality of service.

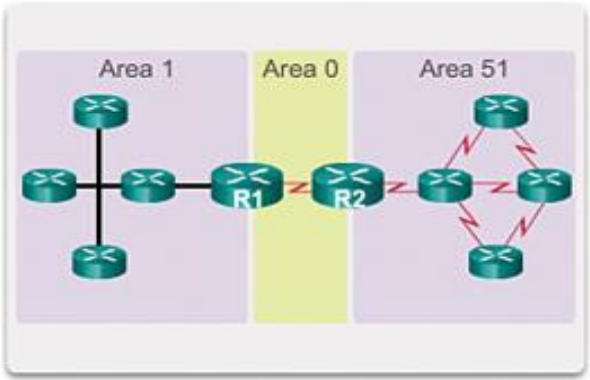
Ways to boost network scalability

- **Segmentation:** Dividing a network into smaller, more manageable segments.
- **Redundancy:** Backup routers or switches, to maintain uninterrupted connectivity and minimize downtime.
- **Virtualization:** allocate resources dynamically and scale networks based on demand.

Ways to boost network scalability cont'







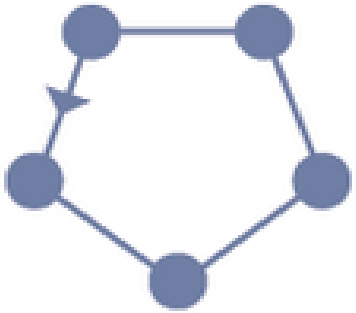
Network topologies and use case

Ring Topology

- Ensures robustness and fault tolerance in different environments.

Advantages

- Redundancy
- Scalability
- Predictable Performance.

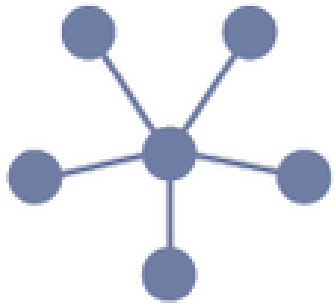


Ring

Network topologies and use case cont’

Star Topology

- popular choice for many network environments.
- due to its simplicity,
- ease of management, and
- scalability.



Star

Recommended considerations

- Build star/tree, **NOT DAISY CHAINS.**
- Technology consideration – Fiber, Microwave.
- Switches – Managed switches e.g. Cisco, juniper, Mikrotik, etc.
- Access Points – managed access points, e.g Ubiquiti, cisco, ruckus, etc
- Firewalls – Next-generation firewalls, e.g. Sophos and FortiGate.
- Power stabilizers – surge protector, UPS or go green.
- Authentication - eduroam, modern switches support 802.1x, LDAP, etc
- Cables - UTP Cat5e and above.

Recommended hardware

Juniper EX2300-24T

Juniper EX2300-C

Juniper SRX300

Mikrotik RB2011UiAS-RM

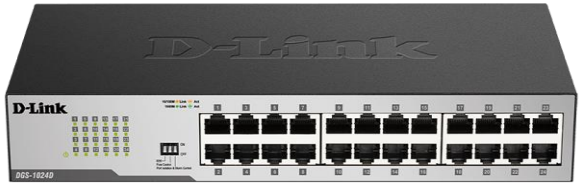
Mikrotik RB2011-iLS

Mikrotik RB760-iGS

Mikrotik CRS326-24G-2S+

Routers

Switches



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THE END

Thank you for your time