CSIT985
Strategic Network Design

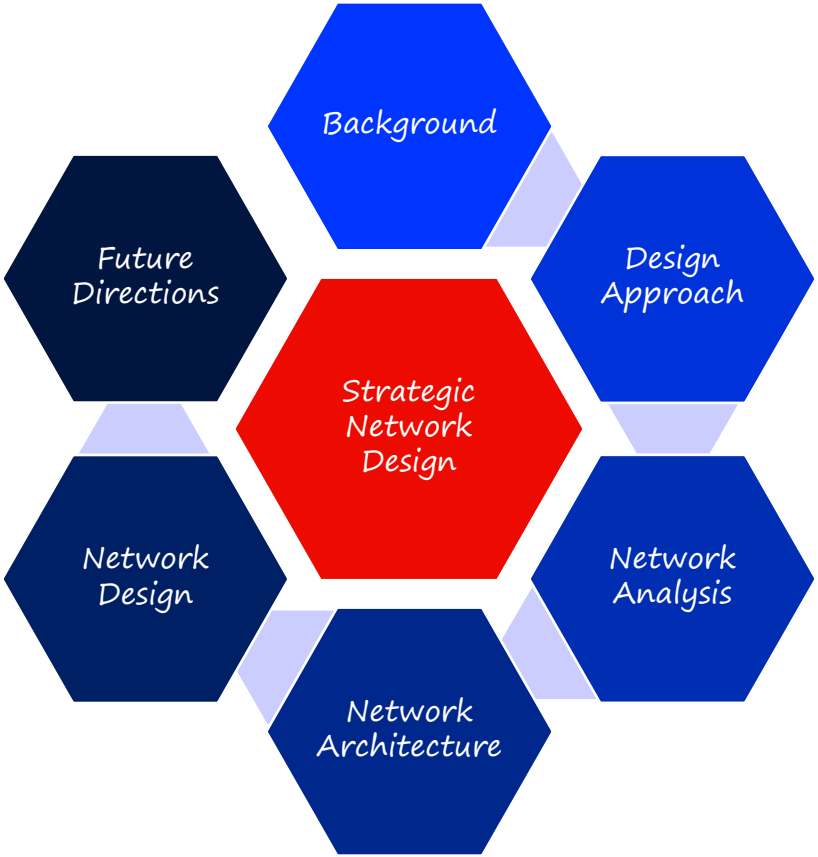
Autumn 2024

UNIVERSITY
OF WOLLONGONG
AUSTRALIA

Week 13:
Summary

UNIVERSITY
OF WOLLONGONG
AUSTRALIA

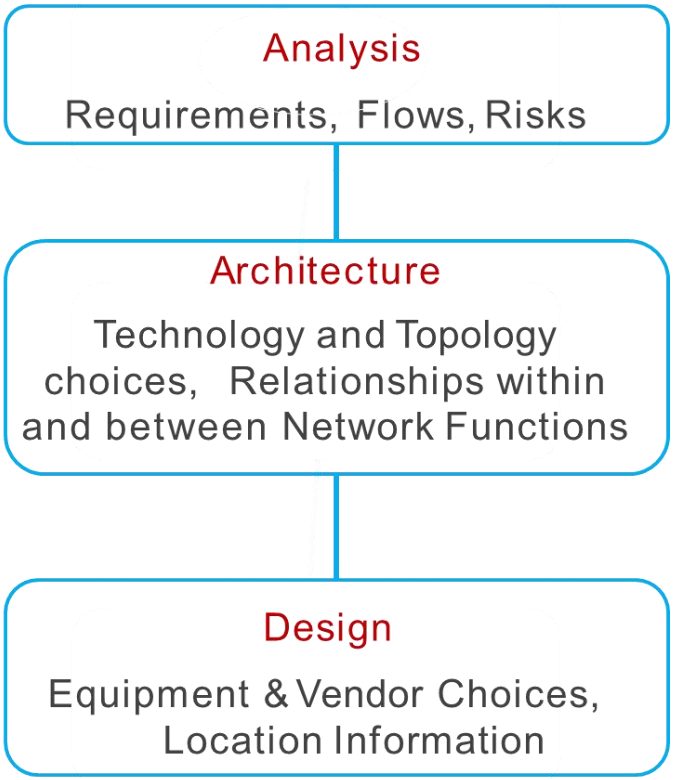
Presented by: Dr. Shengbing Tang
Lecturer, CCNU-UOW Joint Institute


Background
Future Directions
Design Approach
Strategic Network Design
Network Design
Network Analysis
Network Architecture

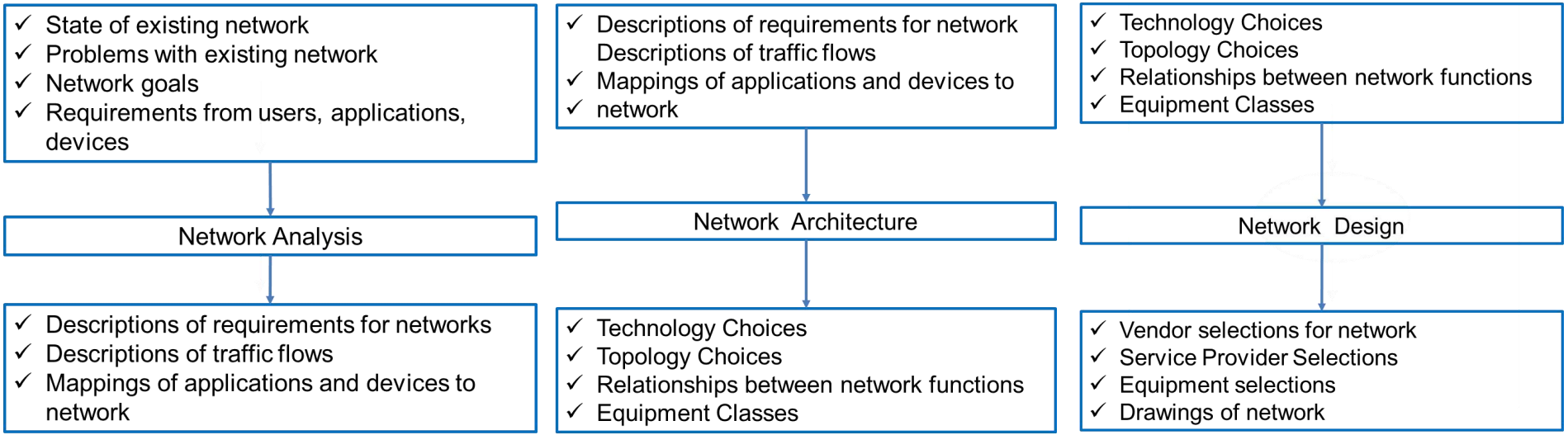
Week 1

- Introduction
  - Subject Overview
  - Overview of Strategic Network Design

Week 1


Analysis
Requirements, Flows, Risks
Architecture
Technology and Topology choices, Relationships within and between Network Functions
Design
Equipment & Vendor Choices, Location Information

Week 1


✓ State of existing network
✓ Problems with existing network
✓ Network goals
✓ Requirements from users, applications, devices
Network Analysis
✓ Descriptions of requirements for networks
✓ Descriptions of traffic flows
✓ Mappings of applications and devices to network
✓ Descriptions of requirements for network
Descriptions of traffic flows
✓ Mappings of applications and devices to
✓ network
Network Architecture
✓ Technology Choices
✓ Topology Choices
✓ Relationships between network functions
✓ Equipment Classes
✓ Technology Choices
✓ Topology Choices
✓ Relationships between network functions
✓ Equipment Classes
Network Design
✓ Vendor selections for network
✓ Service Provider Selections
✓ Equipment selections
✓ Drawings of network

Week 2 – Fundamentals of Network

- Network Elements
- Network Categories
- Network Protocols
- Network Topology
- Network Addressing
- Network Performance

Week 2 – Fundamentals of Network

- Types of networking devices: hub, switch, router, bridge, gateway, modem, repeater, or access point.
- Transmission Media
- Computer network models
- Network categories, LAN, MAN, WAN
- Network Performance Metrics

Week 3 – Network Design Methodology

- Network Design Methodology
  - Hierarchical model
  - PPDIOO
  - Eight Steps Design Method
- Network Design Process
- Strategic Network Plan
- Six Tips for Strategic Planning
- Ten Pitfalls of Strategic Planning
- Factors in Selecting Strategies
- Planning team
  - Who should be involved in planning?

Week 4 – Requirement Analysis

- Gathering and Listing Requirements
- Gathering Initial Conditions
- User Requirements and Performance
- Service metrics
- Characterizing Behavior
- RMA Requirements
- Application Characteristics and Additional Requirements
- Procedures and Documentation

Week 5a – Requirements Analysis: Recap

- Requirements Mapping
- Requirements Specification
- Best effort Predictable and Guaranteed Performance
- Flow specification

Week 5b – Network Architecture

- Architecture and Design
- Component Architectures
- Reference Architectures
- Architectural models
  - Topological
  - Flow-based
  - Functional

Week 6 – Addressing and Forwarding Techniques - introduction

- Definitions
- Addressing Fundamentals
- Routing Fundamentals

Week 7a – Network Addressing

- Addressing Fundamentals
- IPv4 address types
- Subnetting an IPv4 Network

Week 7b – Network Routing

- Routing Fundamentals
- Routing Mechanism
- Routing Strategies
- Evaluating Routing Protocols
- Choosing and Applying Routing Protocols
- Architectural Considerations

Week 8 – Security and Privacy Architecture

- Basic Concepts and Mechanisms of Security
- Three classic security considerations
- What does it cover?
- Developing a Security and Privacy Plan
- Security and Privacy Administration
- Policies and Procedures
- Policies Areas
- Security and Privacy Mechanisms
- Architectural Considerations

Week 9a – Network Design

- Design Process
- Vendor, Equipment, and service-provider evaluations
  - Developing goals
  - Developing criteria for technology evaluations
  - An architectural approach to network design
  - Network architecture design elements
  - Guidelines and constraints
  - Making technology choices for the design
- Network layout
- Design traceability
- Design metrics

Week 9b – Network Design

- Four Guiding Principles
- Creating Design Team

Week 10 – Performance Architecture

- Background
- Definition
- Developing Goals for Performance
- Performance Mechanisms
  - Quality of Service
  - Resource control
  - Service Level Agreements
  - Policies
- Architectural Considerations

Week 11 – Network Management Architecture

- Network Management Architectures
- Network Devices and Characteristics
- Network Management Mechanisms
  - Monitoring Mechanisms
  - Instrumentation mechanisms
  - Configuration mechanisms
- Architectural Considerations
  - In-band and Out-of-band management
  - Centralized, distributed, and hierarchical management
  - Scaling network management traffic
  - Checks and balances
  - Management of Network Management Data
  - MIB selection
  - Internal relationships
  - External relationships

Week 12 – Advanced Networking Technologies

- SDN
- SDN and Big Data
- NFV
- Machine Learning

Thank you
Q&A ?

UNIVERSITY
OF WOLLONGONG
AUSTRALIA