Top-Down Network Design

Chapter One

Analyzing Business Goals and Constraints

Top-Down Network Design

- Network design should be a complete process that matches business needs to available technology to deliver a system that will maximize an organization's success.
  - In the LAN area it is more than just buying a few devices.
  - In the WAN area it is more than just calling the phone company.

Start at the Top

- Don't just start connecting the dots.
- Analyze business and technical goals first.
- Explore divisional and group structures to find out who the network serves and where they reside.
- Determine what applications will run on the network and how those applications behave on a network.
- Focus on Layer 7 and above first.

Layers of the OSI Model

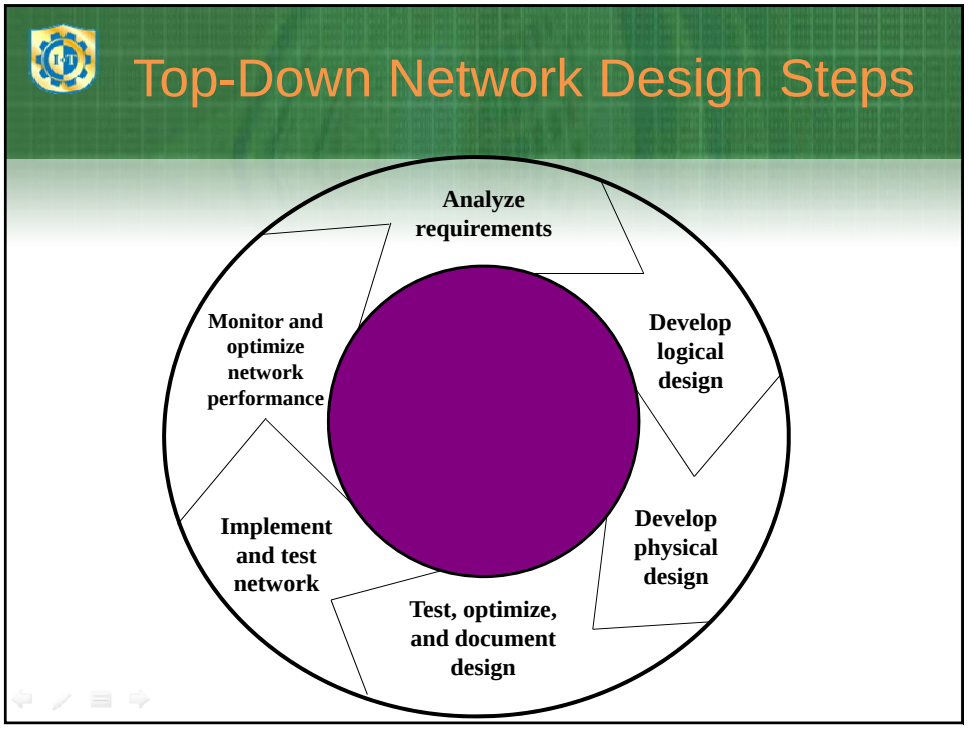
Layer 7	Application
Layer 6	Presentation
Layer 5	Session
Layer 4	Transport
Layer 3	Network
Layer 2	Data Link
Layer 1	Physical

Structured Design

- A focus is placed on understanding data flow, data types, and processes that access or change the data.
- A focus is placed on understanding the location and needs of user communities that access or change data and processes.
- Several techniques and models can be used to characterize the existing system, new user requirements, and a structure for the future system.
- A logical model is developed before the physical model.
  - The logical model represents the basic building blocks, divided by function, and the structure of the system.
  - The physical model represents devices and specific technologies and implementations.

Systems Development Life Cycles

- SDLC: Does it mean Synchronous Data Link Control or Systems Development Life Cycle?
- The latter for the purposes of this class!
- Typical systems are developed and continue to exist over a period of time, often called a systems development life cycle (SDLC).



Network Design Steps

- Phase 1 – Analyze Requirements
  - Analyze business goals and constraints
  - Analyze technical goals and tradeoffs
  - Characterize the existing network
  - Characterize network traffic

Network Design Steps

- Phase 2 – Logical Network Design
  - Design a network topology
  - Design models for addressing and naming
  - Select switching and routing protocols
  - Develop network security strategies
  - Develop network management strategies

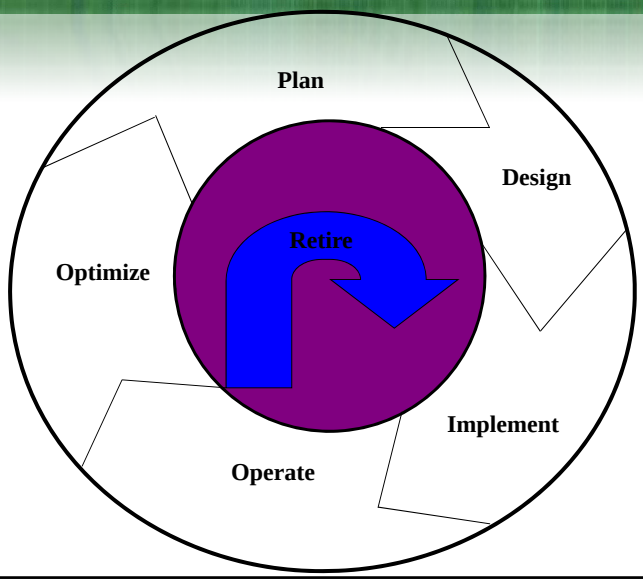
Network Design Steps

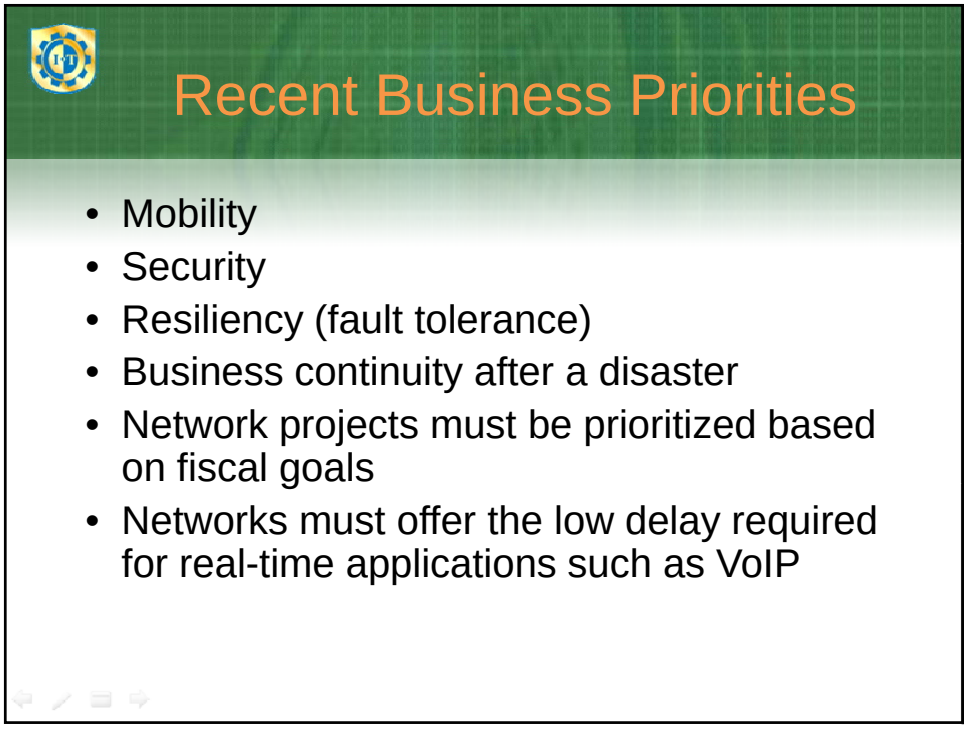
- Phase 3 – Physical Network Design
  - Select technologies and devices for campus networks
  - Select technologies and devices for enterprise networks

Network Design Steps

- Phase 4 – Testing, Optimizing, and Documenting the Network Design
  - Test the network design
  - Optimize the network design
  - Document the network design

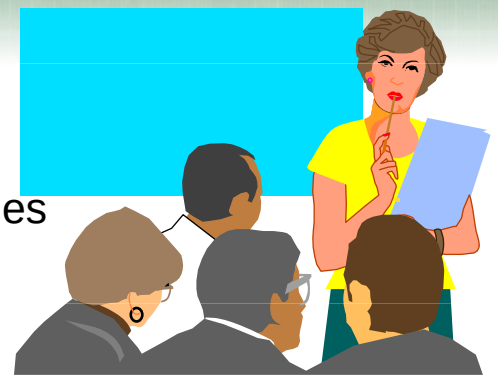
The PDIOO Network Life Cycle





Business Constraints

- Budget
- Staffing
- Schedule
- Politics and policies



Collect Information Before the First Meeting

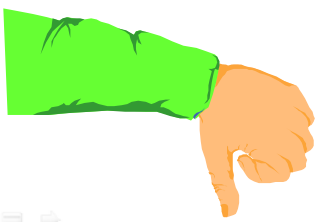
- Before meeting with the client, whether internal or external, collect some basic business-related information
- Such as
  - Products produced/Services supplied
  - Financial viability
  - Customers, suppliers, competitors
  - Competitive advantage

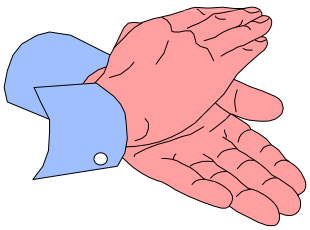
Meet With the Customer

- Try to get
  - A concise statement of the goals of the project
    - What problem are they trying to solve?
    - How will new technology help them be more successful in their business?
    - What must happen for the project to succeed?

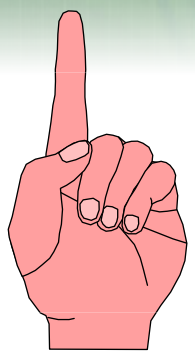
Meet With the Customer

- What will happen if the project is a failure?
  - Is this a critical business function?
  - Is this project visible to upper management?
  - Who's on your side?





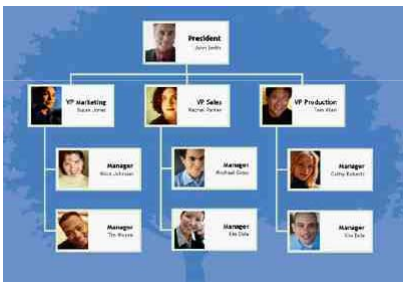
Meet With the Customer



- Discover any biases
  - For example
    - Will they only use certain company's products?
    - Do they avoid certain technologies?
    - Do the data people look down on the voice people or vice versa?
  - Talk to the technical and management staff

Meet With the Customer

- Get a copy of the organization chart
  - This will show the general structure of the organization
  - It will suggest users to account for
  - It will suggest geographical locations to account for



Meet With the Customer

- Get a copy of the security policy
  - How does the policy affect the new design?
  - How does the new design affect the policy?
  - Is the policy so strict that you (the network designer) won't be able to do your job?
- Start cataloging network assets that security should protect
  - Hardware, software, applications, and data
  - Less obvious, but still important, intellectual property, trade secrets, and a company's reputation

The Scope of the Design Project

- Small in scope?
  - Allow sales people to access network via a VPN
- Large in scope?
  - An entire redesign of an enterprise network
- Use the OSI model to clarify the scope
  - New financial reporting application versus new routing protocol versus new data link (wireless, for example)
- Does the scope fit the budget, capabilities of staff and consultants, schedule?

Gather More Detailed Information

- Applications
  - Now and after the project is completed
  - Include both productivity applications and system management applications
- User communities
- Data stores
- Protocols
- Current logical and physical architecture
- Current performance

Network Applications

Name of Application	Type of Application	New Application?	Criticality	Comments

Summary

- Systematic approach
- Focus first on business requirements and constraints, and applications
- Gain an understanding of the customer's corporate structure
- Gain an understanding of the customer's business style

Review Questions

- What are the main phases of network design per the top-down network design approach?
- What are the main phases of network design per the PDIOO approach?
- Why is it important to understand your customer's business style?
- What are some typical business goals for organizations today?