2. Identifying customer's needs

CHAPTER 2

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Business Goals

- Increase revenue
- Reduce operating costs
- Improve communications
- Shorten product development cycle
- Expand into worldwide markets
- Build partnerships with other companies
- Offer better customer support or new customer services

The Scope of the Design Project

- Small in scope?
  - Allow few people in a sales office to access the enterprise 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?

Business Priorities

- Mobility
- Security
- Resiliency (fault tolerance)
- Business continuity after a disaster
- Network projects must be prioritized based on fiscal goals
- Networks must offer the low delay required for real-time applications such as VoIP

Business Constraints

In addition to analyzing business goals and determining your customer's need to support new and existing applications, it is important to analyze any business constraints that will affect your network design

- Budget
- Staffing
- Schedule
- Politics and policies

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 2

- 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 3

- 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 4

- 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 5

- 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

Gather Detailed Information

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

Technical Goals

- Scalability
- Availability
- Performance
- Security
- Manageability
- Usability
- Adaptability
- Affordability

Scalability

- Scalability refers to the ability to grow
- Some technologies are more scalable
  - Flat network designs, for example, don't scale well
- Try to learn
  - Number of sites to be added in the next year
  - What will be needed at each of these sites
  - How many users will be added
  - How many more servers will be added

Availability

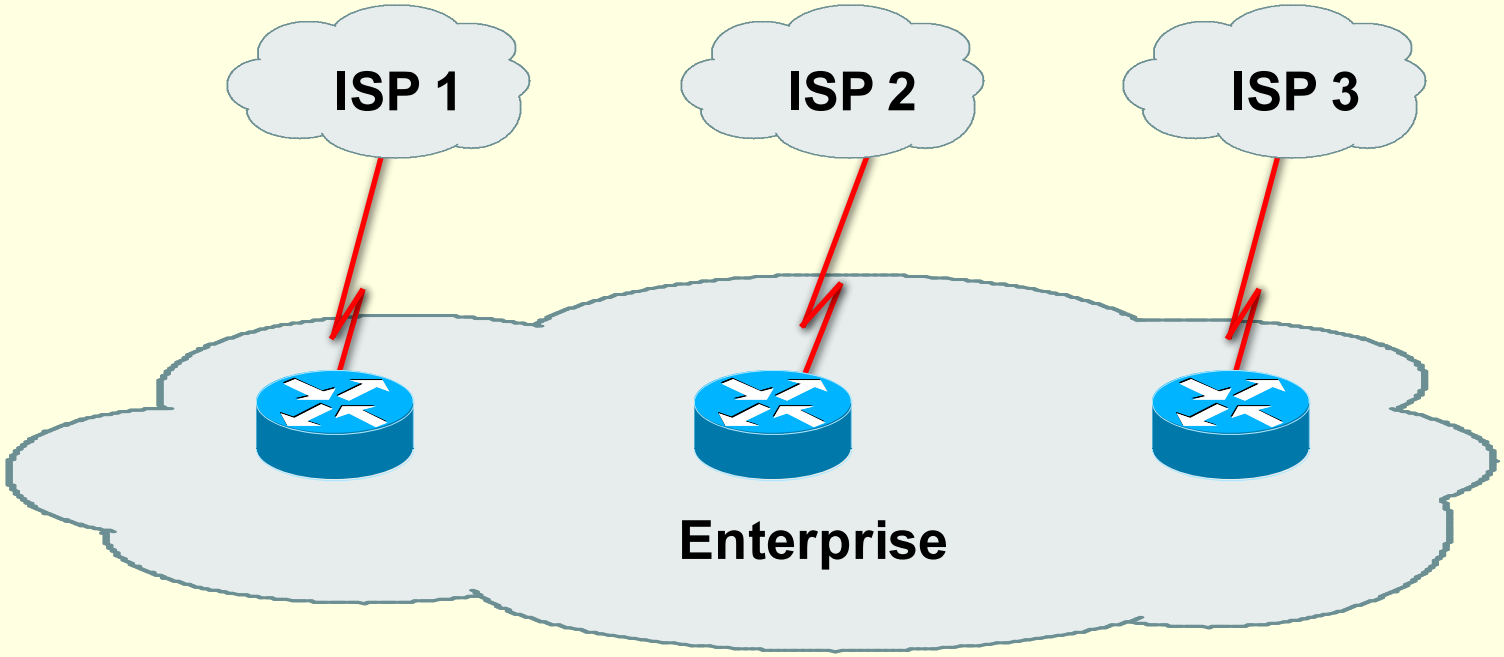
- Availability can be expressed as a percent uptime per year, month, week, day, or hour, compared to the total time in that period
  - For example:
    - 24/7 operation
    - Network is up for 165 hours in the 168-hour week
    - Availability is 98.21%
- Different applications may require different levels
- Some enterprises may want 99.999% or "Five Nines" availability

Availability

- Availability can also be expressed as a mean time between failure (MTBF) and mean time to repair (MTTR)

- Availability = MTBF/(MTBF + MTTR)
  - For example:
    - The network should not fail more than once every 4,000 hours or (166 days) and it should be fixed within one hour (A typical MTTR goal is 1 hour)
    - 4,000/4,001 = 99.98% availability

99.999% Availability Require Redundancy



- Can the customer afford this?

Network Performance

- Common performance factors include
  - Bandwidth
  - Throughput
  - Efficiency
  - Response time
  - Delay (latency)

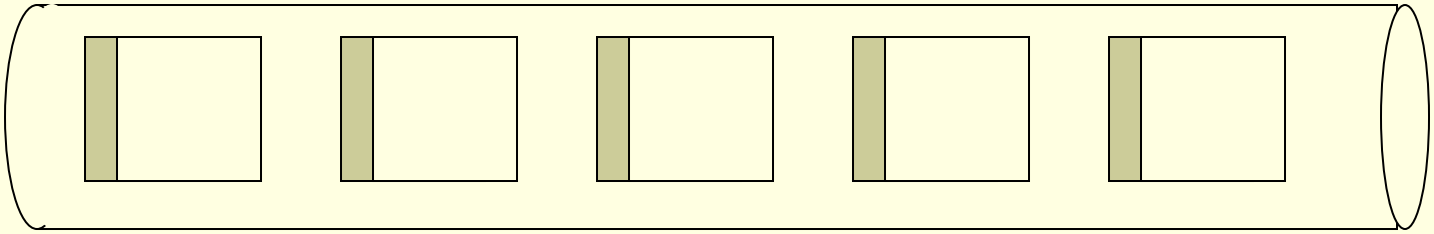
Bandwidth Vs. Throughput

- Bandwidth and throughput are not the same thing
- Bandwidth is the data carrying capacity of a circuit
  - Usually specified in bits per second
- Throughput is the quantity of error free data transmitted per unit of time
  - Measured in bps, Bps, or packets per second (pps)

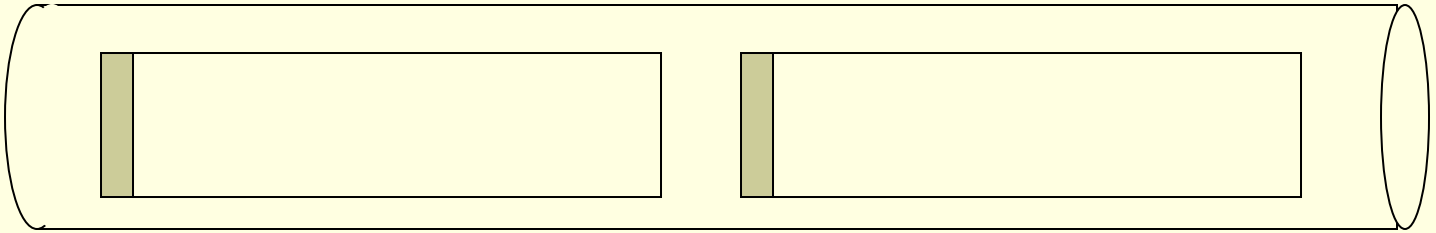
Efficiency

It is a measurement of how effective an operation is in comparison to the cost in effort, energy, time, or money

Small Frames (Less Efficient)



Large Frames (More Efficient)



Efficiency

- How much overhead is required to deliver an amount of data?
- How large can packets be?
  - Larger better for efficiency (and goodput)
  - But too large means too much data is lost if a packet is damaged
  - How many packets can be sent in one bunch without an acknowledgment?

Response Time

The amount of time between a request for some network service and a response to the request

- A function of the application and the equipment the application is running on, not just the network
- Most users expect to see something on the screen in 100 to 200 milliseconds

Delay

- Propagation delay
  - A signal travels in a cable at about 2/3 the speed of light in a vacuum
- Transmission delay (also known as serialization delay)
  - Time to put digital data onto a transmission line
    - For example, it takes about 5 ms to output a 1,024 byte packet on a 1.544 Mbps T1 line
- Packet-switching delay
- Queuing delay

Security

- Focus on requirements first
- Identify network assets
  - Including their value and the expected cost associated with losing them due to a security problem
- Analyze security risks

Cycuit switch

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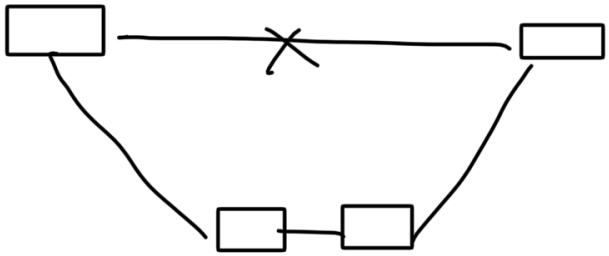

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Security Risks

- Hacked network devices
  - Data can be intercepted, analyzed, altered, or deleted
  - User passwords can be compromised
  - Device configurations can be changed
- Denial-of-service attacks

Manageability

- Fault management
- Configuration management
- Accounting management
- Performance management
- Security management

Usability

- Usability: the ease of use with which network users can access the network and services
- Networks should make users' jobs easier
- Some design decisions will have a negative affect on usability:
  - Strict security, for example

Adaptability

- Avoid incorporating any design elements that would make it hard to implement new technologies in the future
- Change can come in the form of new protocols, new business practices, new fiscal goals, new legislation
- A flexible design can adapt to changing traffic patterns and Quality of Service (QoS) requirements

Affordability

- A network should carry the maximum amount of traffic possible for a given financial cost
- Affordability is especially important in campus network designs
- WANs are expected to cost more, but costs can be reduced with the proper use of technology
  - Quiet routing protocols, for example

Making Tradeoffs

Scalability	20
Availability	30
Network performance	15
Security	5
Manageability	5
Usability	5
Adaptability	5
Affordability	15
Total (must add up to 100)	100