



# Manage and Optimize Your LAN and WAN

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- Learning Solutions
- Small Business Specialist Community
- MSA (*Microsoft Software Advisor*)



# Agenda

Breakfast	07:30 AM
Agenda Review and Introductions	07:35 AM – 07:40 AM
Manage and Optimize Your LAN and WAN	07:40 AM – 08:25 AM
Software Demonstration	08:25 AM – 08:40 AM
Final Q&A Session	08:40 AM – 08:50 AM

## Introductions

- Name
- Company Name, Area of Business, and Products/Services
- Why are you here and do you have any major initiatives planned for 2010?

# Network Design Goals

- **Functionality** – The network must work. The network must allow users to meet their job requirements. The network must provide user-to-user and user-to-application connectivity with reasonable speed and reliability.
- **Scalability** – The network must be able to grow. The initial design should grow without any major changes to the overall design.
- **Adaptability** – The network must be designed with a vision toward future technologies. The network should include no element that would limit implementation of new technologies as they become available.
- **Manageability** – The network should be designed to facilitate network monitoring and management to ensure ongoing stability of operation.

# Design Considerations

- To maximize available LAN bandwidth and performance, the following LAN design considerations must be addressed:
  - The function and placement of servers
  - Collision detection issues
  - Segmentation issues
  - Broadcast domain issues
  - Security issues

# OSI Layers Defined

- **Layer 1**: Physical Connectivity
  - The actual physical connections between the network devices and the network wiring
- **Layer 2**: Data Link Connectivity
  - Provide flow control, error detection, error correction, and to reduce congestion in the network
- **Layer 3**: Network Layer Connectivity
  - Adds IP routing to connect unique LAN segments

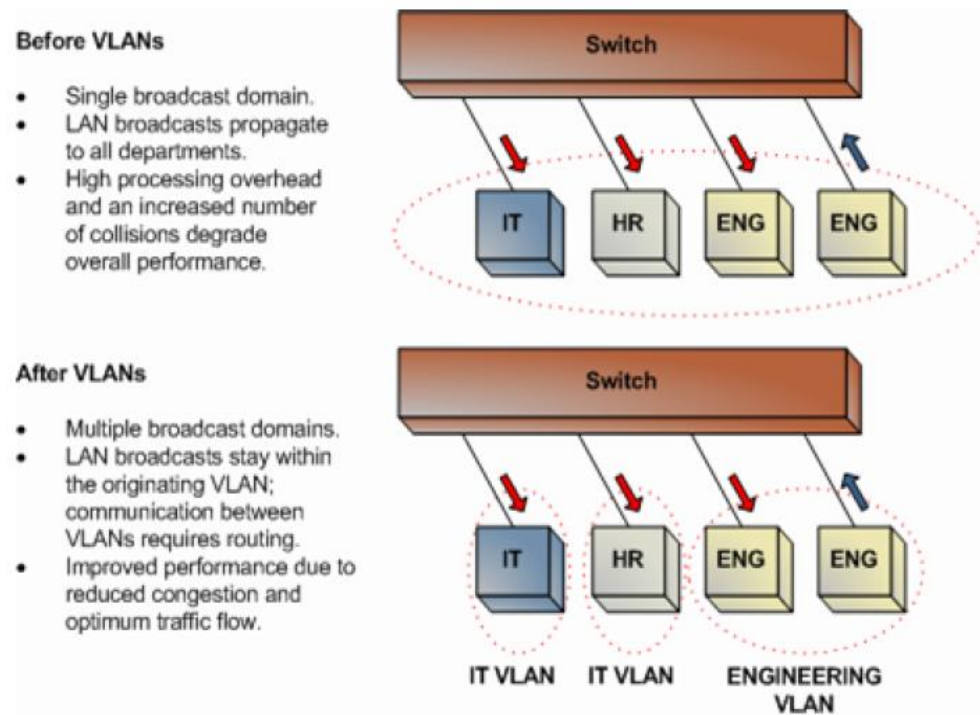
# Network Segmentation

- Why Segment?
  - Performance, Administration, and Security
- The Tools to Use:
  - Virtual Local Area Network (VLAN)
    - A virtual switch creating an individual broadcast domain
    - VLAN segmentation cuts network congestion
  - Subnet
    - A logical subdivision of the address space defined by a TCP/IP network ID
    - Subnetting breaks a network into smaller realms that may use existing address space more efficiently

# Virtual Local Area Network (VLAN)

- VLANs make sub-nets easier to use and maintain
- VLANs can span between physical switches
- Private VLANs can offer an additional level of security where specific devices are not allowed to communicate with each other.

Figure 1. Broadcast Domains Before and After VLAN Segmentation



# Subnets

- Typically one subnet per VLAN
- Subnets are normally why VLANs are used
- While increasing the routing complexity, the payoff is enhanced network capabilities (i.e. improved performance, security, QoS, etc)

# Optimizing Network Segmentation

- Provides ways to diagnose and identify device and network issues based on subnet and location
- Static routing is unintelligent, but can be appropriate for smaller networks.
- Use of dynamic routing protocols increases efficiencies and can be used to provide redundancy

# Implementing Quality of Service (QoS)

- QoS is about deciding what IP traffic is most important – it's not just for voice.
  - However, VoIP requires QoS to be successful
- Imagine a 3 lane highway
  - Voice and real-time traffic in the "express lane"
  - ERP and business-critical data in the "fast lane"
  - Everything else (browsing, etc) in the "right lane"

# Merging Voice and Data Traffic

- Voice traffic is real-time and requires special planning
  - VLANs, Subnets, Prioritization (QoS)
- Causes of poor voice quality:
  - Latency: Network delay
  - Jitter: Variations in delay
  - Loss: Loss of data packets

# Wireless Networks

- Deployed properly, wireless networks can be secure and flexible
- Wireless should be segmented using VLANs and subnets
- Wireless networks are frequently segmented (i.e. guest and private networks; voice and data; specialized equipment)

# Security Planning

- Basic Security
  - Encryption, password & security policies, limited access to network devices
- Mid-Level Security
  - 802.1x port security, BPDU Guard, etc.
- High-Level Security
  - IDS, IPS, Cisco NAC, etc.

# Selectively Adding Capacity

- More often than not, capacity is not the constraint that impedes network performance.
- Adding network capacity is more than simply adding bandwidth.
- Before you can add capacity, you need to understand how your LAN/WAN is operating and where you need additional capacity.

# Monitoring The LAN

- If you can't measure it, you can't manage it.
- Most Network Management Systems (NMS) use Simple Network Management Protocol (SNMP)
- Can provide pro-active and re-active tools routers, switches, servers, workstations, etc.
- Provides forensic tools to analyze bandwidth usage – potentially down to the packet level

# Network Management Systems

- Cisco Works LAN Management Solution
- HP OpenView
- Nortel Enterprise Management System
- SolarWinds Orion
- Manage Engine OpManager
- Kiwi Cat Tools
- CA Unicenter
- What's Up Gold
- Multi-Router Traffic Grabber – Free Product

# Network Readiness Assessment

- Define your network needs for today and tomorrow
- Define your QoS requirements
- What is the required / desired level of redundancy?
- Fully inventory, document, and diagram all LAN / WAN equipment (including topology, protocols, etc.)
- Perform a network security review
- Establish utilization and performance bench-marks



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# Software Demonstration

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