

◀ Lab 4.5.6 Switched LAN design - Overview

Estimated time: 60 min.

Objectives:

- Analyze requirements for a simple Local Area Network with Internet access.
- Design a Layer 1 and 2 topology based on switched Ethernet and given requirements
- Determine the type, number and location of Ethernet switches and cabling required based on wiring closet locations for MDF and multiple IDFs based on a simple floor plan
- Research the Cisco web site and those of Cisco vendors for models and costs

Background:

This lab will help prepare for the Case Study. In this lab you will be given some basic requirements for a small LAN that spans multiple buildings. Your focus is on the physical topology and Data link layer components. The goal is to replace an aging 10BASE2 thinnet Ethernet network with current technology Ethernet switches and cabling based on structured cabling standards and the extended star topology. You will decide which type of Ethernet switches to use and where to place them. You will also determine which type of cabling to use based on the requirements given. Your users will need access to several servers and they will need to be placed in the most effective locations. You will use vendor catalogs and web based research to find out the model numbers and costs of various switched Ethernet solutions.

Tools / Preparation:

This is a research lab and will not require a physical lab setup. You will need access to data communications equipment catalogs and web access for research. Use the Cisco web site URLs listed below. Work in teams of 3 or more. Before beginning this lab you should read the Networking Academy Second Year Companion Guide, Chapter 4 - LAN Design. You should also review semester 3 On-line Lesson 4. The following is a list of equipment required.

- PC with Internet access for product research
- Data communication vendors catalogs

Web Site Resources

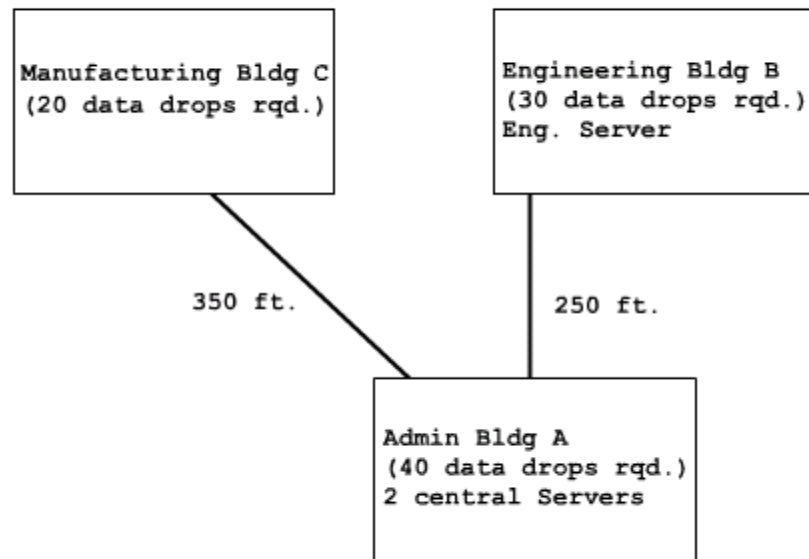
- [LAN Switching basics](#)
- [General information on all Cisco products](#) - (Scroll down to chapter 15 - Switches)
- [1900 / 2820 series Ethernet switches](#)
- [2900 series Fast Ethernet switches](#)
- [3500 series Gigabit Ethernet switches](#)
- [Cisco switch clustering technology](#)

Notes:

Step 1 - Review the requirements.

You are designing a LAN for a small company with one location and several buildings that need to be interconnected. Use the building diagram and requirements listed to decide what type of switches and cabling should be run where.

1. There are 3 buildings in a campus arrangement - Admin, Engineering and Manufacturing
2. Admin is Building A, Engineering is building B and Manufacturing is building C
3. The Admin building is between Engineering and Manufacturing
4. The distances between the buildings are shown in the diagram
5. There is a wiring closet in each of the buildings
6. The wiring closet for the POP is in the Admin building
7. There are 35 PCs and 5 printers that need network access in the Admin building
8. There are 27 PCs and 3 printers that need network access in the Engineering building
9. There are 18 PCs and 2 printers that need network access in the Manufacturing building
10. The customer wants the fastest Ethernet switching technology available for the backbone
11. The customer wants to keep cost down for the workstation connections
12. All users need access to the Internet and two centralized file and print servers
13. Engineering users need local access to a high performance departmental server



XYZ Company Data Network

Fill in the table and answer the following questions based on your knowledge of Ethernet switching equipment, routers and structured cabling standards.

1. Admin building A - MDF / POP Equipment (40 data)

Equip. Type	Model No.	Qty.	No./Type Ports	Description/Function	Cost

2. Engineering building B -- IDF 1 Equipment (30 data)

Equip. Type	Model No.	Qty.	No./Type Ports	Description/Function	Cost
			(1)		

3. Manufacturing building C -- IDF 2 Equipment (20 data)

Equip. Type	Model No.	Qty.	No./Type Ports	Description/Function	Cost

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4. What type of cabling will you run from the switches in the wiring closets to the users desk workstations and why?

5. What will be the speed of these links?

6. What are some terms related to this type of cabling?

7. What type of cabling will you run from the MDF/POP in building A to buildings B and C ar

8. What will be the speed of these links?

9. What are some terms related to this type of cabling?

10. Why is the wiring closet in the Admin building the best place for the MDF?

Lab 4.5.6: Switched LAN design - Answers

1. Admin building A - MDF / POP Equipment (40 data)

Equip. Type	Model No.	Qty.	No./Type Ports	Description/Function	Co (va
Ethernet Switch	3508G-XL	1	(4) 1000SX fiber (4) 1000TX copper	Gigabit backbone switch aggregation point (center of star)	
Ethernet Switch	3548-XL	1	(48) 10/100TX copper (2) 1000TX copper	Fast Ethernet (10/100) switch for servers and desktops with 2 Gigabit copper uplink to 3508	
Router	2620	1	(1) 10/100TX (2) WAN serial	Internet Router with Fast Ethernet interface to LAN	

2. Engineering building B -- IDF 1 Equipment (30 data)

Equip. Type	Model No.	Qty.	No./Type Ports	Description/Function	Co
Ethernet Switch	3524-XL	1	(24) 10/100TX copper (1) 1000TX cop (1) 1000SX fiber	Fast Ethernet (10/100) switch for servers and desktops with Gigabit fiber uplink to 3508 in MDF	
Ethernet Switch	3512-XL	1	(12) 10/100TX copper (1) 1000TX copper	Fast Ethernet (10/100) switch for server and desktops with Gigabit copper uplink to 3524	

3. Manufacturing building C -- IDF 2 Equipment (20 data)

Equip. Type	Model No.	Qty.	No./Type Ports	Description/Function	Co
Ethernet Switch	3524-XL	1	(24) 10/100TX copper (1) 1000SX fiber	Fast Ethernet (10/100) switch for desktops with Gigabit fiber uplink to 3508 in MDF	

4. What type of cabling will you run from the switches in the wiring closets to the users desktop workstations and why? CAT5E UTP - distance less than 100ft and cost is concern

5. What will be the speed of these links? Fast Ethernet (100Mbps) full duplex = 200Mbps

6. What are some terms related to this type of cabling? Horizontal, copper, 100BASE-TX

7. What type of cabling will you run from the MDF/POP in building A to buildings B and C and why? Multimode fiber - due to distance, resistance to electrical problems and security

8. What will be the speed of these links? Gigabit Ethernet (1000Mbps) full duplex = 2000Mbps

9. What are some terms related to this type of cabling? Vertical, Backbone, fiber, 1000BASESX

10. Why is the wiring closet in the Admin building the best place for the MDF? It is centrally located and the POP (Point of Presence) for the telco is there