

Test 1: NET3011 – Advanced Switching

Winter 2013

Time: 50 minutes; Test scored out of: 45 Total Marks available: up to 48
(Allocation of marks is shown beside each question)

Instructions:

1. **BEFORE** answering any questions, please check that your copy of the test has all pages (as indicated in the footer at the bottom of each page). Please read all questions carefully, then answer question 0 first!
2. This is a **closed book** test. No textbooks, notes, electronic devices, or any other aids are permitted. (The only exception is ASL interpreters.)
3. If you are uncertain what a question is asking, make reasonable assumptions, write those assumptions down on this test paper, and continue answering the question.

0. What is your:

NAME? _____

(Continued on next page)

1. [3 marks] In Chapter 1 of the textbook, Cisco presents a number of networking models, including a three layer "Hierarchical Campus Model" which is used as the basis of this course. **Clearly** identify the three layers and provide 1-2 descriptive sentences about each layer. (Of course a diagram is always helpful!)

See textbook pp.6-7 or Ch 1 slide deck slides 8-12 and 26-32 for details

Access: bottom layer; local & remote user/workgroup access to network;
ACLs and QoS may be implemented here; primarily L2 switches

Distribution: middle layer; aggregates access layer devices; IP routing implemented
establishes a boundary definition and defines policy for the network

Core/Backbone: top layer; focus is on max speed so no ACLs, encryption, NAT
primarily L3 routers

2. [2 marks] Name and **clearly** describe & **differentiate** the first two phases of the PPDIOO model. (They both start with "P"; what are they and what's the *difference* between them??)

See p 37 of the textbook as well separate as PPDIOO slide deck.

"Prepare" focuses on organization requirements and financial considerations, and identifies technologies only from a high level in order to achieve the objectives.

"Plan" focuses on networking requirements, infrastructure, operating environment, time lines, costs, and required resources (ie. much like *any* overall plan!)

3. [2 marks] **Clearly** describe how to remove all VLAN information from a Cisco switch.
Ref: Cisco labs 1.1 and 1.2

Completely disconnect switch from rest of network:

- remove all cabling other than console cable, or
- administratively shutdown all ports

Delete all stored VLAN info: `del vlan.dat`

Reboot switch: `reload`

4. [2 marks] **Clearly** identify the **necessary** conditions for VLAN information to be exchanged between a pair of switches. [1 mark per **pair** of items]
Must have a trunk link established between the switches
Both switches must have the same VTP domain (and password, if used)
At least one switch must be in VTP server mode
The other switch must be in VTP server or client mode (not transparent)
The switches must have **different** config revision numbers

5. [6 marks] Name and **clearly** describe the VTP modes (available on our lab equipment): what can/will they do, and what can/will they not do? Ref: Ch2-VLAN-2, slide 26

[2 marks per mode]

Server: can add, delete, edit VLANs; VLAN database updated from VTP msgs;
will propagate VTP msgs in same VTP domain

Client: can not add, delete, or edit VLANs; VLAN database updated from VTP msgs;
will propagate VTP msgs in same VTP domain

Transparent: can add, delete, edit VLANs; VLAN database not updated from VTP msgs;
will propagate VTP msgs in same VTP domain

6. [5 marks] **Clearly** define and distinguish the terms: *default VLAN*, *Native VLAN*, *Management VLAN*, *User VLAN*, and *Blackhole VLAN*. Be sure to include some relevant protocols and any specific VLAN numbers in your definitions. [1 mark per VLAN type]

Definitions for Cisco boxes as per slide deck on VLAN types:

- default VLAN: always VLAN 1; by “default” all other VLANs start off in VLAN 1
- Native VLAN: the (one) single VLAN that runs across a trunk untagged; configurable;
choice of specific VLAN number is according to local/company policy
- Management VLAN: the VLAN you do **not** share with ordinary users! For telnet & SSH
access to configure & manage network equipment; locally chosen
- User VLAN: any VLAN (probably several) used for “ordinary” user data; locally chosen
- Blackhole VLAN: defined purely for security purposes; never allowed across trunk links
choice of specific VLAN is according to local/company policy;
new equipment is given a “blank” config with all ports in this VLAN
and then ports actually in use are re-configured to some other VLAN

7. [2 marks] Name and give a **clear**, brief description of the two kinds of algorithms which are used in Etherchannel (ie. for choosing which link to use). When is each one used?

XOR: the bitwise XOR operation; used when two fields (src, dst) are used to choose

hash: a complicated algorithm (hopefully evenly random); used for single fields

12. [4 marks] **Clearly** state and/or explain at least 4 Best Practices for VLAN design.
[Ref: Ch2-VLAN-1 slide 8]

- One to three VLANs per access module and limit those VLANs to a couple of access switches and the distribution switches.
- Avoid using VLAN 1 as the "blackhole" for all unused ports.
Use a dedicated VLAN separate from VLAN 1 to assign all the unused ports.
- Separate the voice VLANs, data VLANs, the management VLAN, the native VLAN, blackhole VLANs, and the default VLAN (VLAN 1).
- Avoid VTP when using local VLANs; use manually allowed VLANs on trunks.
- For trunk ports, turn off Dynamic Trunking Protocol (DTP) and configure trunking.
- For trunking, use IEEE 802.1Q rather than ISL because it has better support for QoS and is a standard protocol.
- Manually configure access ports that are not specifically intended for a trunk link.
- Keep all data traffic off VLAN 1; only permit control protocols to run on VLAN 1 (DTP, VTP, STP BPDUs, PAgP, LACP, CDP, etc.).
- Don't use Telnet because of security risks; enable SSH on management VLANs.

13. [2 marks] **Clearly** explain reasons why Etherchannel load balancing may **not** distribute frames evenly across all links. [1 mark=variability; 1 mark=choose only 1 link for majority]

The load balancing algorithm (either XOR or hash) depends on having fields that **vary**. If a majority of the traffic uses addresses (src / dst) that are the same, the algorithm will choose the same link for all that traffic, resulting in an unbalanced loading.

14. [1 marks] What is VTP pruning? **Clearly** describe (explain) it.

VTP pruning: Eliminate unnecessary broadcast/flooded frames when it can be determined in advance that no hosts participate in the relevant VLAN at the far end of a trunk. **NB:** *knowledge* of the relevant VLAN is **never** pruned!

15. [2 marks] After successfully clearing and resetting one of our lab switches, an admin configures two VLANs. What would "`sh vtp status`" display for the Configuration revision number and total number of VLANs? Explain.

Total # of VLANs = 7 = 5 default (#1, #1002-1005) + 2 configured
Revision number = 2 (switch just reset; exactly two VLAN edits by adding 2 VLANs)

16. [2 marks] **Clearly** identify all the conditions under which DTP will successfully create a trunk link. Include the **exact** names of any relevant modes.

As covered in textbook and slide notes:

Need one of dynamic desirable or trunk on one side;

dynamic auto, dynamic desirable, or trunk on other side

17. [2 marks] **Clearly** identify all the conditions under which LACP will create an aggregated link. Include the **exact** names of any relevant modes.

As covered in textbook and slide notes:

First option: "on" on both sides;

Second option: active on one side; active or passive on the other side

18. [Up to 3 marks] Pick your favourite question from **last year's** midterm that is not on this midterm. Write that question **clearly** and provide the **correct** answer. [Max 3 marks, using the same marking scheme as last year.]