

Test 1: NET3011 – Advanced Switching

Winter 2014

Time: 50 minutes; Test scored out of: 45 Total Marks available: at least 46
(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. [1 mark] Cisco uses the terms "Layer 2 switch" and "Layer 3 switch". What capability does a Layer 3 switch have that a Layer 2 switch does **not**? [Ref: Ch 1, p. 12]

routing capability

2. [3 marks] What are the steps that a switch performs when processing a frame? The steps should include the possibility that the frame traverses a trunk link. [Ref: Quiz 1]

1. Re-compute CRC
2. Discard frame if bad CRC; otherwise continue processing
3. Determine VLAN:
 - for access ports, according to configured VLAN
 - for trunk ports, according to VLAN tag on frame (or Native VLAN if no tag)
4. Look in MAC address table, according to VLAN, for possible match
 - if match, then select single egress port
 - if no match, then select flooding as egress method
5. Determine whether to add or strip VLAN tag:
 - **Add** a tag if passing from access to trunk (new tag = access VLAN #)
 - **Strip** the tag if passing from trunk to access
 - **No change** if *not* crossing access / trunk boundary
6. If VLAN tag added or stripped, re-do CRC
7. Forward the frame to selected egress port(s)

3. [2 marks] **Name** and **clearly** describe & differentiate the last two phases of the PPDIOO model. (They both start with "O"; what are they and what's the *difference* between them??)

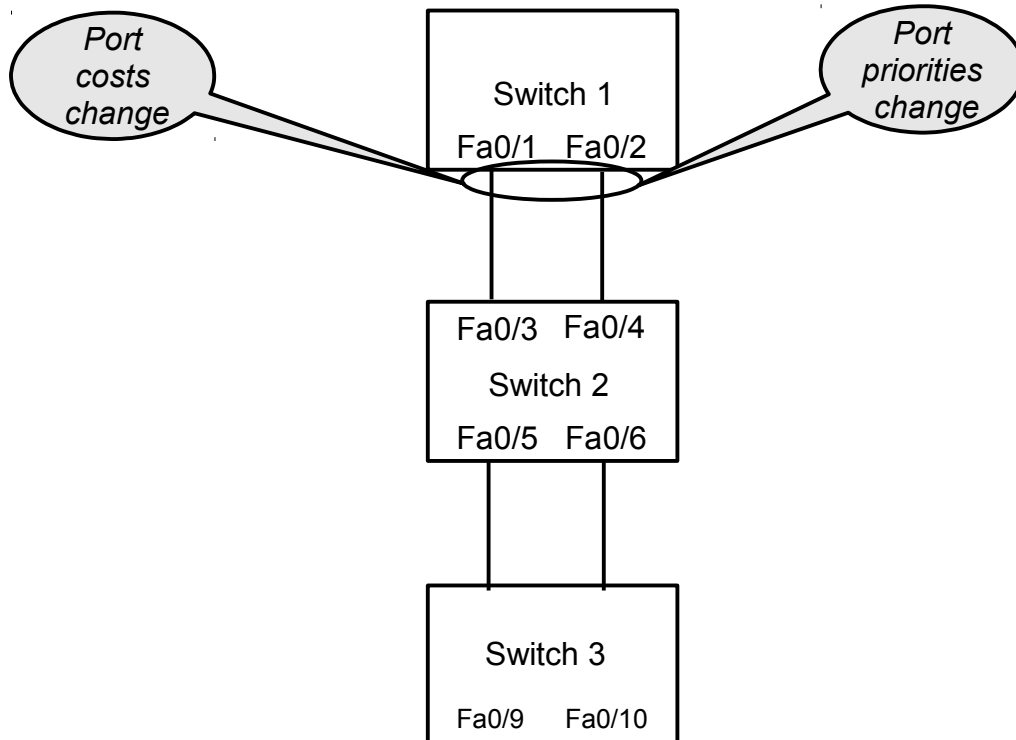
Operate: maintaining network health through day-to-day operations, including maintaining high availability and reducing expenses. The fault detection, correction, and performance monitoring that occur in daily operations provide the initial data for the optimization phase.

Optimize: Proactive management to identify and resolve issues before they affect the organization. Reactive fault detection and correction (troubleshooting) is needed when proactive management cannot predict and mitigate failures. Can prompt a network redesign if too many network problems and errors arise, or if performance does not meet expectations.

4. [1 mark] According to Cisco's definitions (contained in the textbook), is Algonquin a:
- (A) small campus network
 - (B) medium campus network
 - (C) large campus network **correct**
 - (D) none of the above (a trick question because of the wording of all the answers A-C)
5. [2 marks] What are the exact commands required to capture the complete configuration of a switch?

```
sh run
sh vlan
sh vtp status
sh vtp password
```

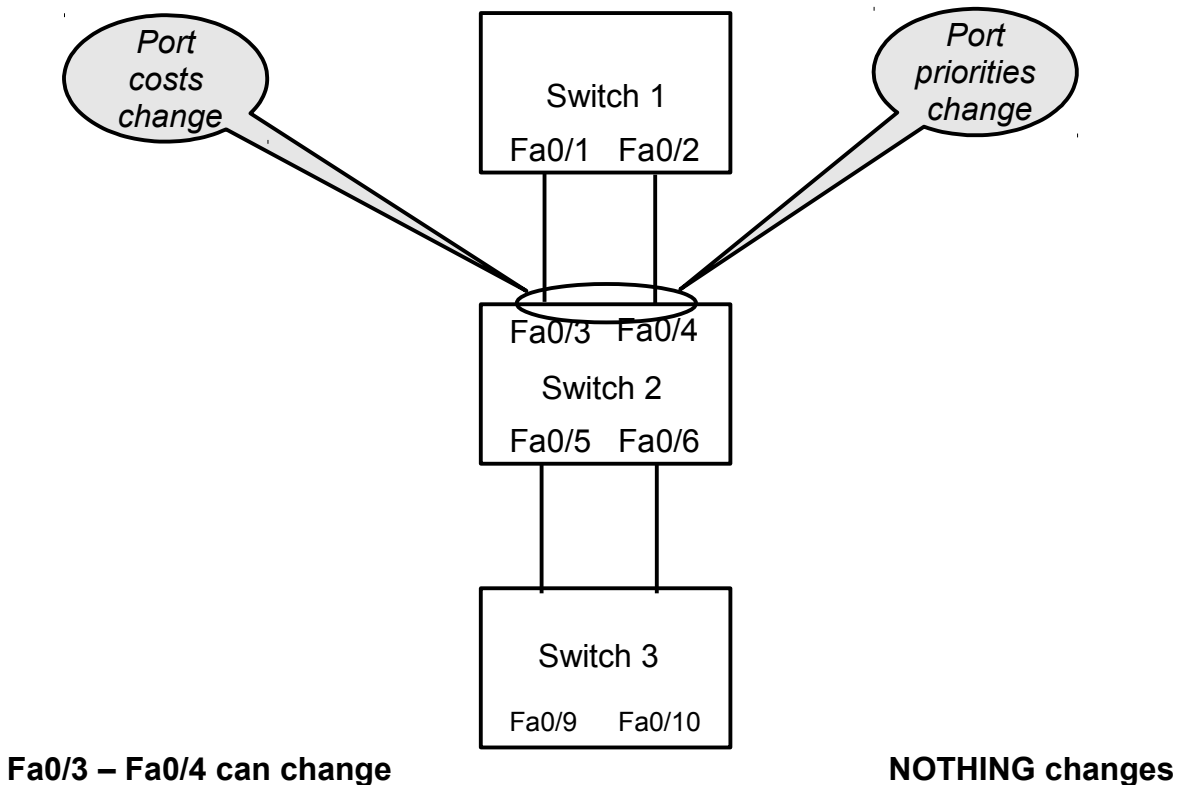
6. [2 marks] The diagram below shows a small network of 2960 switches running STP. There are two **separate, independent** scenarios. In scenario #1 (on the left), only the configuration of the port costs for fa0/1 and fa0/2 are changed. In scenario #2 (on the right), only the configuration of the port priorities for fa0/1 and fa0/2 are changed. **Clearly** indicate for each scenario (left, right), which STP port states could change as a result of the configuration. If it helps, you may assume that Switch 1 is the root switch. [Ref: Lab 3.2]



NOTHING changes

Fa0/3 – Fa0/4 can change

7. [2 marks] The diagram below shows a small network of 2960 switches running STP. There are two **separate, independent** scenarios. In scenario #1 (on the left), only the configuration of the port costs for fa0/3 and fa0/4 are changed. In scenario #2 (on the right), only the configuration of the port priorities for fa0/3 and fa0/4 are changed. **Clearly** indicate for each scenario (left, right), which STP port states *could* change as a result of the configuration. If it helps, you may assume that Switch 1 is the root switch. [Ref: Lab 3.2]



8. [4 marks] Your co-worker is trying to get a promotion, so he took the Boss out for lunch & a round of golf, and talked about boosting the entire company's bandwidth using link aggregation. He told the Boss that configuring link aggregation on any Cisco switch is completely foolproof and guaranteed to increase the usable bandwidth under all conditions. The Boss has given you 2 days and a staff of 1st year BIT-NET students to boost all network speeds. What could possibly go wrong?? Separate your answer into specific items.

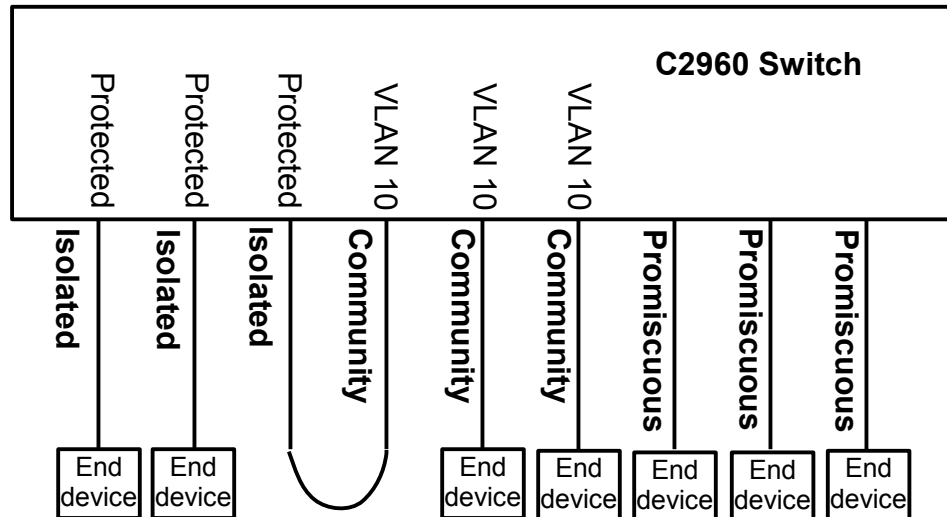
[1 mark per item in the list below]

- incompatible protocol settings (ie. different protocols, or auto/auto, or passive/passive)
- mis-matched params for the different links (will fail to aggregate)
- incorrect # of links (ie. something other than a power of 2)
- poor load-balancing (unsuitable choice of load-balancing algorithm or heavy individual flows)

9. Study the diagram below carefully. It shows a Cisco 2960 switch with 3 ports using the basic protected port feature, and three ports in VLAN 10. All other settings are at their default. [Ref: pVLAN quiz]

[1 mark] On which interfaces, if any, will VLAN tags be present in the frames? None!

[3 marks] **Label** each interface with its **equivalent pVLAN functionality**. Be as specific as possible. (Answer on diagram)



10. [1 mark] In a pVLAN configuration on a single Cisco 3560 switch, such as the one in Lab 2.9, which of the interfaces has VLAN tags present in the frames? [Ref: Lab 2.9]
None!

11. [2 marks] You need to back up the VLAN configuration for a dozen (or more) network switches, which are all cascaded in one long chain. Your colleague says that all VLAN configs are identical to the root bridge, which is in VTP server mode. To prove it, he creates a new VLAN on that switch and then new VLAN appears on the very last switch in the chain. What do you say? Explain and justify your answer, whether you agree or disagree!

No, not correct; one or more switches could be in Transparent mode
Any Transparent mode switches could propagate the new VLAN info in the demo, so their presence would not be revealed with the above test. Any VLAN config configured on the Transparent switches could well be (very) different and would be lost if not backed up separately.

Oh, yeah, don't forget that the STP root has **NOTHING** to do with VTP server/client status
So the comment about the root bridge is a total red-herring. ..

12. A. [5 marks] We have discussed 5 different categories for VLANs. Give the name and **clearly** describe each of the 5 categories. Include specific VLAN numbers and example protocols where appropriate. [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

- B. [2 marks] One of the VLAN categories above *shouldn't* have any traffic flowing into it. Which category is it? **Clearly** explain why we don't expect any traffic.

Blackhole VLAN should **not** have traffic since it is explicitly **not** supposed to be used. Any traffic would likely be an indication of cabling error(s) and/or attempts at hacking.

- C. [1 mark] In several labs this semester, starting with Lab 1.2, you've used a shortcut command which allows you to configure multiple interfaces all at once. What is this command? (eg. for configuring interfaces fa0/1 – fa0/24)
interface **range** fa0/1-24

13. A. [1 mark] We have discussed two different models or architectures for VLAN design. Which one requires trunking?

End-to-End VLANs require trunking; local VLANs do not.

- B. [1 mark] Can trunking be used over an etherchannel link? [Ref: lab work] For sure!

- C. [1 mark] In Cisco's "Heirarchical Campus Model", is trunking used at the Access layer? If yes, identify **clearly and specifically** where it is used. [Ref: p. 29-30]

No, it's not used on the links to the host devices

OR Yes, it's used on the up-links to the distribution layer

- D. [1 mark] In Cisco's "Heirarchical Campus Model", is trunking typically used at the Core layer? If yes, identify **clearly and specifically** where it is used. [Ref: p. 30-31]

No, it's not typically used in the core (all L3 routed traffic)

- E. [2 marks] What are the recommended Best Practices for VLAN design that relate to trunking? You **must** give supporting info (for example, the reason) for each recommendation! [Ref: VLANs slide 8]

disable DTP & use static trunking (less vulnerable to attack, so more secure)

use 802.1Q instead of ISL: industry standard; fewer bytes; support for QoS markings

14. [2 marks] **Clearly** identify all **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

15. [4 marks] Some 2nd year BIT-NET students are discussing VLANs. Unfortunately they are confused about the maximum number of VLANs. Some students say the maximum is 255, others say 1000, others say 1005, and one student even says 4096. To prove that you're smarter (ie. a 3rd year student!!), **clearly** explain the correct answer and respond to **each** student so that s/he can go away **not** feeling like a complete fool.

[1 mark for each correctly explained limit]

- 255 is a limit on the maximum number of VLANs in use **simultaneously** (eg. C2960)
- 1000 (#2-1001) is Cisco's limit on the (truly) available choices of VLAN # in VTP ver 1-2
- 1005 is Cisco's limit on total available choices of VLAN # (incl pre-configured VLANs)
- 4096 isn't correct for the VLAN range, since #0 and #4095 aren't allowed, so 4094!

If you're really interested, check out:

http://www.cisco.com/en/US/docs/switches/lan/catalyst3750x_3560x/software/release/12.2_55_se/configuration/guide/swvlan.html#wp1092283

16. [2 marks] Complete the DTP chart below, to show the result when combining each possible combination of DTP modes. Be sure to use the **correct** term for the resulting state, and indicate any problematic combination(s). [Ref: slide Ch 2-32]

	access	dyn. auto	dyn. desirable	trunk
access	access	access	access	Problem!
dyn. auto	access	access	trunk	trunk
dyn. desirable	access	trunk	trunk	trunk
trunk	Problem!	trunk	trunk	trunk

Extra Work

Marks are awarded for a reasonable attempt at complete, comprehensive commentary. Commentary must be convincing that the video had been watched and reflected upon.

[max 3 marks] Bonus question for following the instructions: Discuss, with insightful comments, any of the four short videos that you have been asked to watch. Use the space above.