# Midterm Test: NET3011 – Advanced Switching

Winter 2016

Time: 110 minutes; Test scored out of: 68 Total Marks available: 76
(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 instructions and 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.

3. If you need extra space, please continue your answer on the last page.

4. 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; Lab] What four commands will clear a switch, guaranteed?

2. [1 mark; Quiz 2] What are the three criteria that define a *managed* switch?

3. [2 marks] **Clearly** define and thus explain the difference between "cut-through" switching and store-and-forward switching.

4. [1 mark] Wireshark can tell whether a frame is Ethernet II or 802.3 format. **Clearly** explain exactly how does Wireshark *always* get it correct?

5. [2 marks; Quiz 1] What are the five steps in the sequence of operations when an *unmanaged* switch receives a frame?

6. [1 mark] The fact that routers need to compute new CRCs is old news. **Clearly** explain if / when a *managed* switch ever needs to compute a *new* CRC. If never, simply say "never".

7. [1 mark] Clearly identify if / when VLAN tags are ever *swapped* by a switch operating only at L2. Consider all operations such as going between access port and trunk, or between trunks.

8. [4 marks] Give at least 2 *distinct* pros or cons for *each* of the two models of VLAN design.

9. [2 marks] In a campus environment, which model for VLAN design is most appropriate for mobile Wifi access? **Clearly** explain *why*.

10. [2 marks; 1 mark/pair] Clearly identify at least 4 of the 7 generic VLAN types.

11. [2 marks] Draw a **clear** illustration of an 802.1Q tag, showing both the *name* and *length* of each field. Be sure to also show the *tag position* within an Ethernet frame.

12. [2 marks] Different Cisco switches support different numbers of VLANs. Other than reasons of cost, **clearly** explain the rationale for the differences in the number of supported VLANs.

13. [2 marks] **Clearly** illustrate VLAN pruning by combining a diagram with a brief explanation.

14. [6 marks] **Clearly** describe at least 6 best practices for VLAN and trunking design.

15. VTP has a number of requirements in order to communicate between devices.
    A. [1] What must exist/be configured before VTP will even attempt to send a message?

    B. [2 marks; 1 mark/pair] What are at least four other parameters that must match for successful communication?

16. [1 mark] Give an example of a VTP command, unique to ver 3, that is **not** saved in the startup config? ("show" commands don't count!)

    [1 mark; Bonus] Give an example of at least one other VTP command that is **not** saved in the startup config? ("show" commands don't count!)

17. A. [1 mark] From which VTP modes can a VLAN be *suspended* ?

    B. [1 mark] From which VTP modes can a VLAN be *shutdown* ?

18. The textbook says on p. 8: *The most important aspect to MLS is recognizing that switches can **route** or "switch" frames at wire-rate speeds using specialized hardware*.

    A. [1 mark] **Clearly** identify this type of forwarding, using appropriate terminology.

    B. [2 marks] **Clearly** explain what specialized hardware is involved, give specific details of any data structures contained in that hardware.

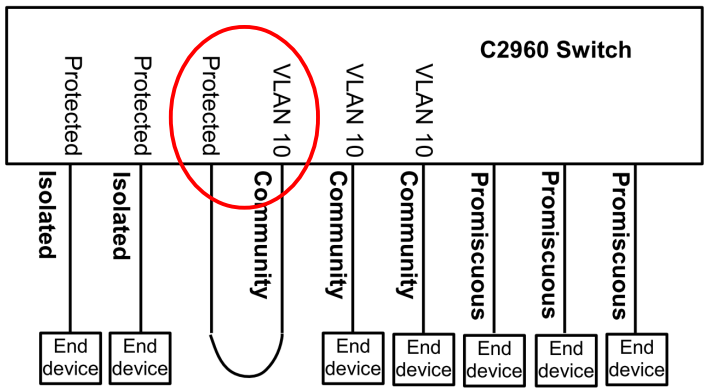
    C. [2 marks] **Clearly** *identify* and *explain* briefly at least two other methods of L3 forwarding.

19. Carefully read the following Wikipedia article (https://en.wikipedia.org/wiki/512K_Day):

> "*While a full IPv4 BGP table as of August 2014, is in excess of 512,000 prefixes, many older routers have a limit of 512k routing table entries. On August 12, outages resulting from full tables hit Ebay, Lastpass and the Microsoft Cloud among others, which TheRegister dubbed 512KDay. A number of Cisco routers commonly in use have TCAM, a form of high-speed content-addressable memory, for storing BGP advertised routes. On impacted routers, the TCAM is default allocated to 512k entries for IPv4 routes, and 512k entries for IPv6 routes. While the reported number of IPv6 advertised routes was only about 20k, the number of advertised IPv4 routes reached the default limit, causing a spillover effect as routers attempted to compensate for the issue by using slow software routing (as opposed to fast hardware routing via TCAM). The main method for dealing with this issue involves operators changing the TCAM allocation to allow more IPv4 entries*"

[2 marks] Give a **clear** explanation, with specific details including example commands, on how you would alter the TCAM allocation on a 3560 switch.

20. [2 marks] When using protected ports to achieve PVLAN functionality, it may be necessary to connect two interfaces directly together (see diagram). What configuration command(s) is/are necessary to ensure that neither of those ports gets disabled or put in blocking mode?



21. I read somewhere that: "To achieve the optimal traffic distribution in a LAG, always bundle an even number of links."

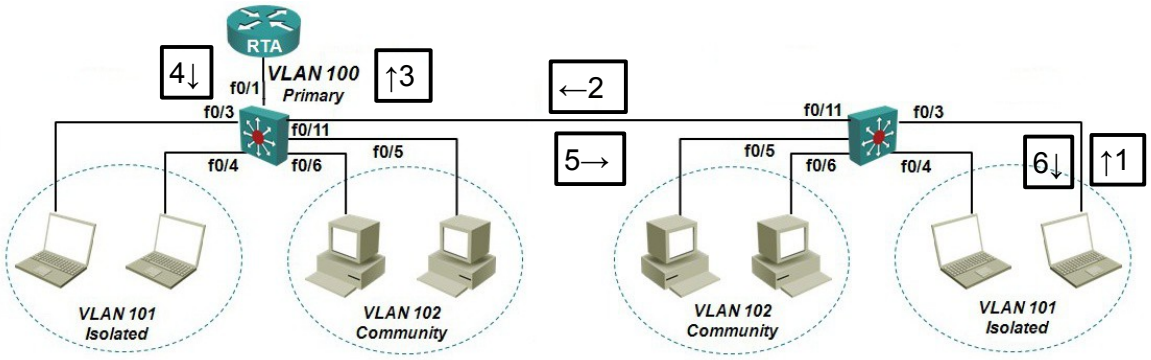
A. [2 marks] **Clearly** describe Cisco's two basic load balancing algorithms for a LAG.

B. [1 mark] **Clearly** explain why the above comment is, or isn't, correct.

C. [1 mark] How is it even possible for a network administrator to determine if a chosen load balancing option is effective?

D. [2 marks] **Clearly** explain why it would be desirable to have different load-balancing choices configured for each end of a LAG. Use a specific example in your answer.

22. [2 marks] The laptop on the very right side is pinging it's gateway, RTA. Identify the VLAN tags on an ICMP Echo Req and Reply throughout the PVLAN.



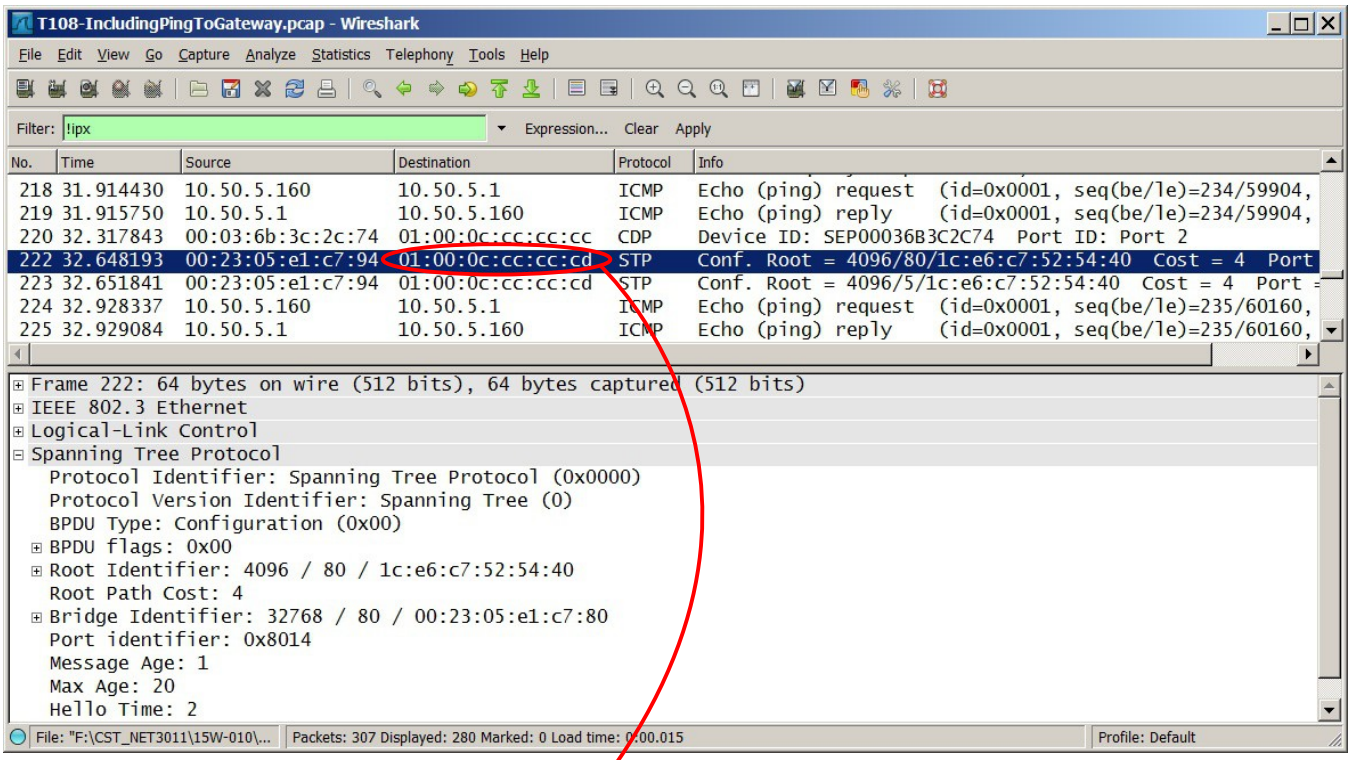

1-Echo Req from PC: ____ 2-Echo Req on trunk: ____ 3-Echo Req to RTA: ____

4-Echo Reply from RTA: ____ 5-Echo Reply on trunk: ____ 6-Echo Reply to PC: ____

23. A. [4 marks] You've memorized the criteria in the STP election processes. Draw a network topology diagram which **clearly** illustrates *each* of the four possible election criteria being used to determine the Root port.

B. [1 mark] Your topology diagram certainly indicates a shared-media segment (i.e. non point-to-point). Give an example of Ethernet technology that creates this type of segment.

24. A. [7 marks] In the wireshark capture below, circle the field(s) which provide the answer to the following questions about STP.




1. What is the destination MAC addr?
2. What version (STP, RSTP, MST)?
3. How far from Root Bridge?
4. What interface?
5. What speed link(s)?
6. Any non-default values?
7. What VLANs exist on this link?
8. Whether this is this a TCA or TC BPDU?

B. [1 mark] Is the interface identified above on the sending switch or the receiving switch?

C. [1 mark] Based on your knowledge of Cisco 2960 and 3560 equipment, give the actual, exact interface.

D. [1 mark] What would be the cost advertised by the switch with MAC 1C:E6:C7:52:54:40?

25. Examine the following output carefully. Be sure to **use it** as the basis for all your answers!

```
DLS1# show spanning-tree
VLAN0001
 Spanning tree enabled protocol ieee
 Root ID Priority  32769
 Address     1c17.d3d2.df00
 Cost        ???
 Port        11 (FastEthernet0/9)
 Hello Time  2sec  Max Age 20sec Forward Delay 15sec

 Bridge ID Priority 32769  (priority 32768 sys-id-ext 1)
 Address     7010.5c16.2580
 Hello Time  2sec  Max Age 20sec Forward Delay 15sec
 Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- ---------
Fa0/1               Desg FWD 10        128.3    P2p
Fa0/2               Desg FWD 20        128.4    P2p
Fa0/3               Altn BLK 30        128.5    P2p
Fa0/4               Root FWD 40        128.11   P2p
```

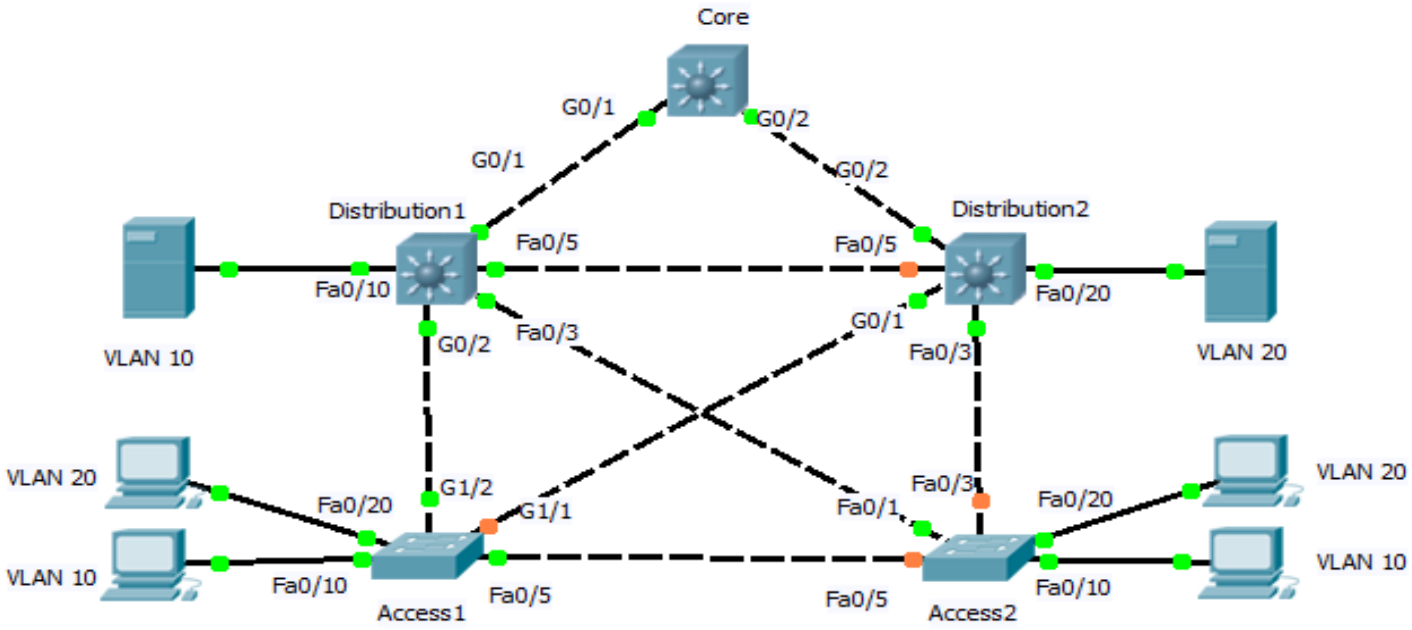
A. [1 mark] In the output above, which value is changed in response to receiving an STP TC BPDU? (This is not a trick question; ***one*** of the shown values ***is*** modified.)

B. [1 mark] Assuming the switch above is directly connected to the Root via a single 1Gbps link, what is the value of the Root path cost?

C. [1 mark] Can configuration made only on this switch affect the value of the Root path cost? If yes, give the (reasonably correct) command ; if no, simply say "no".

D. [2 marks] Using the available information, draw a sketch of where this switch is situated in the topology. Be as specific as possible but if sufficient information isn't available, you may label interfaces simply as "towards Root", "to peer Sw", or "to lower level switches".

26. [3 marks] In the diagram below, **clearly** mark where to apply each STP optimization:




– Mark everywhere to apply Backbone fast with a "B"
– Mark everywhere to apply Loopguard with an "L"
– Mark everywhere to apply Uplink fast with a "U"

# Extra Work