
ADVANCED NETWORK SWITCHING

School of Advanced Technology**Course Number:**
NET3011**Contribution to Program:**
Core**Educator(s):**
Michael Anderson**Applicable Program(s):**
Bachelor of Information
Technology – Network Technology**AAL:**
06**Approved For:**
Winter 2011**Course Hours:**
6 contact hours per week**Prerequisites:**
NET2001**Approved By:****Corequisites:**
NoneAndrew Pridham, Chair
Computer Studies Department**Approved for Academic Year:**
2010-2011**COURSE DESCRIPTION**

VLANs and inter-VLAN routing in a multilayer switched environment. Variants of STP and the use of related enhancements. Techniques for network redundancy and load balancing. Securing a switched infrastructure. Supporting advanced services including multicasting, and maintaining QoS for converged traffic (wireless, voice, video).

COURSE CURRICULUM

I. Course Learning Requirements/Embedded Knowledge and Skills

Course Learning Requirements	Knowledge and Skills
<p>To earn credit for this course, you must reliably demonstrate your ability to:</p> <ul style="list-style-type: none"> ○ Effectively design, deploy and troubleshoot multiple switches connected in an enterprise internetwork. ○ Identify key Layer 2 attacks and configure devices to mitigate the associated risks. ○ Explain and implement multicasting at an introductory to intermediate level, including: <ul style="list-style-type: none"> ○ the computation of a multicast MAC address corresponding to an IPv4 or IPv6 address ○ different architectures and mechanisms involved in delivering multicast traffic across a routed internetwork ○ Explain the design goals and underlying principles keynote to wireless segments and rich media traffic. ○ Prepare the network infrastructure in such environments. 	<ul style="list-style-type: none"> – campus network design models and principles – VLANs, link aggregation, trunks – Spanning Tree and related protocols for loop-free frame forwarding, while providing path redundancy – integration of L2 with L3: provisioning L3 addressing (DHCP), inter-VLAN routing, L3 switching – high availability network strategies, tools and designs – controlling trunk links – MAC-based attacks & L2 spoofing – tools for monitoring and analysis – how an IPv4 multicast address maps to a layer 2 address – the role of IGMP in grafting and pruning networks for traffic delivery to a multicast group – the role of multicast routing protocols such as PIM in providing reachability to multicast groups – impact of WLANs, voice and video traffic – Quality of Service (QoS) mechanisms and configuration

II. Learning Resources

Required Textbook:

Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide, by Froom, Sivasubramanian, Frahim, Cisco Press, ISBN: 978-1-58705-884-4 (1-58705-884-7)

Suggested Reference Books:

The following books are suggested to enhance your learning. They are NOT required texts for this course. Nothing presented in this course requires that you have (or have access to) these particular books.

- 1) CCNP SWITCH 642-813, Official Certification Guide, by David Hucaby, Cisco Press, ISBN: 1-58720-253-0
- 2) CCIE Routing and Switching Certification Guide (4/e), by Odom, Healy, Donohue, Cisco Press, ISBN 978-1-58705-980-3 (1-58705-980-0)

Lab Notebook:

During lab periods, you will be expected to have and maintain a separate lab notebook to manually record anything you may need to repeat or recall in the future. Some lab exercises may instruct you to record information in your lab notebook for future reference in follow-on labs. If you are involved in a troubleshooting exercise, the lab book will be particularly valuable for recording any issues, your diagnostic and corrective actions and the ensuing results. Proper documentation is a critical aspect of an effective problem solving methodology.

Functioning IT Account:

You need a functioning IT account to do work required for this course, sometimes while in the lab. **Make sure you have a functioning IT account!**

Required Equipment:

Each student will require:

- one eSATA drive kit (minimum 80 GB), and
- Virus protection software installed on the hard disk

Students are advised to purchase these items at the College Bookstore where they may be available in a single package at a bundle price. BIT-NET students who already have an older style drive and caddy from a previous course, will be able to continue using their caddy without needing to purchase a new eSATA drive.

Course activities are predicated on the use of the “Required Equipment” as stipulated, using the college-supplied software image, within the scheduled lab. Students attempting to use other hardware, platforms, etc. do so at their own risk

III. Teaching/Learning Methods

The course consists of 6 contact hours per week in a mixture of lectures and hands-on lab sessions. It is anticipated that you will need to spend an additional 3 - 6 hours per week, outside of that for readings, assignments and further study/research.

During this course you are likely to experience:

Classroom Lectures:

The classroom lectures will cover the core relevant material in each chapter of the required textbook, expanding on some of the topics presented while reviewing in more detail, other important concepts.

It is important to follow the theory sessions closely as they carry & expand the “knowledge” thread for the course, and are structured in a way to ensure intuitive and durable learning.

Certain topic areas will be briefly presented in “big picture terms” in the earlier lectures and then revisited in more depth later on in subsequent lectures or semesters.

Lectures will present part of the theoretical material of the course. Students are expected to attend all of the lectures. Students are encouraged to ask questions during lectures and to consult with the professors on topics, which they do not clearly understand. Professors will inform students, at the beginning of the course, of suitable times for consultations.

Online Cisco curriculum:

Unlike previous Cisco-embedded networking courses, no online Cisco curriculum will be available. Instead, students will be expected to have read the relevant portion of the required text PRIOR to attending lectures.

Online Cisco assessments, however, are still applicable via login to the Cisco Networking Academy site with your Cisco account user name and password.

Labs:

The labs are the hands-on component of the course, allowing students to apply relevant portions of the theoretical material in a more concrete way.

It is also important to follow the lab sessions closely as they do not necessarily “track” the theory lectures. The lab sessions are structured as independent stand-alone learning opportunities that *complement* the theory portion of the course.

Students are expected to perform initial analysis and design **before** their scheduled lab, in order to take advantage of the limited lab time. Laboratory assignments will be closely integrated with the theory material. The students’ ability to successfully complete the assigned exercises will directly correlate with their level of success on tests and the final exam.

While the text references and lectures constitute major sources of information for this course, additional information such as **.pdf** format course notes posted on the course website, Internet references, exercises, lab worksheets and other material will be provided as required.

This course requires you to learn material in the following broad areas listed below, and the organization of the theory and lab portions of the course will reflect this division of learning.

- A. Concepts related to “how it works”, “why it's necessary”, “where/when it's used”.
- B. Standards & practices related to applying the knowledge & technologies to achieve certain results.
- C. Recognizing relevant and valid applications of the technology, and knowing what to expect from them.
- D. Ways and means of dealing with malfunctioning networks.
- E. Evolutions and trends related to all the above.
- F. The acronyms and technical jargon associated with all of the above.

Case Study:

Integrative learning will be facilitated by means of one or more case studies as you may have experienced in past networking courses. Working in groups of 2 or more, students will be expected to distribute the workload amongst themselves to apply and integrate knowledge acquired not only throughout this course, but also from relevant courses in previous semesters.

Successful completion of case study projects may require proper documentation, in accordance with the methodology introduced in prior courses and reinforced again in this one. Marks will be allocated for appropriate, accurate complete and verifiable solutions, as evidence of the integration and application of networking knowledge and skills. Even though work on case studies necessarily occurs in a group, each student is individually responsible for knowing all facets of any work done by all group members.

IV. Learning Activities

Samples of learning activities may include:

- Self-directed reading and research (text and online materials)
- Lectures in-class or online
- Chapter quizzes
- In-class quizzes
- Assigned laboratory work, individually or in groups
- Individual homework assignments
- In-class exercises, individually or in groups

V. Course Content

It is anticipated that course topics will be covered according to the following week-by-week schedule, though the professor reserves the right to make adjustments as deemed necessary:

Week(s)	Topic
1	Campus Network Architecture
2 - 4	Implementing VLANs
5, 6	Spanning Tree Protocol (and variants)
7, 8	Integration of L2 with L3 (Inter-VLAN Routing & DHCP)
9, 10	High Availability
11	L2 Security
12, 13	Advanced Services Involving L2 (Multicasting, QoS, rich media delivery)

VI. Evaluation/Earning Credit:

The following will provide evidence of your learning achievement:

Assessment of student learning will be done by means of class and online tests, final exam and laboratory activities that include a “practical” lab test.

Laboratory attendance is compulsory, and absence from three or more laboratory sessions without the prior consent of the professor will result in a final grade of “F”. Students are responsible for keeping a record of the number of laboratory sessions they have missed. Your teacher is not responsible for informing students of an impending failure because of missed laboratory sessions.

The Computer Studies Department requires that all course assignments (homework exercises, laboratory work, projects, etc) be submitted by students using a standard which could be specific to one or more courses. Professors will ensure, at the beginning of the term, that students are advised of the exact details of these course specific submission requirements. Professors will also post them online alongside the course outline. Student submissions that do not meet the course published submission standards may not be marked, and may incur a penalty of up to 100% of the submission mark.

All laboratory assignments must be successfully completed in order to obtain course credit. Late assignments will be penalized and receive a mark of zero, but must still be completed. Any evaluation aspects missed will result in a grade of “0” for that item. In the case of a documented emergency or prior arrangement, the professor, in consultation with the Chair, will determine how the marks will be made up and/or final grade

adjusted.

All students are required to write the final exam. If, as a result of being off-track in your program, you note that there is a scheduling conflict in your final exam schedule, it is your responsibility to alert your course professor no later than one week before the start of the final exam period, to allow for any special arrangements. For any other situations resulting in a student not writing their final exam, the normal Carleton University rules for missed final exams will apply. See the following link for details:

<http://www.carleton.ca/calendars/ugrad/current/regulations/acadregsuniv2.html#2.5>

The factors determining the final grade are:

1. Tests, Quiz & Final Examination		60%
Formative Assessments	30%	
- Midterm Test(s)		
- Class Quizzes & Exercises		
Final Examination	30%	
2. Lab Evaluation		30%
Lab Exercises	10%	
- Write-ups		
- Case Study		
Practical lab test	20%	
3. Cisco Academy Online Test(s)		10%

In order to obtain a credit for this course, students **must**:

- a. achieve a minimum contribution of:
 - **30% from Evaluation Item #1**
 - **20% from Evaluation Items #2 & #3**
- b. achieve a passing grade in the Cisco CCNP SWITCH course

Lab Evaluation Details

Lab evaluation is conducted by the lab professor, and contributes significantly to your final grade. For this course, the following criteria must be satisfied in order to obtain a non-zero lab mark:

1. Satisfactory attendance and participation in the lab.
2. Satisfactory workmanship and behaviour in the lab.
3. Satisfactory adherence to rules prescribed for the lab facility.
4. Being prepared and equipped for lab work while in the lab.
5. Satisfactory completion of the work required within the lab period.
6. Satisfactory completion of any exercises and projects outside of lab hours.

Where there is a requirement for group work and/or sharing of hardware within a group, the lab professor reserves the right to reorganize/stipulate group memberships and to suspend or deny further access to the lab at any time if attendance and participation criteria are not being met. No allowances are made in the course for students whose access to the lab is suspended or denied for disciplinary reasons.