

IT 280 Study Guide

Winter 2013

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This is the **Official IT 280 Study Guide** for the IT 280 Computer Networking class taught by Don Colton, Winter 2013.

This study guide is focused directly on “what” and “when.” It talks about the description and grading of the exams and labs. It tells what is required for each one.

UPDATES: As we go through the semester, this study guide will be updated from time to time so it reflects the latest information on due dates, deadlines, and requirements.

There is also a textbook. It tells “why” and “how.” Its role is explaining things and telling how to make things work.

The textbook is “Networking 101: An Introduction To Networking,” by Don Colton. It is available in PDF form, free.

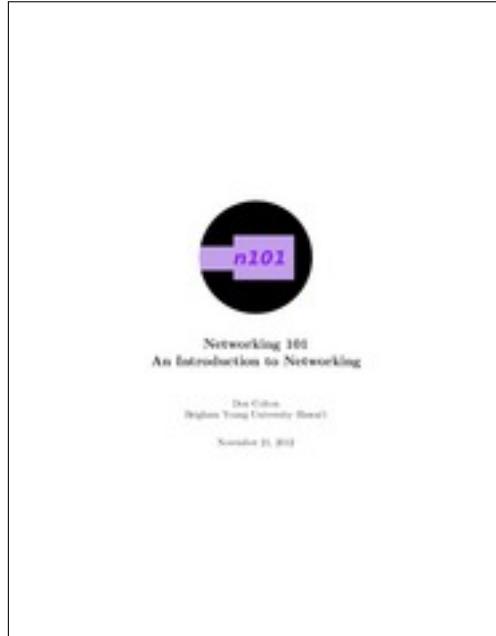
Free textbook:

<http://n101.tk/>

Alternate URL for textbook:

<http://n101.doncolton.com/>

The textbook is 99% stable, but new material is occasionally added and chapter numbering may even change. The index is good.



Contents

1	Overview	3
2	SN: Skill with Numbers	5
3	SS: Skill with Subnets	6
4	SV: Skill with VLSM	7
5	L1: Ethernet Cable	8
6	L2: Router Configuration	9
7	L3: Wi-Fi Site Survey	11
8	L4: Dia - Network Diagramming	14
A	Appendix	16

Chapter 1

Overview

As we go through the semester, this study guide will be updated from time to time so it reflects the latest information on due dates, deadlines, and requirements.

There are three skills tests. There are four labs. Each is described by a chapter in this study guide.

The phrase “due date” means the date by which you should have the assignment done so that you can consider yourself to be caught up with your classwork.

The word “deadline” means the date beyond which you cannot receive credit for your work unless you beg and grovel and have a really good excuse. And maybe not even then. A lot of work might never get done if it weren’t for “the last minute.” Accordingly we have a last minute, and it is called the deadline.

The period of time between the due date and the deadline is sometimes called the “grace period.”

The “grading label” is a short code that is used both in this study guide and in the gradebook to identify and track grades for activities.

Learning Objectives

This study guide (with the accompanying textbook) provides support for the following learning objectives. By the conclusion of this course, students

should be able to do these things.

- **Internet:** Explain how the Internet works. This includes topics such as connecting to the Internet, using the domain name system and using dynamic host configuration.
- **Home Networking:** Properly set up a home network. List and explain the different objects, media, and devices used in a home network that is connected to the Internet through an ISP. Design, install, configure, and manage a simple LAN, install services, and connect the LAN to the Internet.
- **Wireless Networking:** Design, install, configure, and manage a simple wireless LAN. This includes channel selection, WEP/WPA, SSID, and antenna considerations.
- **Security:** Explain what security typically exists and how to get more. Includes password selection, firewalls, and issues with opening up ports for gaming.
- **Theory:** Explain the following basic concepts: OSI 7-layer stack, protocol data units (packets, frames, etc.), udp, tcp, arp, and ports.
- **IPv4 Addressing:** Explain network masks, subnetting, address classes, private IP addresses, MAC addresses, collision domains, broadcast domains, and what a LAN is.
- **Power Tools:** Demonstrate the use of common network applications and utilities including ping, traceroute, ipconfig, dig, nmap, ssh, telnet, ftp, and Wireshark.

Chapter 2

Task SN Skill with Numbers

Networking uses several different number bases, with the most important one being binary.

This exam consists of 40 questions. There is a practice test with possibly many more questions. As you answer each question, it will tell you whether you got the answer right nor not, and will let you try again until you do get it right.

There are 5 questions that ask you to convert a number from binary into base 8 (octal).

There are 5 questions that ask you to convert a number from base 8 (octal) into binary.

There are 5 questions that ask you to convert a number from binary into base 16 (hexidecimal, or hex).

There are 5 questions that ask you to convert a number from base 16 (hex) into binary.

There are 10 questions that ask you to convert a number from binary into base 10 (decimal).

There are 10 questions that ask you to convert a number from base 10 (decimal) into binary.

Chapter 3

Task SS

Skill with Subnets

Networking uses IP addresses. The currently prevailing scheme is called IPv4, and divides the IP address into two parts: the network address and the host address. Subnetting divides the IP address into three parts: the network, the subnet, and the host.

This exam consists of xxx questions. There is a practice test with possibly many more questions. As you answer each question, it will tell you whether you got the answer right nor not, and will let you try again until you do get it right.

Chapter 4

Task SV Skill with VLSM

Chapter 5

Task L1 Ethernet Cable

- Status: Officially Assigned.
- Discussed:
- Due Date:
- Deadline:
- Grading Label: **L1**

Summary: Construct a working cat5 cable.

I will provide ice cubes, cable, a cutter-crimper, and a cable tester. Although most people complete the task in class within an hour, about 1/3 do not. You are allowed to borrow the equipment and return it later.

Grading Rubric (Rules for Grading)

20 Cable works as verified by cable tester.

20 Cable ends are neat.

Chapter 6

Task L2 Router Configuration

- Status: Officially Assigned.
- Discussed:
- Due Date: Thu, Feb 21, end of day.
- Deadline:
- Grading Label: **L2**

Print out the next page and go with it to see the teaching assistants in GCB 103.

They are probably available evenings, Tuesday through Thursday, maybe 7 PM to 9 PM. But check in GCB 103 for the correct times.

Write your name on the sheet.

The TA will fill in the other top blanks of the sheet. Then they will give you a router to work with.

Complete the activities on the sheet and have the TA check your work. They should sign the sheet.

Bring the sheet to me so I can record your credit.

1 Teaching Assistant Selections

Use the BEFW11S4 router provided by Bro Colton via the TA.

The teaching assistant (TA) should randomly select values for the following items. Write the values selected in the blanks below.

- (1) _____ Specify a LAN network number (third quad) between 2 and 255.
- (2) _____ Specify the Router Inside IP Address (last quad) between 2 and 99.
- (3) _____ Specify an Administrative Password to be used.
- (4) _____ Specify a Wi-Fi Password to be used (8+ chars).
- (5) _____ Specify a Wi-Fi SSID to be used.
- (6) _____ Specify a Wi-Fi Channel (1-11) to be used. (Not 6.)

2 Router Configuration

Use a laptop provided by the student, or a computer provided by the TA. The student demonstrates each item to the TA, or the TA verifies the item. The TA should initial the blank at the start of the line. When all items are verified, the TA should sign below. Where (1) through (6) are mentioned, replace them by the values specified above.

_____ (1a) Reset the router. Prove that this was done by showing the router configuration.

Call for the TA to verify the item above.

- _____ (2a) Set the router network to 192.168.(1).0.
- _____ (2b) Set the router internal IP address to 192.168.(1).(2).
- _____ (2c) Set the administrative password to the value (3) shown above.
- _____ (2d) Set the Wi-Fi password to the value (4) shown above.
- _____ (2e) Set the Wi-Fi SSID to the value (5) shown above.
- _____ (2f) Set the Wi-Fi channel to the value (6) shown above.
- _____ (2g) Activate Logging.

Call for the TA to verify the items above and below.

_____ (3a) Demonstrate that the laptop has an IP address issued by the router.

_____ (3b) Demonstrate that the laptop is connecting through the router to the Internet, and that several different web sites can be visited successfully.

_____ (3c) Demonstrate that Logging has occurred.

TA certifies that the lab was completed. Student or TA returns the form to the instructor.

_____ TA Signature

_____ TA Name

_____ Date

Chapter 7

Task L3 Wi-Fi Site Survey

- Status: Officially Assigned.
- Discussed: Mon, Mar 11.
- Due Date: Tue, Mar 19, 23:59.
- Deadline: Tue, Mar 26, 23:59.
- Grading Label: **L3**

A Wi-Fi Site Survey is checking for Wi-Fi signals that already exist in various places.

Your task is to visit several locations and record your findings. Then you will report the things you found interesting.

What is interesting? It depends on your purpose.

Are you planning to set up a new hotspot? Then you do not want to conflict with the channels already in use.

Are you planning to connect to free Wi-Fi with your laptop? Then you want something that is unlocked and has a strong signal. (Some businesses provide Wi-Fi to their customers: food places, laundries, doctors, hospitals, anyplace that keeps you waiting around, or wants to keep you around.)

Are you just looking for amusing WAP names? Then that would be interesting all by itself.

I am told that the visits and recording can be done in an hour or two, and the write-up is not terribly hard. Do not procrastinate.

This lab is to be done alone. You can travel in a group, but do not share your results. Make this your own work.

Scanning.



BYUH-Secure.



(Hidden)



I will check out a Hotspot Finder to you in class. I will show you how to use it. Basically you just go someplace, turn it on, let it find all the hotspots, and then you write down the results.

You may already own a Wi-Fi Hotspot Finder. It might be built into your laptop or cell phone. You are welcome to use it instead of the one I make available.

You will need a paper and something to write with.

7.1 Submitting Your Work

You must submit your work using my DCQuiz platform, the L3 assignment. It is basically one question: What is your report? Paste it in, make sure it is complete, and submit it for grading.

Work that is submitted early will be graded early, and if you did not get full credit, you will have an opportunity to update your report for more credit.

Notice that the deadline is Kuhio day, which is a holiday. The due date is

actually a week earlier.

7.2 Visits

On Campus: Visit at least five places that students might like to study. Make a note of your findings.

Off Campus: Visit at least two places around your neighborhood, or around Laie. Make a note of your findings.

7.3 Data

The Hotspot Finder gives information about each hotspot it detected. Following are examples of the information you can pay attention to and record.

Count: The finder may display something like “1/15”, “2/15”, etc. The bottom number tells how many wireless networks were found. The top number tells which of those networks you are reading about.

SSID: Each reading will tell the SSID, something like “BYUH-Setup” or “BYUH-Secure” or “(Hidden)”. There may be other possibilities. Some of these are very amusing.

Security: Each reading may display something like “WEP” or “WPA” or “unlocked icon”. There may be other possibilities.

ABG: Each reading may display something like “A” or “B” or “G” or “N”. These refer to 802.11(b) and related networking standards. There may be other possibilities.

Bars: Each reading will display signal strength, 0, 1, 2, 3, or 4 bars. There may be other possibilities.

Channel: Each reading will tell what channel is in use. It may be something like “CH1” or “CH11” or “CH48” or “CH149”. There may be other possibilities.

Chapter 8

Task L4 Dia - Network Diagramming

- Status: Officially Assigned.
- Discussed: Wed, Mar 20.
- Due Date: Thu, Mar 21, 23:59
- Deadline:
- Grading Label: **L4**

Purpose: To give you a way to create a network diagram.

Summary: Using the network described below, construct a one-page diagram. Email a PDF of your diagram to me.

You are supporting 3 routers and 5 work groups.

Router r1 connects to: r3.

Router r2 connects to: r3.

Router r3 connects to: r1 r2.

Work group Delhi has 31 users and connects to router r3.

Work group Honolulu has 57 users and connects to router r1.

Work group Istanbul has 15 users and connects to router r1.

Work group Lima has 23 users and connects to router r1.

Work group Warsaw has 12 users and connects to router r2.

We will use the Dia Diagram Editor. It is similar to Microsoft Visio. Dia is available free for Mac, Windows, and Linux (including Ubuntu).

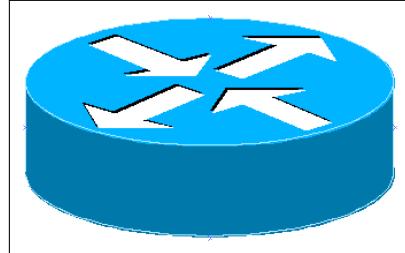
Google search “dia diagram editor tutorial” for instructions.

The required email subject line is:

Subject Line: **it280 L4 lastname, firstname**

Also include it280, L4, your name, and today's date on your diagram.

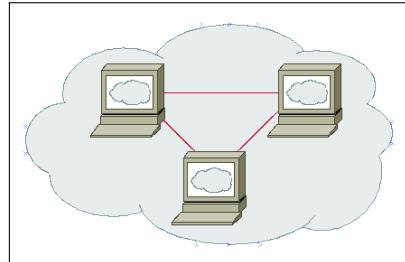
Use this symbol for each router. You can find it on the “Cisco - Switch” symbol sheet. Put a text label on each router that tells its designated name.



Use this symbol for each switch. (Put a switch between each router and its workgroup.) You can find it on the “Cisco - Switch” symbol sheet.



Use this symbol for each workgroup. You can find it on the “Cisco - Computer” symbol sheet. Put a text label on each workgroup that tells its designated name (location) and group size.



Connect the symbols with lines that indicate their wiring relationship to one another.

Appendix A

Appendix

A.1 Seeing Your Grade

<https://dcquiz.byuh.edu/> is where I maintain my online gradebooks.

There will be several gradebooks. One will have your overall grade. Another will have your portfolio points. In connection with your points, there may be comments. They may tell you how your grade was calculated.

Each grade is identified by a short label.

A.2 Emailing Me

At times you may want to email me regarding this class, or I may ask you to email something to me.

I will reply within 24 hours to every email I receive, unless it clearly does not need a reply. My reply will let you know (a) that I got your email, or (b) I have done whatever was requested. If you do not hear from me within a day, probably I did not get your email.

Here are the rules.

To: You can email to doncolton2@gmail.com or to don.colton@byuh.edu. They both end up the same place.

Subject: The subject line is important.

For email in general, it looks like this:

`it280 (normal subject line of your choice)`

The it280 gets it past my spam filter and helps me organize my work flow. Trust me, some days I get a lot of email. You don't want yours to be lost or overlooked.

The (normal subject line of your choice) is whatever you want it to be.

For email I requested, it looks like this:

`it280 (item) (lastname firstname)`

The (item) is usually a program identifier, or the words "study time".

The (lastname firstname) is the name by which you are known on my roll sheet. We will agree on that name early in the semester.

I may reply initially with something like "received" so you know I got it. This generally means I have not been able to do whatever was requested, but it is in my queue.

I often reply with "done" so you know I updated your study points.

Email is not 100% reliable. Maybe your email was lost. Maybe my reply was lost. If you do not receive a reply within a day, it probably means I did not get it. Check your sent mail, fix if necessary, and try again. Do you have the correct email address for me? Did you put "it280" at the start of the subject line?