

# Compass Honors High School

## Network Fundamentals



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### Course Overview

In this course, you will learn both the practical and conceptual skills that build the foundation for understanding basic networking. First, you will examine human versus network communication and see the parallels between them. Next, you will be introduced to the two major models used to plan and implement networks: OSI and TCP/IP. You will gain an understanding of the "layered" approach to networks and examine the OSI and TCP/IP layers in detail to understand their functions and services. You will become familiar with the various network devices (hubs, switches and routers), network addressing schemes (TCP/IP v4 and v6), and finally, the types of media used to carry data across the network.

In this course, you will gain experience using networking utilities and tools, such as Packet Tracer and Wireshark®, to explore networking protocols and concepts. These tools will help you to develop and understanding of how data flows in a network. A special "model Internet" is also used to provide a test environment where a range of network services and data can be observed and analyzed.

- A. Always feel free to contact your instructor if you have any questions or concerns any time before 9PM.
- B. There will be weekly Labs where we will have 'hands-on' projects, ONLY IF Class work, tests, and reading is done.
- C. Homework: There will be some homework assignments as needed to cover the curriculum. Most homework assignments will be reading sections of the online curriculum and some Internet research. I will try to keep the homework to a minimum depending on how much can be covered during class time. Most homework assignments will not take more than 10 – 15 minutes to complete.
- D. Attendance is an absolute must! We will be moving quickly in this class and have a lot of information to cover and Labs to do. If a student is absent on lab or lecture days it will be difficult to catch up.
- E. Discipline:
  - 1. As with all Compass classes there will be no talking or playing around. The only talking will be discussing our subject and collaborating during lab time. As soon as students enter the class they will need to log in to their computer and log in to the Cisco curriculum, and be ready for instruction to begin. We will have very little transition time.
  - 2. There is no excuse for damaging computers. It is a crime and will be reported to the police as vandalism.
- F. Notebooks are required. Handwritten notes are one of the best ways to remember information that is important and it makes a great reference for future use. Notebooks must be kept in an orderly fashion and must be legible. Notebooks will be checked periodically and credit will be given for taking notes. You may take notes in Microsoft Word if you would rather type. Tests are "open note!"

- G. Grading: There will be 11 chapter tests and a final exam making up the bulk of your grade. There will also be credit for attendance, class participation, and notebooks.

Material we will cover:

**Chapter 1** - Chapter 1 presents the basics of communication and how networks have changed our lives. You will be introduced to the concepts of networks, data, local area networks (LANs), wide area networks (WANs), quality of service (QoS), security issues, network collaboration services, and Packet Tracer activities. In the labs, you will learn how to set up a wiki and establish an instant messaging session.

**Chapter 2** - Chapter 2 focuses on how networks are modeled and used. You will be introduced to the OSI and TCP/IP models and to the process of data encapsulation. You will learn about the network tool Wireshark®, which is used for analyzing network traffic, and will explore the differences between a real network and a simulated network. In the lab, you will build your first network - a small peer-to-peer network.

**Chapter 3** - Using a top-down approach to teaching networking, Chapter 3 introduces you to the top network model layer, the Application layer. In this context, you will explore the interaction of protocols, services, and applications, with a focus on HTTP, DNS, DHCP, SMTP/POP, Telnet and FTP. In the labs, you will practice installing a web server/client and use Wireshark® to analyze network traffic. The Packet Tracer activities let you explore how protocols operate at the Application layer.

**Chapter 4** - Chapter 4 introduces the Transport layer and focuses on how the TCP and UDP protocols apply to the common applications. In the labs and activities, you will incorporate the use of Wireshark®, the Windows utilities command netstat, and Packet Tracer to investigate these two protocols.

**Chapter 5** - Chapter 5 introduces the OSI Network layer. You will examine concepts of addressing and routing and learn about path determination, data packets, and the IP protocol. By the end of this chapter, you will configure hosts to access the local network and explore routing tables.

**Chapter 6** - In Chapter 6, you will focus on network addressing in detail and learn how to use the address mask, or prefix length, to determine the number of subnetworks and hosts in a network. You will also be introduced to ICMP (Internet Control Message Protocol) tools, such as ping and trace.

**Chapter 7** - Chapter 7 discusses the services provided by Data Link layer. An emphasis is placed on the encapsulation processes that occur as data travels across the LAN and the WAN.

**Chapter 8** - Chapter 8 introduces the Physical layer. You will discover how data sends signals and is encoded for travel across the network. You'll learn about bandwidth and also about the types of media and their associated connectors.

**Chapter 9** - In Chapter 9, you will examine the technologies and operation of Ethernet. You will use Wireshark®, Packet Tracer activities, and lab exercises to explore Ethernet.

**Chapter 10** - Chapter 10 focuses on designing and cabling a network. You will apply the knowledge and skills developed in the previous chapters to determine the appropriate cables to use, how to connect devices, and develop an addressing and testing scheme.

**Chapter 11** - In Chapter 11, you will connect and configure a small network using basic Cisco IOS commands for routers and switches. Upon completion of this final chapter, you will be prepared you to go on to either CCNA Exploration Routing or CCNA Exploration Switching courses.