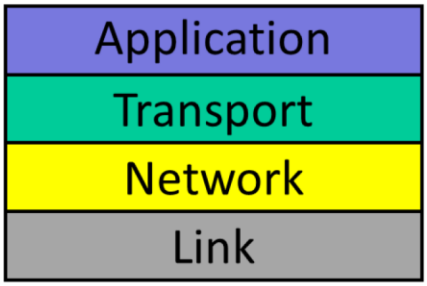
# CS144
# An Introduction to Computer Networks

## Unit 1: The Internet and IP






Phil

In this unit, learned some of the basics about how the Internet works. You learned how applications like web browsing and Skype work, how an application use the Internet, and the basic structure of the Internet. You learned about some of the fundamental architectural principles of networking. Perhaps by now you know which one of us is Phil and which one is Nick.

Now you've finished the first unit, you should be very familiar with this picture of the 4-layer

model of the Internet. You now know that the Internet is broken down into four distinct layers, what the four layers are, and how they work together. But even more importantly than how it works, you hopefully understand why it works this way and why layering is a good idea in all networks, not just the Internet.

You've now seen that the Internet works by breaking data up into small units called packets. When you request a web page, your computer sends some packets to the web server. The Internet decides how these little pieces of data arrive to the right destination – and how the packets the web server responds with, containing the page, make their way to you correctly as well.

You 've learned how two architectural principles, layering and packets, come together, in the architectural principle of encapsulation. Encapsulation is how one takes layers and lets them use packets in a clean and simple way, such that each layer' s use of a packet is independent of the others. We' ll talk about a few more architectural principles in later units.

# What you learned

How an application uses the Internet

The structure of the Internet: The 4 layer model

The Internet protocol (IP): What it is

Basic architectural ideas and principles

- Packet switching
- Layering
- Encapsulation



Nick

In this unit we studied four main topics

<click> 1. How an application uses the Internet. Phil explained the common way in which a variety of different applications use the Internet, using Skype, BitTorrent and the Web as specific examples. You learned that most applications want to communicate over a reliable, bi-directional byte-stream between two or more end points.

<click> 2. The structure of the Internet. You learnd what the 4-layer model is, and the responsibility of each layer. You also learned why we use the Internet Protocol or “IP” every time we send packets across the Internet, and why we call IP the “thin waist” of the Internet.

<click> 3. The Internet protocol (IP). Because IP is so important, we spent several videos describing what IP does for us, and how it works. So far we’ve focussed on IP version 4, because it’s the most widely used version of IP today. You’ll learn about IP addresses, how routers look up IP addresses and so on. Later in the course you’ll learn about the newer version of IP, IPv6.

<click> 4. Basic architectural ideas and principles. You’ve studied three fundamental principles of networks, all of which are very relevant to our understanding of the Internet. The first is packet switching, which is the simple way in which data is broken down into self-contained packets of information that are forwarded hop-by-hop based on the information in the packet header. The second is

Layering, which we've already mentioned. And the third is encapsulation, which is the process of placing a packet processed at one layer inside the data of the packet below. This helps a clear separation of concerns between how data is processed at each layer in the hierarchy.

# What this will help you with

At the end of the unit, you should have a good understanding of the basic structure of the Internet and three basic architectural ideas.

This information provides an intellectual structure for the rest of the course.



Phil

you should now have a good understanding of the basic structure of the Internet and three basic architectural ideas. You understand how applications like your web browser works, and how the Internet delivers packets between two computers. You ‘d probably heard the term TCP/IP used before: now you know what TCP is and what IP is, and why they’ re related. At first glance, these might seem like grungy, low-level details. But it turns out that they’ re the bedrock of what the Internet is. Every year, new

applications and uses of the Internet emerge. But all of them use these basic principles you're learning about, and almost all of them use TCP/IP. By starting with these fundamentals that have remained amazingly constant, you'll learn the knowledge that will continue to be important even as we move on to 5G wireless networks, Web 3.0, and the Internet of Things.

And that's part of what's exciting. The Internet and what it can do is always expanding and changing. But there are some core ideas and principles which are constant through all of that evolution. By learning them, you not only know how the Internet and networks work today, but most likely how they will work in 20 years as well.