Informative Speech Outline

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**Presentation Title**: Wires at Work! – The unseen side of the internet

**Purpose**: To inform my audience about how a message gets sent over the internet; specifically, what steps are taken to make sure the message reaches its target destination and what protocols should be known by the public in the opinion of a computer scientist.

**Introduction**:

In the modern age, the internet could be argued as one of the most important inventions in human history. It can transfer data from one side of the planet to the other in a fraction of a second, and information is now available to every person on an unprecedented level, but Billions of people use the internet with no idea how the gears in our computers make it work. The simple action of connecting to any website requires hundreds of steps that happen before your eyes can even blink.

**Body**

I. How IP addresses work when connecting two computers together and how they tell us where other computers are located on the web.

A. Think of an IP address as the address you would mail a letter to.

1. Everybody lives somewhere and if you want to send a message to someone you need to know where they live. This location would be their physical location. whether this is street in Paris, France or just down the street when you mail a letter, you are sending it to a physical location.

2. Like mailing letters, when computers send and receive information, those “letters” must traverse the internet to get to its location. The key difference is that locations on the web are very different from our physical location. That is where IP addresses come in to fix the problem.

B. What types of IP addresses are there and what are they used for. There are two types of IP addresses to fix certain problems that arise when sending your virtual “letter.”

1. The first problem comes with knowing which where to send the message across the world. The public IP address solves this issue by addressing a number to every network in the world (Kaspersky).

2. The second problem comes with knowing which device on the network should you message be sent to. On any given network there are probably a couple phones, computers, TVs, and printers connected to the router. Each device on your network has a private IP that identifies it (Kaspersky). To send your “letter” to the correct device, the recipient’s network must know who you are trying to send your message to.

II. The conversion process of URLs to IP addresses.

A. Converting URLs to IP addresses is related to sending a letter to someone.

1. When a friend tells you to send a message to his house you do not write their address as “Jonathan’s house” but instead as the physical location of his house. In this case “Jonathan’s house” would be the URL and his location would be the IP address.

B. How do computers find out the IP address of a URL

1. When you tell your computer that you want to go to google.com, your computer has no idea where google is on the internet. To find out where you want to go, your computer will ask other computers until one knows the location.

2. First your computer will ask your router whether it knows, but most of the time it does not. Your computer then sends a DNS query to a DNS server which will tell your computer the IP address of the website you are looking for (Fisher , 2020).

C. What are DNS servers and how do they relate to Root Zone databases.

1. DNS servers have one job and one job only: to match URLs with IP addresses. Inside a DNS server there is one giant list URLs and their respective IP address. When you send a DNS query it checks this list and sees if there is a match (Shaw & Fruhlinger, 2020).

2. When a computer sends a DNS query one of a couple things will happen: the ISP DNS server can know right away what website address to send your computer, or it will ask a Root Zone database which DNS server will know (Jelen, 2019).

3. Root Zone databases keep track of which DNS servers know about what URLs. For example, there are 6 DNS servers that keep track of all of the .org websites (Root Zone Database).

III. The protocols for sending a message to a specific IP address

A. How we send physical messages in the real world.

1. When you send a letter to another part of the world, you do not go there yourself, instead you put the message in an envelope and put down the needed information to get it there.

2. When you send a message you need to put down the address, the return address, and a message inside the envelope. Only then can the message be delivered.

B. How those messages correspond to certain internet protocols.

1. When sending messages over the internet there are two ways to go about this: TCP and UDP. TCP is the protocol that is used when you need two way communication, and UDP is used for fast one way communication (IETF Documents).

2. Just like sending our physical letter, TCP requires the same information plus a little bit more. It needs the receiving address, and the senders address but it also needs formatting numbers to make sure the packet is sent correctly (IETF Documents). Once the packet is made it can be sent out and delivered to its destination within a matter of milliseconds.

3. Like TCP, UDP requires the same information but doesn’t make a two-way connection before it sends the message. Because of this UDP is quicker and more efficient than TCP but is not designed for continuous communication (IETF Documents).

**Conclusion**: The internet is one of the most powerful tools in the modern era but not too many people who use it do not know how it works. If someone sends a letter though the mail it requires a message, an address to deliver it to, and a return address. Similarly, to send a message over the internet requires the same things but there are a couple more steps involved. When you press enter to go to a website your computer asks the DNS server system what the IP address is for the URL you are looking for. After this your computer will make a TCP or UDP connection and start sending and receiving data. All of this happens before the page can be displayed. The wires beneath our fingers really do make the world only a fraction of a second away.

**References**

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