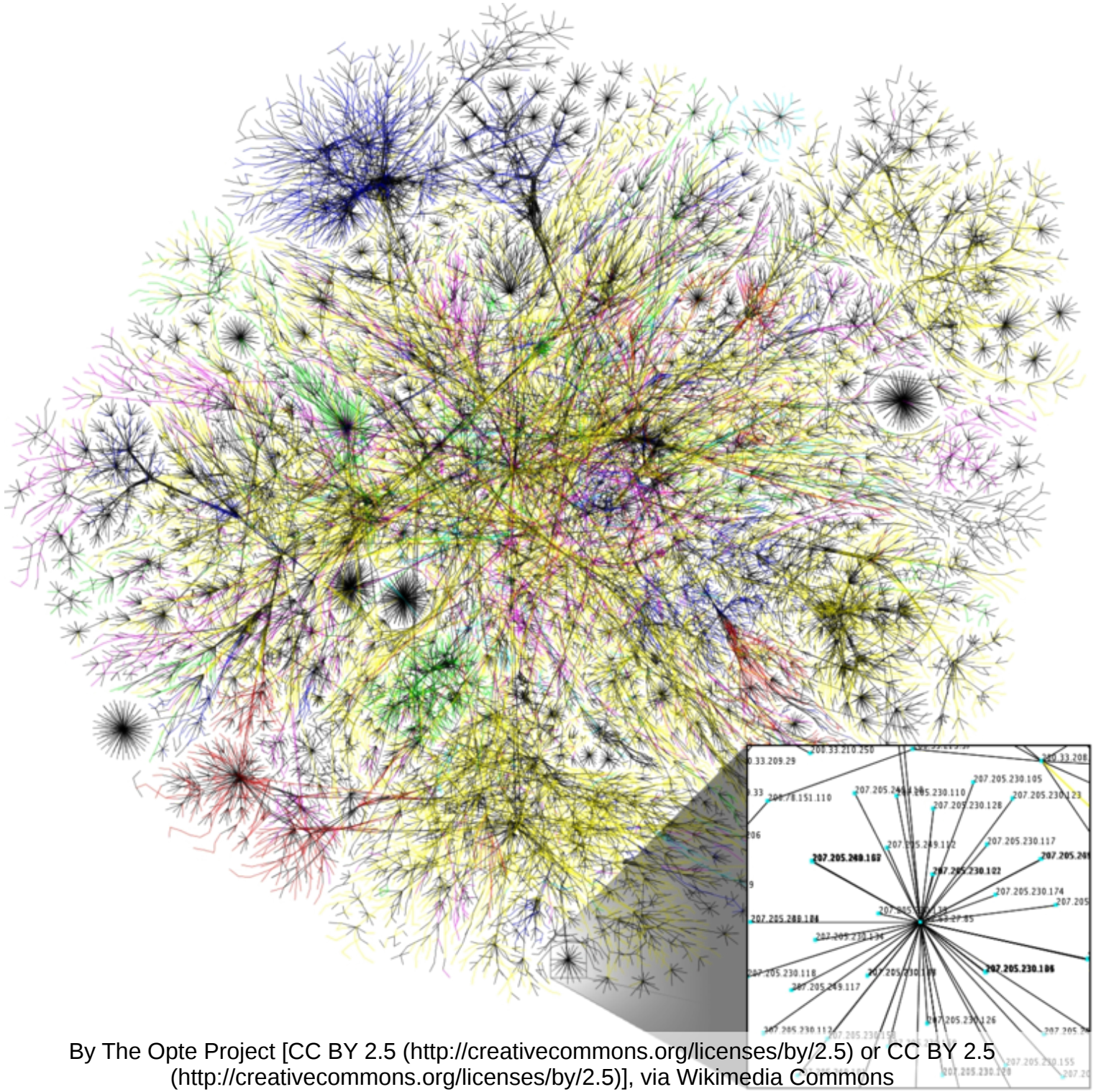
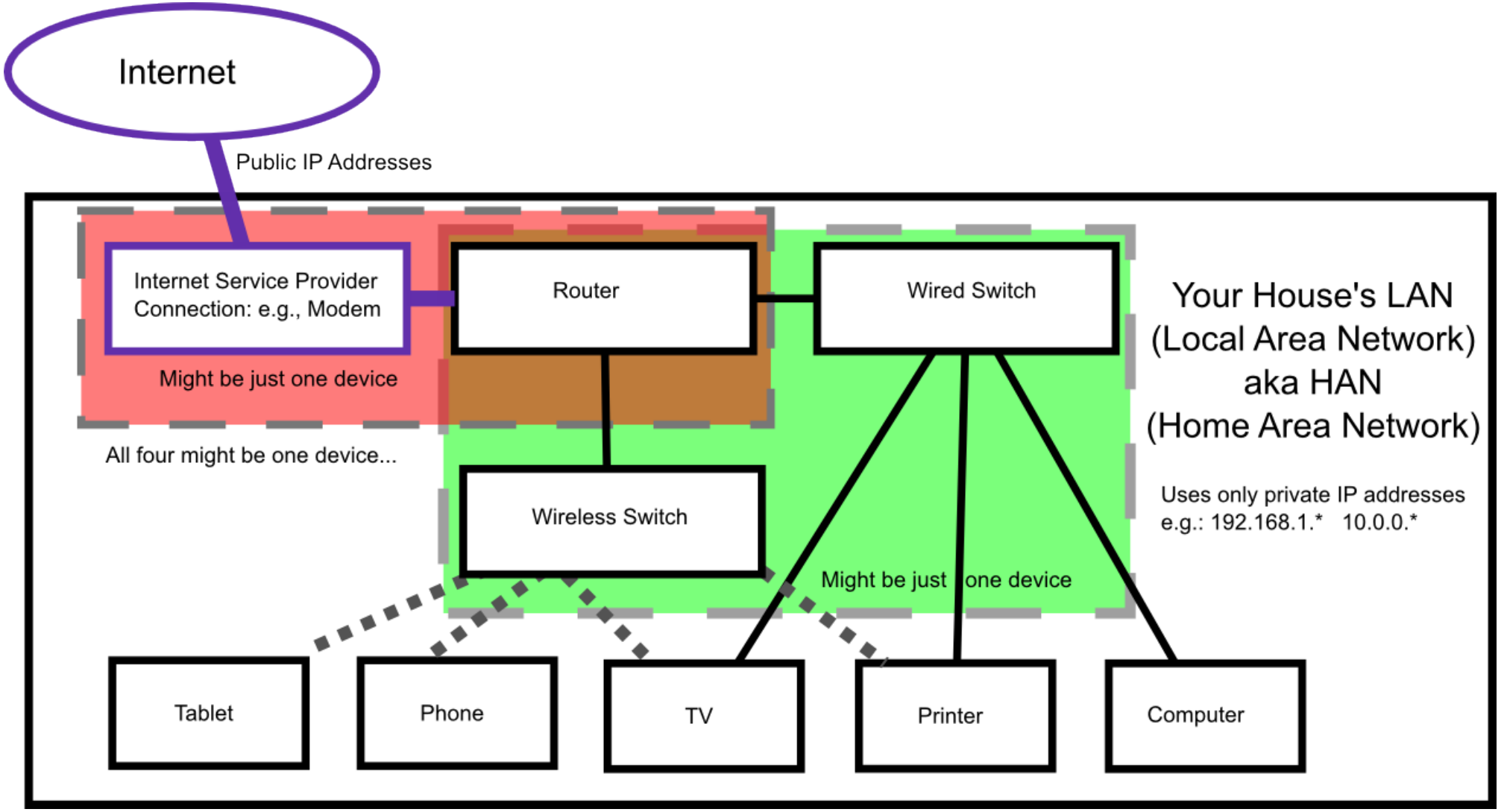
Networking

Frita Noob Hour 2016-12-07

Lachele Foley



Home Access to the Internet

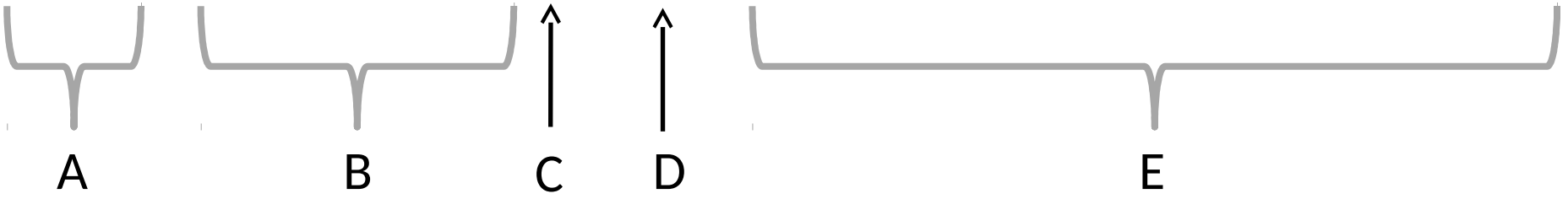


Some Terminology

- Network
  - A set of computers/devices that can exchange data
  - The hardware over which they exchange data
- Router – provides interface between two networks
- Switch
  - Adds connectivity within a network
  - Usually must not have loops
- Private network – not accessible by the internet
- Internet – the global connection of computers
- World Wide Web – collection of information on the internet that is accessible via URLs

Anatomy of a Uniform Resource Locator (URL)

http://glycam.org:80/url?condensed=DGlcpNAcb1-OH



- A: *Scheme* or *protocol*: service being requested
- B: *Host*: identifier of the website's server
- C: *Port*: optional, usually omitted for websites
- D: *Path to resource*: location of info you want
- E: *Query String*: this is not part of the URL
  - It is passed on to some process on the server
  - If this is included, you have a URI
    - Uniform Resource Identifier

How Computers Find Each Other

- IP Address
  - A series of numbers
  - Computers use to locate each other
- Numbers are hard to remember
  - http://freeitathens.org - Much easier!
  - Directory: DNS Server (Domain Name System)
    - Translates name to address
    - Example: google.com → 64.233.177.99 (one of many)
- The computer must have the IP address to connect

Internet Protocol (IP) Addresses

- Common IPv4 form: 4 numbers, dot-separated
  - Numbers go from 0 to 255
    - Example: 8.8.8.8
  - New IPv6 address format in a couple slides
- Most are public
- Some are private – use these in your home network

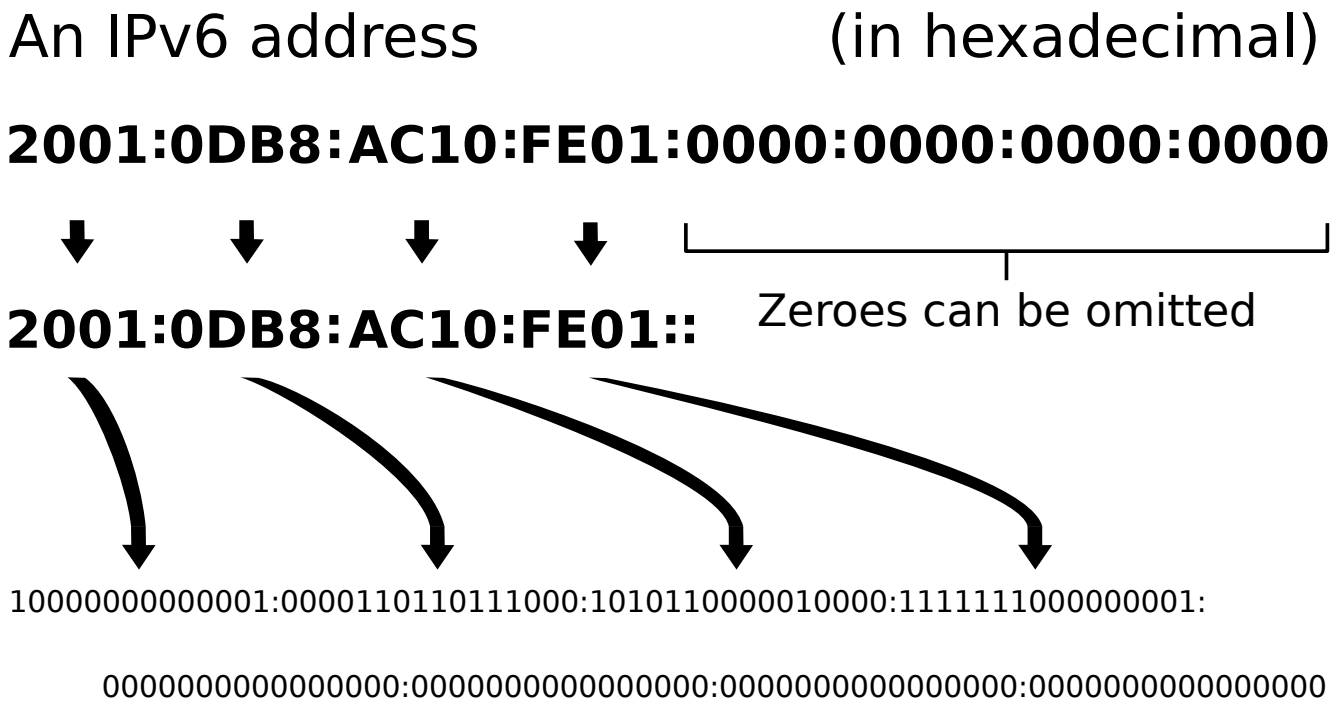
Start	End	# of addresses
10.0.0.0	10.255.255.255	16,777,216
172.16.0.0	172.31.255.255	1,048,576
192.168.0.0	192.168.255.255	65,536

How Computers Get IP Addresses

- Can be static or dynamic
  - Static – computer has permanent address assigned
  - Dynamic – gets address from another computer
- DHCP – Dynamic Host Configuration Protocol
  - DHCP servers give IP addresses
  - Often, the router does this, but not always!
- At home, in a LAN, usually have DHCP
- Need public, static IP to be accessed on web

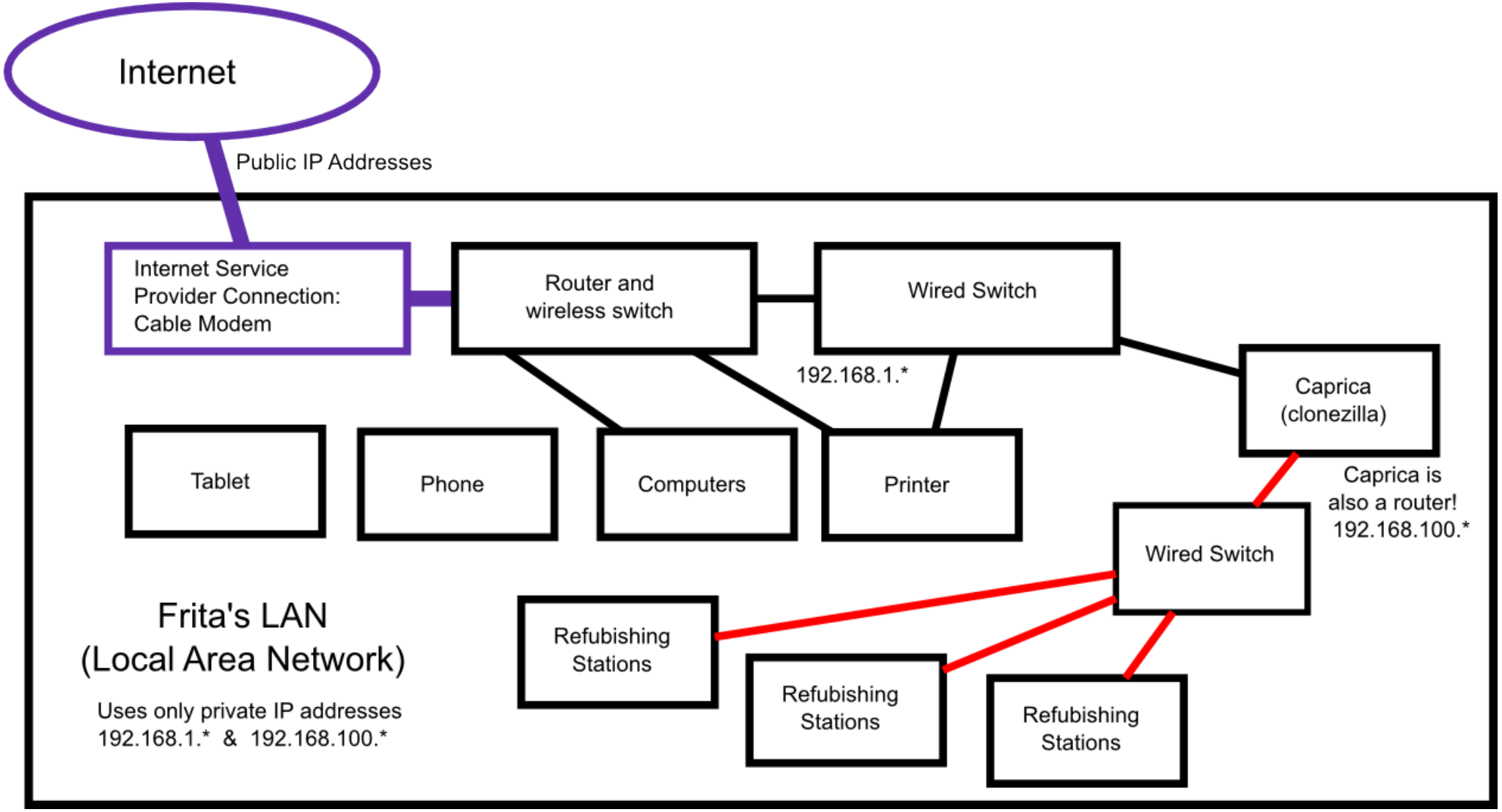
IPv4 vs IPv6

- IPv4 is out of public addresses (since 2011)
  - Max: 4,294,967,296
    - One '256' for each of the four dot-separated numbers
- IPv6 looks different, but has many more addresses
  - Has 2^{128} = ~3.403 x 10^{38} (that's a lot...)



By Indeterminate (Own work) [Public domain], via Wikimedia Commons

Frita's Network (simplified)



Common Types of Networks

- PAN – personal area network
- LAN – local area network
  - HAN – home a. n.
  - SAN – storage a. n.
  - WLAN – wireless LAN
- WAN – wide a. n.
- VPN – virtual private network
  - Let's a computer outside a network behave as though it is inside the network
  - Employers use these the most
    - Let employees access internal network from remote

Notes on Security

- This is a whole talk by itself...
- Some common terms:
  - HTTPS – secure http; encrypts traffic both ways.
    - Requires web site to have a certificate
  - SSH – secure shell (terminal); encrypts both ways
  - PGP – pretty good privacy; for anyone to use
    - Publish public key far and wide
      - Keep the private key secure!
    - People encrypt communication to you using it
    - Only you can decrypt the communication
      - (using your private key)

Brief Notes on OpenWireless Movement

- Will be more on this at a future Noob Hour
- Jon will present brief intro now