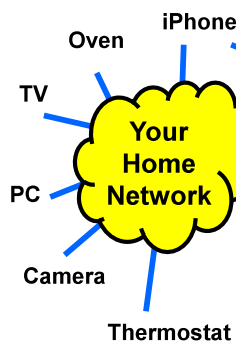


How Your Internet Works

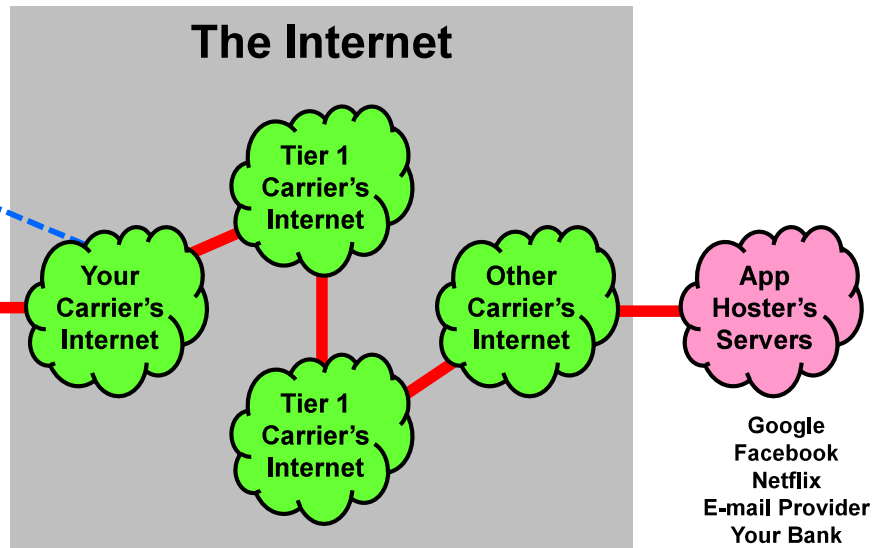
February 2, 2026

What The Internet Really Looks Like

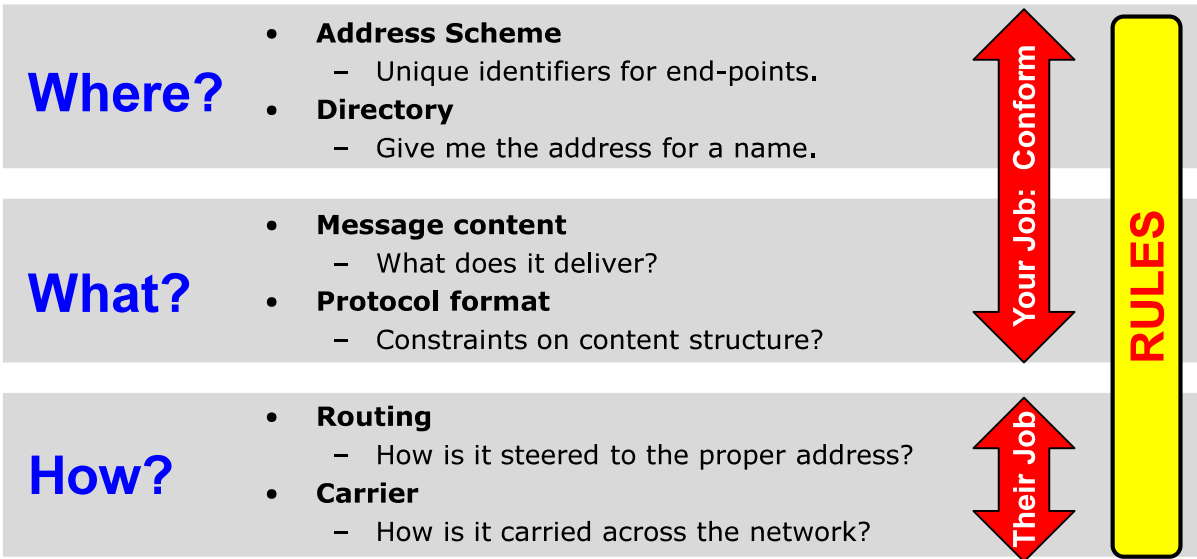
Your Internet



The Internet



Network Characteristics



Characteristics of Familiar Networks

		US Mail	Telephone	Internet	Ethernet
WHERE	Address	Name, Street, City	Phone Number	IP address	MAC address
	Directory	n/a	Phone Book, Rolodex, 411	URL + Domain Name Service	ARP
WHAT	Content	Almost Anything	Sounds	Binary Data	Binary Data
	Packaging	Freeform	4 KHz Analog Audio	IP Packets	Ethernet Packets
HOW	Routing	Post Offices, Sorters	Cord Boards + Switching	"Routers"	"Switches"
	Carrier	Horse, Truck, Train, Plane	Wire, Radio, Fiber Optics	Wire, Radio, Fiber Optics	Wire, Radio, Fiber Optics

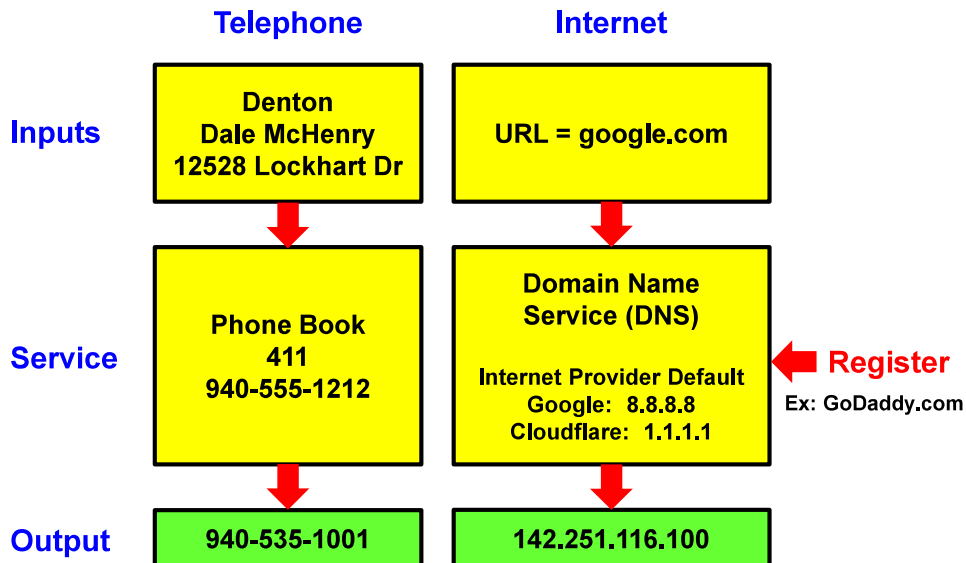
Internet Protocol (IP) Addressing

- **Administration was modeled after the telephone system**
 - Rules determined by central committee and issued in formal documents. Lots of them.
 - Number blocks centrally managed, some reserved for world regions.
 - Some leading blocks were reserved for specialized functions.
- **Internet addresses (version 4) were defined in 1980**

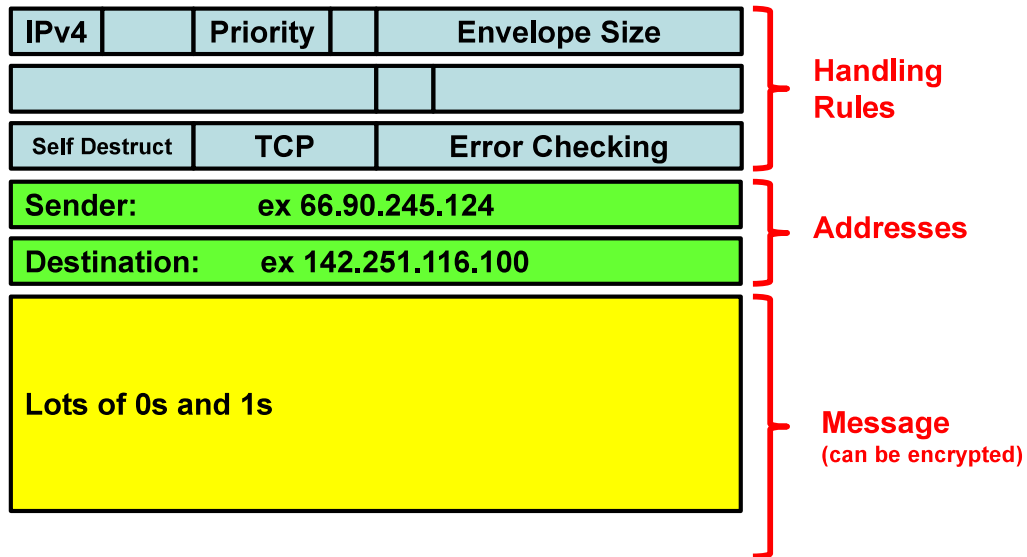


- Example: 42 . 249 . 1 . 58 (leave out the zeros!)
 - Unique address for each endpoint device
- **Allowed for (only) 3,758,096,384 attached devices**

Directories: Finding The Address You Need

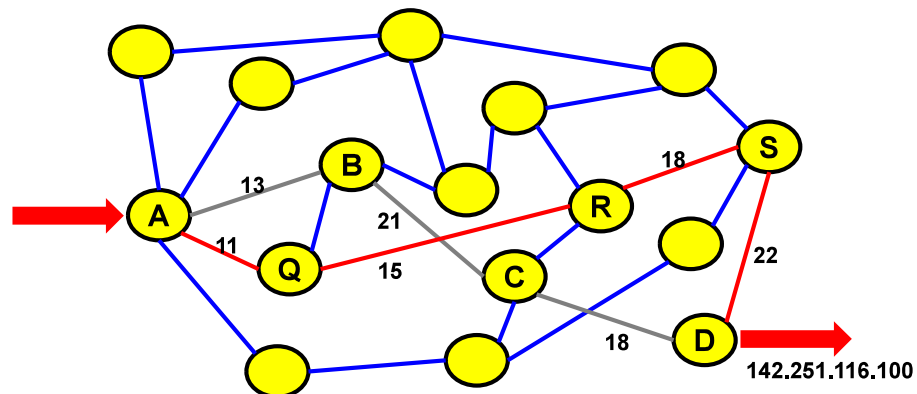


The Message Envelope: IPv4 Packet



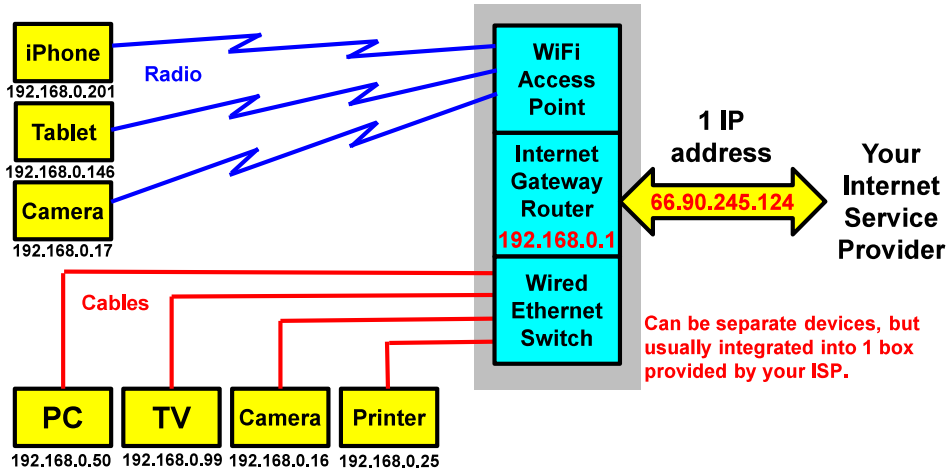
Internet Routing is Dynamic, not Static

- Lots of options. No single points of failure.
- Routing can be managed to minimize: hops, miles, delay, etc.
- Most carriers tinker with "link costs" to steer routing.
- ABCD "cost" = 52 (preferred); AQRSD "cost" = 66 (backup)
- Requires a lot of computing memory & CPU power to run.



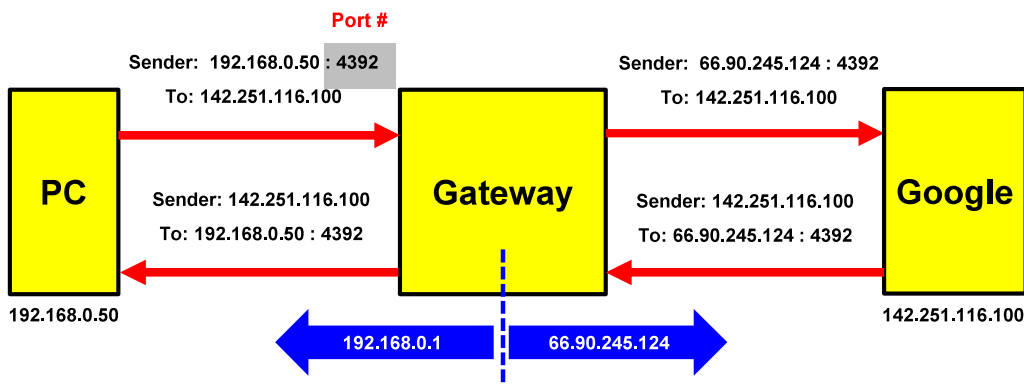
Your Home Network

- Your devices talk to each other with private IP addresses. But they can't talk to the internet using those addresses.
- Your gateway bridges between "your internet" and "the internet".



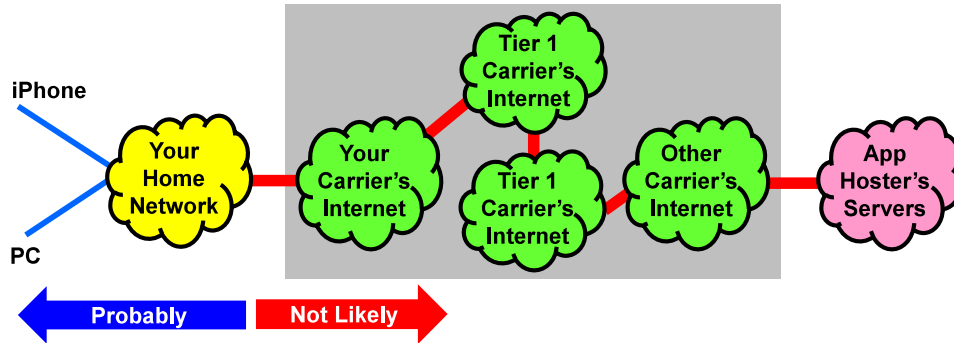
Sharing Your 1 Public IP Address

- All your devices must share your public address of 66.90.245.124
- Your gateway can cut and replace IP addresses, but how does it keep track of who to send incoming messages to?
- "Port Address Translation" appends something like a telephone extension to sender addresses.



Is My Internet Provider Swindling Me?

- "I buy 300M service from my internet carrier, but my speed test only shows 50M..."



- WiFi speed caps: 54M (gen 3), 600M (gen 4), 1G (gen 5)
- Wired speed caps: 100M or 1G
- Do speed testing over wire.
- Make sure your WiFi is 802.11n on 5 GHz radio band.

Do you really need 500 Mbps??