

# Network Protocols

By example...

Goal: browse to <http://www.depaul.edu>

# What things happen first?

- What happens when you hit enter or click the link?
- What does the browser do?

# URL interpretation

- Parses request URI
- Its an HTTP GET
- For [www.depaul.edu](http://www.depaul.edu)
- What is [www.depaul.edu](http://www.depaul.edu)?

# Domain name system

- Hold on... maybe the browser has a name cache?
- OK, say it doesn't...
- `gethostbyname()` or equivalent
- The whole resolution process happens...

# Whats involved in resolving?

- Are we a stub resolver? Full resolver?
- Does hosts.txt have [www.depaul.edu](http://www.depaul.edu) in it
- OK, we're a stub, who do we talk to?
  - And how did we get that information?
- OK, let's format an A? Query what about AAAA?
  - Maybe, oh man, this is a PITA already!

# OK, let's send the query!

- Not so fast!
- Put the DNS message in... UDP? Ya thats good
- OK, IP packet, sending to DNS resolver, easy
- From... my IP address? Oh, man am I connected?
- OK, send it on the wire!!

# Finish your IP encap bub

- Fits in MTU, checksum, set TTL, etc... OK go, go!
- Who you talking to first? Is it a local host?
- Oh, gotta talk to a router... OK lets do that.
  - How do I know who that is? Argh...
- OK, got it, get this into Ethernet and awa...
- OH darn, gotta ARP...

# Here ya go router!

- OK, Ethernet daddr is to the router?
  - Wha...? is that right
- Yep, unless your mask is broken
  - What the @?!# is a mask?
- Router's go itt, what's it gonna do?
- Re-encap... routing protocols now?!?!... policy decisions...? ARP some more?
- At least no DNS... I think

# Skip ahead, DNS server has query!

We're not even close to done!!

# Time warp...

- Sending TCP packet
  - UDP for DNS, now TCP? What gives?
- Gotta setup a connection
  - Connection? I thought this was connectionless
- Exchange options, sequence numbers
- Timers, congestion control, sliding window, oh my!

# This ain't gonna be a cake walk

- Its hard to learn how this all works even after year's of experience, never mind a short protocols course
- But we'll try our best...
- I left out a whole bunch of stuff. This slide deck could have been hundreds of pages long, easily! ..and that's without pictures