

TDC 375

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
- It is an HTTP GET
- For www.depaul.edu
- What is www.depaul.edu?

Domain name look up

- Does the browser have the name cached?
- Let us assume the answer is no
- Browser issues a `gethostbyname()` or equivalent
- We embark on a resolution sub-process...

What is involved in resolving?

- Does hosts(.txt) have www.depaul.edu in it
- Are we a stub, forwarder or full resolver?
- Assume we're a stub, who do we talk to?
 - And how did we get that information?
 - That was probably derived from boot strap
- OK, let's format an **A** query. What about **AAAA**?
 - Maybe do both?
- Getting pretty complicated isn't it?

OK, let's send the query!?!?

- Not so fast!
- Put the DNS message in... UDP? Ya should work
- OK, IP datagram, sending to DNS resolver, easy
- From... my IP address? Uhm, am I connected?
- OK, send it on the wire?!?!?

Finish your IP encap bub

- Fits in MTU, checksum, set TTL, etc... OK go, go!
- Wait, what L2 destination? Is it a local host?
- Oh, gotta talk to a router... OK lets do that.
 - How do I know who that is? Argh...
 - That was probably part of boot strap
- OK, got it, get this into Ethernet and off we go...
- Done yet? Not even close

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?
- Presume it's non-local, router gets it, now what?
- Router has a decision to make.
- Forwarding/policy decision, re-encap, ARP, etc...
- At least no DNS... I think

Skip ahead, DNS server has query!

We haven't even gotten to HTTP request yet!

DNS server processing

- Process query
 - Can we?
 - Do I know about this name? Cache or auth?
 - How do I go about finding out?
- If not auth and not cached, how many more steps?
- Quite a few maybe
- ...skip ahead ...skip ahead ...skip ahead

Time warp...

- Sending TCP packet
 - UDP for DNS, now TCP? What gives?
- Gotta setup a connection, the 3-way handshake
 - Connection? Isn't IP connectionless?!?!?
- Exchange options, sequence numbers
- Timers, congestion control, sliding window, oh my!
- Is it time for HTTP now?

This isn't a cake walk

- Its hard to learn how this all works even after year's of experience, never mind a short networks 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
- Someone else's version of a related idea:

<https://github.com/alex/what-happens-when>