Week 7 – Mobile Networking (1st Half)

What's our goal? What should the network provide for mobile users?

- Transparent applic. support? (applications never know/care if they're talking on a mobile link?) Seems pretty tough.
- Non-transparent – do applications have to know whether they're mobile? Seems like they do (e.g., database atomic transaction mgmt. seems necessary in many cases)
- Handle handoff connection between "last-mile" mobile links (e.g., like a cell-phone system)
- Keep track of where you are so your fixed IP can be found (e.g., forwarding systems)

... in general, current solutions tend to do things in the application later – it is difficult to build applications robust to non-persistent connections.

Consider a few applications that need to work over mobile links

- Telnet
- Outlook (reconnect periodically)
- Compilation (seems quite different from others)
- Downloading a large file
- Chat room
- Navigation (e.g., telling you where you need to go in a car)
- Internet radio
- Voice over IP
- Mobile teleconferencing

What is the right layer for the solution?

- application (appears they need to be aware regardless of who handles the dirty work)
- application system services (e.g., application OS services)
- TCP
- IP

Solution approaches

- Multiple active IP addresses, pre-negotiated for all the places you might be
- DNS handles relocations dynamically as you move (hey, it handles the domain name to IP mapping now, can't it just be modified to do it dyamically?)
- Applications need something more than just TCP socket returns error on disconnect. Need a better API than just sockets – it needs some kind of QofS reservation
- TCP aware – applic might toggle it on/off
- IP aware – appli might toggle it on/off

TCP vs. IP

- A solution might involve a forwarding agent at IP address that looks just like fixed host to people connecting, but forwards transparently to IP-prime.
- One big problem is that if you reply from IP-prime directly to someone who connects to you, then connector sees IP-prime rather than IP. You want everyone to see you at IP and never know about IP-prime.

DNS Discussion

- Small number (~14?) of root name servers, then handle the base name (e.g., washington.edu)
- Sub-domains handled by local name servers which handle everything below this (e.g., cs.washington.edu).
- To reduce loads on root servers, name service gateways will cache addresses so that there isn't a hit on each address query. (But implementations have problems – 50% of root name requests are from same gateways doing the same addresses over and over.) Also root servers are multiplexed so that there are lots of servers to distribute load over.
- Caching causes issues for mobile addresses moving around – naieve idea for mobile is to have each address expire with TTL=0 (obvious load implications).

Asides

- Japan has a different model – applications are mobile, but don't assume nearly as much bandwidth. Many more handheld applications available.
- Japan charges by the packet.
- Cellular phone companies have figured out the mobile addressing "find you" problem for their systems at $40/month – if you call your local cell number it finds you.