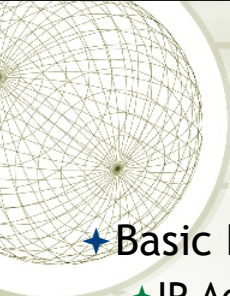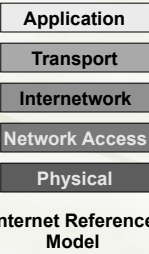# Introduction to Zeroconf

Info 341 Networking and Distributed Applications
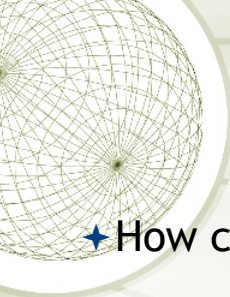

Zeroconf

✦ Basic Issues
  ✦ IP Address Assignment
  ✦ Name Selection
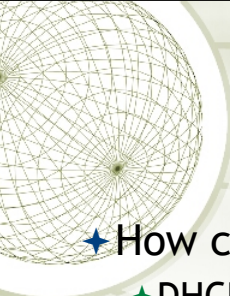 ✦ Service Discovery

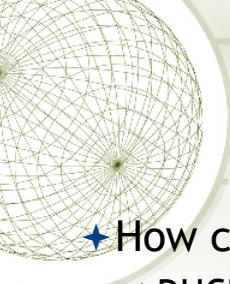| Application |
| --- |
| Transport |
| Internetwork |
| Network Access |
| Physical |

Internet Reference Model

Getting Addresses

✦ How can a machine get an IP address?

Getting Addresses

✦ How can a machine get an IP address?
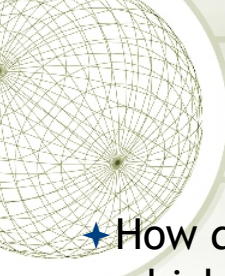 - ✦ DHCP
  - ✦ Static Address Assignment

Getting Addresses

✦ How can a machine get an IP address?
  - ✦ DHCP
  - ✦ Static Address Assignment

✦ If no DHCP and no static address
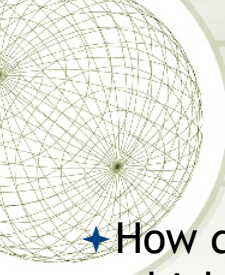 - ✦ Self-Assigned address

Self-Assigned Addresses

✦ Special Addresses
  - ✦ 169.254.x.x
    - ✦ But not all addresses in the range available
  - ✦ Actual range
    - ✦ 169.254.1.0 to 169.254.254.255
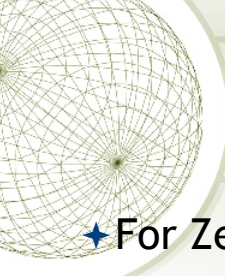   - ✦ About 65,000 addresses in that range

Claiming an Address

✦ How do you find which machine has which IP address?

Claiming an Address

✦ How do you find which machine has which IP address?

  ✦ ARP
    ✦ Broadcast – who has …
    ✦ Reply with the MAC address of the machine

  ✦ What if no one replies?
    ✦ What would that mean?

Claiming an Address

✦For Zeroconf IP Address
  - ✦Pick a random address in the range
  - ✦ARP to ask who has that address
  - ✦If no reply keep address, if a machine replies, repeat
  - ✦Announce/defend claimed address

Domain Names

✦What is a domain name?
  - ✦Examples?
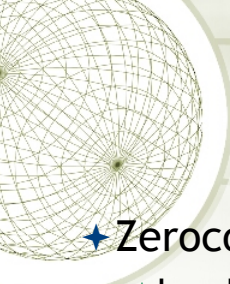
Domain Names

✦ What is a domain name?
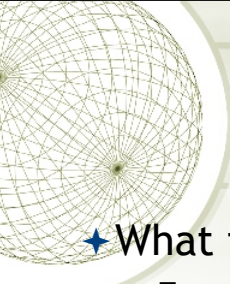 ✦ Examples?
    ✦ www.irs.gov
    ✦ uw.edu
    ✦ www.amazon.com
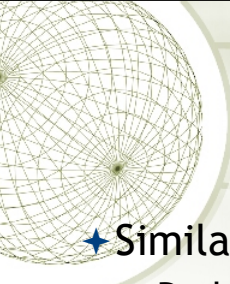
Domain Names

✦ What is a domain name?
  ✦ Examples?
    ✦ www.irs.gov
    ✦ uw.edu
    ✦ www.amazon.com

✦ What is a TLD?

Domain Names

+ Zeroconf creates an implicit TLD
  + local
    + www.dwmc-mbpro.local
  + Names still need to be unique

+ mDNS – multicast DNS

Domain Names

+ Similar to claiming an IP address
  + Probe for name
    + Make request for T_ANY
    + Three requests 250ms wait for each
  + Reserve name
  + Announce name

Service Discovery Commands

DNS-SD Command

```
dns-sd -E                              (Enumerate recommended registration domains)
dns-sd -F                              (Enumerate recommended browsing domains)
dns-sd -B        <Type> <Domain>              (Browse for services instances)
dns-sd -L <Name> <Type> <Domain>              (Look up a service instance)
dns-sd -R <Name> <Type> <Domain> <Port> [<TXT>...] (Register a service)
dns-sd -P <Name> <Type> <Domain> <Port> <Host> <IP> [<TXT>...]  (Proxy)
dns-sd -Z        <Type> <Domain>    (Output results in Zone File format)
dns-sd -Q <FQDN> <rrtype> <rrclass> (Generic query for any record type)
dns-sd -C <FQDN> <rrtype> <rrclass>   (Query; reconfirming each result)
dns-sd -X udp/tcp/udptcp <IntPort> <ExtPort> <TTL>    (NAT Port Mapping)
dns-sd -G v4/v6/v4v6 <Hostname>  (Get address information for hostname)
dns-sd -V    (Get version of currently running daemon / system service)
dns-sd -A                          (Test Adding/Updating/Deleting a record)
dns-sd -U                                (Test updating a TXT record)
dns-sd -N                                (Test adding a large NULL record)
dns-sd -T                                (Test creating a large TXT record)
dns-sd -M      (Test creating a registration with multiple TXT records)
dns-sd -I   (Test registering and then immediately updating TXT record)
dns-sd -S                (Test multiple operations on a shared socket)
```
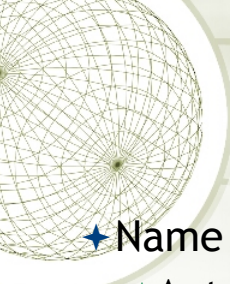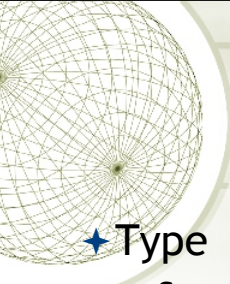
Parameters

+ Name
  + A string, text to name the service
+ Domain
  + "local" is the special domain for mDNS and is the only one supported
+ Port
  + Protocol port for the service

Parameters

+ Type
  + Special strings that indicate a service
  + Must be registered
    + http://www.dns-sd.org/ServiceTypes.html
  + Examples
    _http._tcp
    _daap._tcp
    _ftp._tcp
    _ichat._tcp
    _ldap._tcp
    _printer._tcp

Browse

✦ dns-sd –B <Type> <Domain>
  ✦ dns-sd –B _http._tcp
  ✦ dns-sd –B _printer._tcp
  ✦ dns-sd –B _ftp._tcp
  ✦ dns-sd –B _smb._tcp
  ✦ dns-sd –B _daap._tcp

Register

✦ dns-sd -R <Name> <Type> <Domain> <Port>
  ✦ dns-sd –R "Service 1" _fake._tcp local 25001
  ✦ dns-sd –R "Service 1" _fake._tcp local 25001
  ✦ dns-sd –R "Service 2" _fake._tcp local 25001