


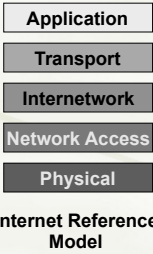
Introduction to Zeroconf

Info 341 Networking and
Distributed Applications

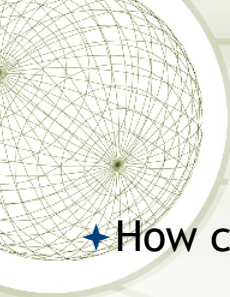


Zeroconf

- ★ Basic Issues
 - ◆ IP Address Assignment
 - ◆ Name Selection
 - ◆ Service Discovery

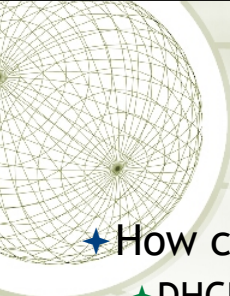


Application
Transport
Internetwork
Network Access
Physical
Internet Reference
Model



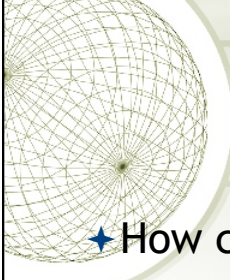
Getting Addresses

- ★ How can a machine get an IP address?



Getting Addresses

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



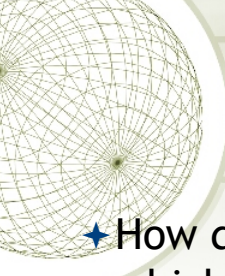
Getting Addresses

- ★ How can a machine get an IP address?
 - ◆ DHCP
 - ◆ Static Address Assignment
- ★ If no DHCP and no static address
 - ◆ Self-Assigned address



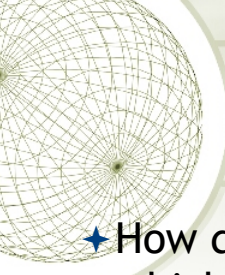
Self-Assigned Addresses

- ★ 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



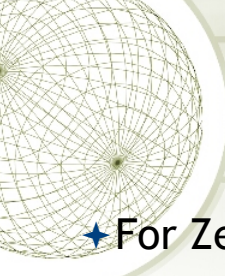
Claiming an Address

- ★ 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?



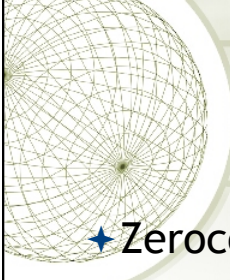
Domain Names

- ★ What is a domain name?
 - ◆ Examples?
 - ◆ www.irs.gov
 - ◆ uw.edu
 - ◆ www.amazon.com



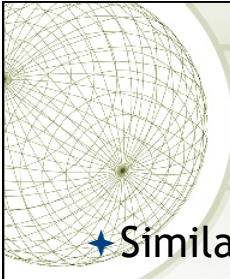
Domain Names

- ★ 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

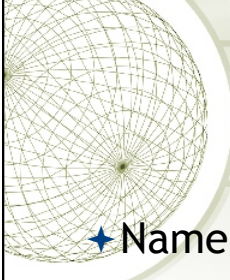


DNS-SD Command

```

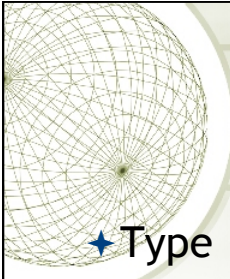
dns-sd -E                (Enumerate recommended registration domains)
dns-sd -F                (Enumerate recommended browsing domains)
dns-sd -B <Type> <Domain> (Browse for services instances)
dns-sd -L <Name> <Type> <Domain> (Look up a service instance)
dns-sd -R <Name> <Type> <Domain> <Port> [<TXT>...] (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`