Bonjour’s
DNS-Based Service Discovery

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Three Legs of Bonjour Networking

- Addressing
- Naming
- Browsing
Addressing

• Self-Assigned Link-Local Addressing
  – Pick random address in 169.254/16
  – ARP to see if anyone else is using it
  – If someone else is using it, try again
  – Ongoing conflict checking

• RFC 3927
  “Dynamic Configuration of IPv4 Link-Local Addresses”

• http://www.ietf.org/rfc/rfc3927.txt
• http://www.zeroconf.org/
IPv4 Link-Local Availability

- Self-Assigned IPv4 Link-Local Addressing first appeared in:
  - Mac OS 8.5, Summer 1998
  - Windows 98, Summer 1998
  - Mac OS X 10.0

- You may know it as Autonet, AutoIP, etc.

- IPv6 already has Link-Local Addressing
  - RFC 2462 “IPv6 Stateless Address Autoconfiguration”
Naming

- Multicast DNS
  - Pick desired name in ".local." subdomain
  - Issue Query to see if anyone else is using it
  - If someone else already using it, pick another
  - Ongoing conflict checking
- draft-cheshire-dnsext-multicastdns-07.txt
- http://www.multicastdns.org/
Multicast DNS Availability

- Multicast DNS client
  - Mac OS 9.2
  - Mac OS X
  - iPhone & iPod touch
  - Linux
  - Bonjour for Windows

- Just type
  - "laserwriter.local." into your Web browser
  - "ssh mymac.local." into a terminal window
Browsing

- Raising the bar
- Should not need to know name in advance
DNS Service Discovery

• Devices already need:
  – IPv4 Link-Local Addressing
  – Multicast DNS

• Don’t need more code
  – Multicast DNS gives us Service Discovery too

• draft-cheshire-dnsext-dns-sd-05.txt

• http://www.dns-sd.org/
Browsing Via DNS PTR

- DNS Query:

  _ipp._tcp.local. PTR ?
Browsing Via DNS PTR

- DNS Response(s):
  
  _ipp._tcp.local. PTR  
  Sales._ipp._tcp.local. 
  Marketing._ipp._tcp.local. 
  Engineering._ipp._tcp.local. 
  3rd Floor Copy Room._ipp._tcp.local.
Components of Service Name

- User-Visible Name
  3rd Floor Copy Room._ipp._tcp.local.

- Service Type/Service Protocol Name
  3rd Floor Copy Room._ipp._tcp.local.

- Domain
  3rd Floor Copy Room._ipp._tcp.local.
Lookup Via DNS SRV

- DNS Queries:

Sales._ipp._tcp.local. SRV ?
Sales._ipp._tcp.local. TXT ?
Lookup Via DNS SRV

- DNS Responses:

  Sales._ipp._tcp.local.  SRV  0 0 631 my-printer.local.
  Sales._ipp._tcp.local.  TXT  pdl=application/postscript
  my-printer.local.       A       169.254.12.34
DNS-SD Availability

• On OS X 10.2, iPhone, iPod touch:
  – System API

• Bonjour for Windows

• Other Platforms:
  – Use Apple’s Darwin Open Source
  – Other Independent Implementations
  – Implement from spec: draft-cheshire-dnsext-dns-sd-05.txt

• http://www.dns-sd.org/
Wide-Area DNS Service Discovery

• Replace “local” with any existing DNS domain
Architecture (Local LAN)

DNS Service Discovery

Multicast DNS
Architecture (Wide Area)

DNS Service Discovery

Discovery

Unicast DNS Queries

Registration

Dynamic DNS Update
Architecture

DNS Service Discovery

Discovery
- Unicast Queries
- Long Lived Queries

Registration
- Dynamic DNS Update
  - NAT-T
  - TSIG
  - RR Lease
Open Source License

Apache 2.0
For More Information

Web Sites

Zero Configuration Networking
http://www.zeroconf.org/

Multicast DNS
http://www.multicastdns.org/

DNS Service Discovery
http://www.dns-sd.org/