ZEROCONF INSIGHTS INTO SCOPING PROBLEMS

Erik Guttman

ZEROCONF WG chair
Sun Microsystems

What is the problem?

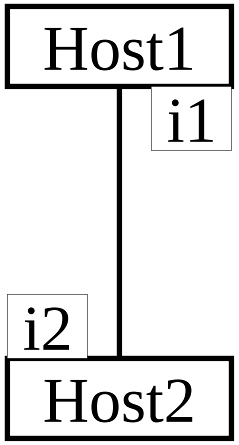
- Normally
  - Addresses are relatively stable
  - Names and addresses are unique within the network reachable by a host
  - Datagrams are routable

- We have broken these assumptions with ZEROCONF
- The solutions we have come up with have problems

- Consider
  - IPv4 link-local addresses
  - Link-local name resolution

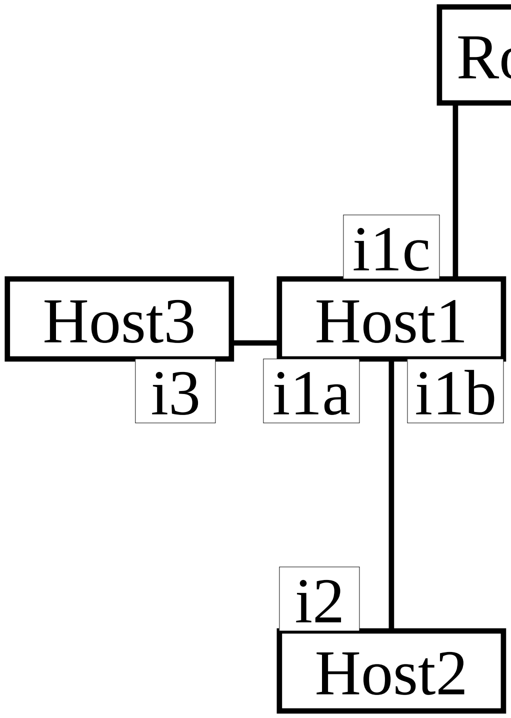
See: http://www.spybeam.org/issues.html

Ideal Zeroconf Scenario



- Limited number of hosts
- Single link
- Name resolution and/or service discovery provides peer address
- Somewhat more volatile but still pretty stable, unambiguous forwarding, unambiguous names and addresses

Real Zeroconf Scenario



Tunnels?

Home address?

Bridging?

- L3 issues
  - Forwarding ambiguity (i3==i2, i2==i1a, etc)
  - Forwarding complexity (i3 is non-LL, i1a is LL)
  - Transitioning (DHCP vs. Zeroconf?)
  - Source address selection
- L7 issues
  - Addresses exposed
  - Interface info not used
  - Locators forwarded
  - Renumbering breaks apps

Name Resolution & Discovery Issues

- Scoped locator forwarding
  - Widely done (html &c)
  - resolution may be ambiguous or fail
  - LLMNR: respond per interface
  - RFC 3111: forward locators with scoping in mind (SLP for IPv6)
- IPv6 exposes address scopes via interface indexes – very hard in IPv4
- Existing apps will break in certain scenarios

Solutions and their problems

- **Always maintain a link-local address.** Only send LL to LL. But: Legacy interoperation fails, it exacerbates scoping problems and one can‘t turn it off.
- **Transition.** Use global address when possible. But: transition is complicated, leads to instability, forwarding rules become more complex.
- **Round robin resolution.** If at first you don’t succeed… But: security implications, arbitrary.
- **Higher level ID based forwarding.** Use stable identifier, rediscover peers, control forwarding policy with apps. But: We don’t know how to do this, no apps do this today.