Stateful vs Stateless: How to choose.
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IPv4 Address Assignment
With IPv4, only two methods:

- Static
- DHCPv4
Types of Addresses

- Global/routable addresses
- “Private” RFC 1918 non-routable
- Anycast (sort of)
IPv6 Address Assignment
More choices!

- Classic: static
- StateLess Address Auto Configuration (SLAAC)
- Stateless DHCPv6
- Stateful (full DHCPv6)
Address Types

- Unicast
- Multicast
- Anycast
Address Scope

- Link Local
- Global Unicast
- Unique Local
- Transition
- Misc (Site Local, Reserved, Special)
SLAAC

- SLAAC == StateLess Address AutoConfiguration
- Uses Router Advertisement (RA) messages
- Network policy moved to the edge
**SLAAC Sequence**

- **Client configures link-local address**
  - Generates 64 bit host ID
  - Combines link local prefix and EUID to generate tentative address (such as `fe80::028c:f5ff:fe05:4235`)
  - Does DAD (Duplicate Address Detection)
    - Sends a multicast Neighbor Solicitation message containing its new tentative address to the solicited node address
    - If no other node responds with a Neighbor Advertisement using that address, the host configures itself with that address
Host now looks for Router Advertisement (RA) Messages

- Sends multicast Router Solicitation message
- Listens for RA messages
- Configures itself based on contents of RA message, including doing DHCPv6
RA Message Contents

- Local prefix(es), including A (autonomous address configuration) flag
- Router info
  - Router's link-level address
  - Lifetime of default route
  - Router priority
- Flags: M (ManagedAddress) flag and O (OtherConfiguration) flag
- Maximum Transmission Unit (MTU) of upstream link
Not in RA Messages…

- RDNS server
- NTP or “other” configuration
- RFC 6106 for RDNS in RA
  - Lack of client support…
DHCPv6

- “public” or “private” (temporary) addresses
- RDNS server, NTP, TFTP, Vendor options
- Update DNS with A/PTR
- But no default route!
Decisions, Decisions
Differences

- DHCPv6
  - Filter/control access
  - Update IP address management system
  - Update A/PTR records in DNS
  - Further from client, more centralized
  - Handles more complex configs, phones, printers, etc.
Differences

- **SLAAC**
  - Local/fast
  - Light weight
  - Decentralized
  - No logging, A/PTR updates or IPAM updates
Your priorities

- Do you have auditing or logging requirements?
- Centralized or distributed management
- Technical level of support staff
- Range of different gear?
Centralized model

- Need auditing
- Need access control
- Senior technical staff not everywhere
- DHCPv6 is your friend
Coffee House

- Baristas are not networking folks
- Customers just need it to work
- No logging, lease churn would be burden
- Small range of client machines
- SLAAC!
DHCPv4-like DHCPv6

- Send RA messages with A=0, O/M=1
- DHCP for all configurations except default route
- DHCP server does A/PTR and IPAM updates
Coffee House Setup

- Send RA messages with A/O=1, M=0
- Send RDNS in RA messages
- DHCP server does no leases, just gives DNS for clients that can’t do RFC 6106
Questions?
Thank you!