







## The good old days



With IPv4, only two methods:

-Static

-DHCPv4

## Types of Addresses



Global/routable addresses

"Private" RFC 1918 non-routable

Anycast (sort of)







Classic: static

 StateLess Address Auto Configuration (SLAAC)

Stateful (DCHPv6)

## **Address Types**



Unicast

Multicast

Anycast

### 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

## **SLAAC** Sequence cont.



- 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

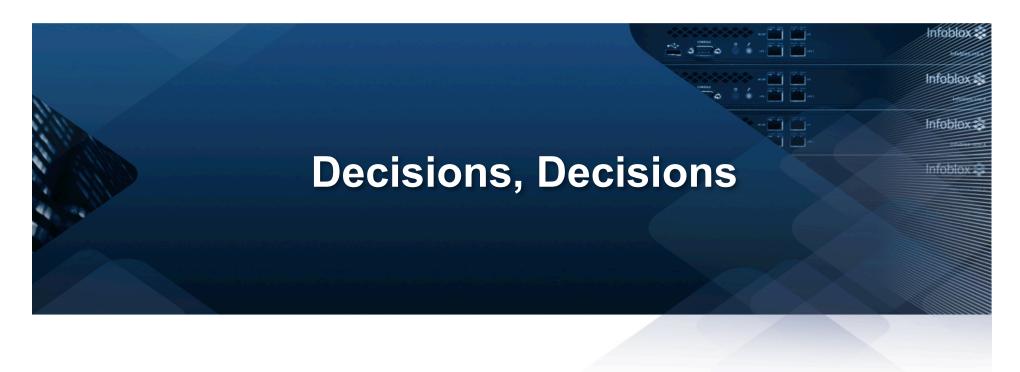
– Lack of client support...

#### DHCPv6



- "public" or "private" (temporary) addresses
- RDNS server, NTP, TFTP
- Vendor options
- But no default route!





#### **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?

### **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





### How did this all start?



ftp (ftp.uu.net, ftp.wustl.edu)

SMTP

Security devices

Silly web things

### How did we do it IPv4



- By hand (ow)
- Scripts
- \$GENERATE
- IPAM

### How would that work for IPv6?



- A single subnet is a /64
- A /64 has 18 quintillion (4 bil x 4 bil) addrs
- A PTR record has 34 labels in IPv6
- Anyone got a computer with enough disk or RAM to hold one /64 zone file?

### So what are we left with?



- Admit that PTRs are pointless
- Pre-populate (assuming FTL travel...)
- Pre-populate statics for routers & big servers
- As previous plus DHCP server adding clients
- Lie on the fly (if not doing DNSSEC)







