Application Listener Discovery (ALD) for IPv6

http://tools.ietf.org/html/draft-woodyatt-ald

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A Brief History of the End-to-end Principle in IPv6 Transition Planning

Firewalls vs. Transparency

- Access across boundaries denied by policy.
- Policy applied when flows actively initiated.
- Endpoint addresses imply policy.
- Transient interior listeners are invisible.

IPv4/NAT Firewall Transparency

- Stateful filtering of transport protocols: TCP, UDP, GRE, IPsec ESP, SCTP, DCCP, etc.
- Application layer gateways: IKE, PPTP, RTSP, FTP, SIP, etc.
- Manual port redirection.
- Dynamic hole-punching services: UPnP IGD, NAT-PMP, MIDCOM, NSIS, etc.

IPv6 Firewall Transparency

- Stateful filtering of transport protocols: TCP, UDP, GRE, IPsec ESP, SCTP, DCCP, etc.
- Application transparency helpers: IKE, PPTP, RTSP, FTP, SIP, etc.
- Manual static configuration of policy.
- What about dynamic policy for transient interior listeners?

Um...

Salvage Operations

...retaining end-to-end transparency with IPv6 firewalls.

- Firewalls need to learn about transient interior listeners.
- Listeners need to learn about firewalls requiring notification.
- Nodes need to learn how to discover relevant firewalls.

Application Listener Discovery (ALD)

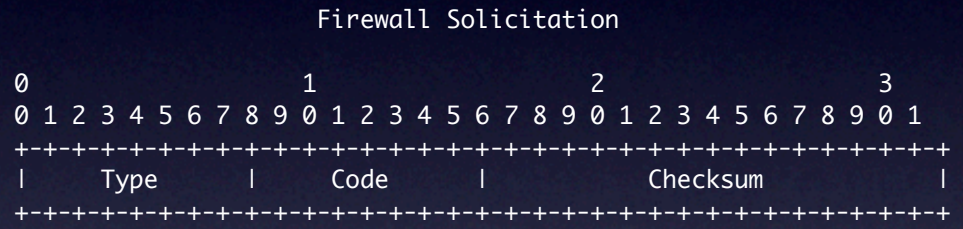
- Extension to ICMP.
- New router advertisement option.
- Existing sockets API sufficient for most applications.
- Some new system, interface and socket options for advanced requirements.

Router Advertisement

- Tells nodes where to send Firewall Solicitation messages
- Destination is either unicast or multicast.
- Hop-limit contributes to scope boundary.

Firewall Discovery

- Ask firewalls to send a unicast advertisement.
- Or... wait for multicast advertisements



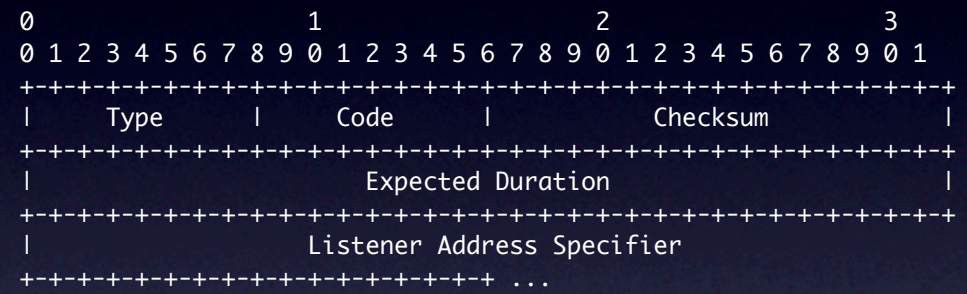
Firewall Advertisement

- Declare the interior prefix.
- Elapsed time since reset informs listeners that notifications may need to be resent.

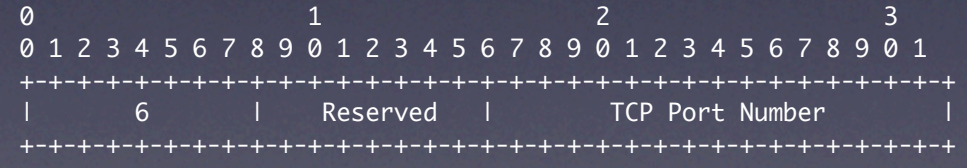
Listener Notification

- Tells firewall about transport-specific address.
- Tells firewall how long application expects to listen.
- Retransmits until acknowledged.

Listener Notification

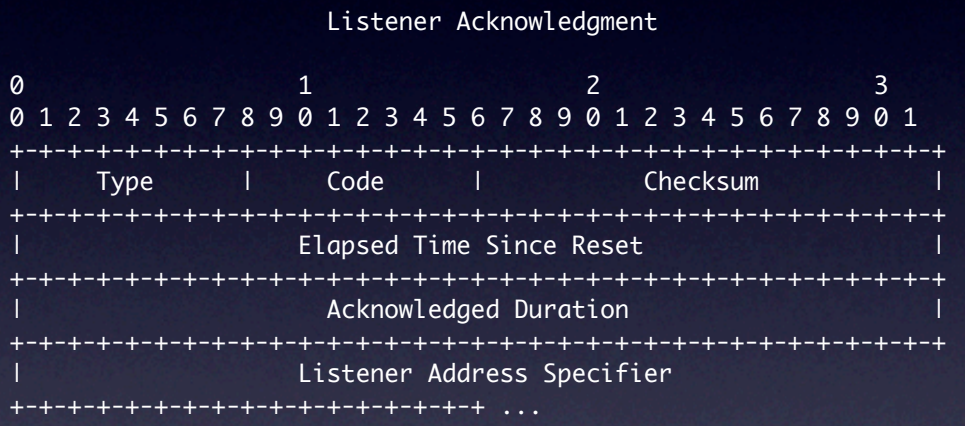


TCP Listener Address Specifier



Listener Acknowledge

- Tells listener to stop sending notifications.
- Duration constrained by firewall.
- Elapsed time since reset is same as in firewall advertisement.



Security Considerations

- ICMP6 source address implies listener source address.
- ALD does not specify firewall policy.
- IPsec w/IKE would be a useful extension.

Q & A

- Unmanaged networks behind firewalls.
- Application programming interfaces.
- Considerations for DHCP6.
- Policy decision at firewalls.
- Policy decision at multiuser listening nodes.