

IP Address Architectures

IAB Open Meeting Report

IAB Plenary

IETF 57

IP Addresses are:...

- A means of uniquely identifying a device interface that is attached to a network
 - Endpoint identifier (**who**)
- A means of identifying where a device is located within the network
 - Locator identifier (**where**)
- A means of allowing intermediaries to pass a packet to a destination device
 - Forwarding identifier (**how**)

These roles are somewhat different - there is visible tension between the constraints of routing and the requirements of end-to-end service sessions

IP Address Types

IPv4 has two address types:

Unique Structured Addresses == Global-Use Internet

Private (Reused) Addresses == Local-Use Internets

IPv6 has three address types:

Unique Structured Addresses == Global-Use Internet

Site-Local Addresses == Scoped Local-Use Internet

Link-Local Addresses == Very Local-Use

IP Address Realm Membership

- IPv4 address architecture assumes a unique 1:1 binding of a device interface to an IP address in a single realm membership model
 - although it is not strictly required
- IPv6 address architecture is exploring the notion of a device acquiring multiple addresses and being a member of multiple address realms simultaneously
 - Although its not entirely clear how this works in practice and what issues this architecture raises and what issues it addresses

IAB Open Meeting

- The IAB held an Open meeting this week to gather input on this topic
- Five Presentations, each exploring different aspects of this area:
 - The impacts of wireless models on the layered network architecture [Jon Crowcroft]
 - The potential uses of explicit scoping in address realms [Tony Hain]
 - Transport considerations of multi-homed and mobile environments [Dave Crocker]
 - Insights gained from ZEROCONF [Eric Guttman]
 - Conflicting requirements placed on addresses [Brian Carpenter]

Observations

- This area of exploration of the semantics of an address within the IP architecture is not a new topic
- Recent (ish) activities include
 - Name Space Research Group
 - IAB output....

The IAB Time Machine said...

"As far as temporal uniqueness (identifier-like behaviour) is concerned, the IPv6 model is very similar to the current state of the IPv4 model, only more so...IPv6 will amplify the existing problem of finding stable identifiers to be used for end-to-end security and for session bindings such as TCP state.

The IAB feels that this is unfortunate, and that the transition to IPv6 would be an ideal occasion to provide upper layer end-to-end protocols with temporally unique identifiers. The exact nature of these identifiers requires further study."

- RFC 2101, February 1997

Areas of Relevance

- Addresses are used in many contexts within the IP environment. Particular contexts where address semantics have particular relevance include:
 - Mobility in IPv4 and IPv6
 - Security associations
 - Routing architectures
 - Scoped address contexts
 - Transport protocols
 - Multi-Homing
 - Dynamic- and Auto-Configuration
 - Application Program Interface (API) to the network stack
 - And doubtless there are others....

Next Steps for the IAB

- The IAB Open Meeting presentations and meeting minutes will be included in the proceedings of the IETF
- Document the considerations raised at the meeting
- Create a moderated forum for further consideration of these issues

Objectives of this activity

- Definitely....
 - Gain a clearer understanding of
 - the roles of addresses and the attributes of addresses used within these various roles
 - the level of inter-dependency between these roles of addresses
- Possibly.....
 - Document some architectural considerations relating the distinguished use of addresses in various contexts