Address Allocation for Private Internets

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Motivations

- Proliferation of private internets
- Use of globally unique addresses for private internets may not always be a preferred choice:
  - requires certain minimum level of address space utilization
  - depletes address pool for the Internet
- Need to provide an alternative addressing plan for private internets

Host Taxonomy

- Access to hosts outside an enterprise is not needed
  - no globally unique addresses are needed
- Access to hosts outside an enterprise is limited to a small set of applications (e.g. e-mail, netnews)
  - no globally unique addresses are needed (use application layer gateways)

Host Taxonomy (cont.)

- Require IP level connectivity to hosts outside an enterprise
  - need globally unique addresses

Address Space Allocation

- 10.0.0.0 - 10.255.255.255 (10/8)
- 172.16.0.0 - 172.31.255.255 (172.16/12)
- 192.168.0.0 - 192.168.255.255 (192.168/16)

Address Space Allocation (cont.)

- Addresses reserved by the IANA
- Use of addresses requires no coordination with the IANA or Internet Registries

Using Private Address Space

- Must be unique within an enterprise
- An enterprise can intermix public (globally unique) and private (RFC1597) addresses
- Possible communication scenarios:
  - public-to-public
  - private-to-public (within an enterprise)
    - use application layer gateways for inter-enterprise
  - private-to-private (within an enterprise)

Implications on Routing

- Address Prefixes associated with private address space should not be carried within the Internet routing system
- Use route filtering to prevent leakage

Tradeoffs

- Pros
  - provides a safe choice for private address space (avoids potential clashes)
  - allows for simpler addressing and routing plan
  - allows for easier growth plans
- Cons
  - potential renumbering

Renumbering

- Not trivial, but doable
- Needs to be more automated (e.g. DHCP, dynamic DNS updates)
- Is likely to be inevitable

On the “goodness” of globally unique addresses

- Globally unique addresses are no longer sufficient for IP connectivity to the Internet
- Connectivity to the Internet is likely to require renumbering (either from globally unique or from globally non-unique addresses)
  - renumbering considered inevitable
- **Routable addresses are good**

Operational Considerations

- Use private address space on all internal subnetworks
- Allocate public subnets where needed
- Install filters on routers that connect the enterprise to the Internet
- Pick a random block of addresses out of the private address space
  - minimizes the likelyhood of address collision

DNS Implications

- Need to avoid RR leaking
- Two Name Servers
  - external server
    - authoritative for public hosts
    - linked with the global DNS
  - internal server

DNS Implications (cont.)

- Resolver on private hosts queries only the Internal DNS Server
- Resolvers outside the enterprise query the External DNS Server
- Internal DNS Server forwards all queries for information outside the enterprise to the External DNS Server

Changes since RFC1597

- Editorial in nature
- CIDR-ize the address space
- Add a paragraph on renumbering

Conclusions

- Private Address Space is being used today
  - driven by pure pragmatic considerations
- Use of Private Address Space requires understanding of the tradeoffs - is not a “black and white” issue
- Conserving IPv4 address space is important
  - private address space helps this effort