

# IPv6 and the IETF Applications Suite

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- **What is the Internet applications suite**
- **IPv6 Transition scenarios**
- **Application types and examples**
- **Some conclusions**

# The Internet Applications Suite

- **Interpersonal services**  
Email, NetNews, IM....
- **Client/Server services**  
HTTP, FTP, SSH, NFS....
- **Middleware services**  
DNS, Routing, NTP, SLP, DHCP....

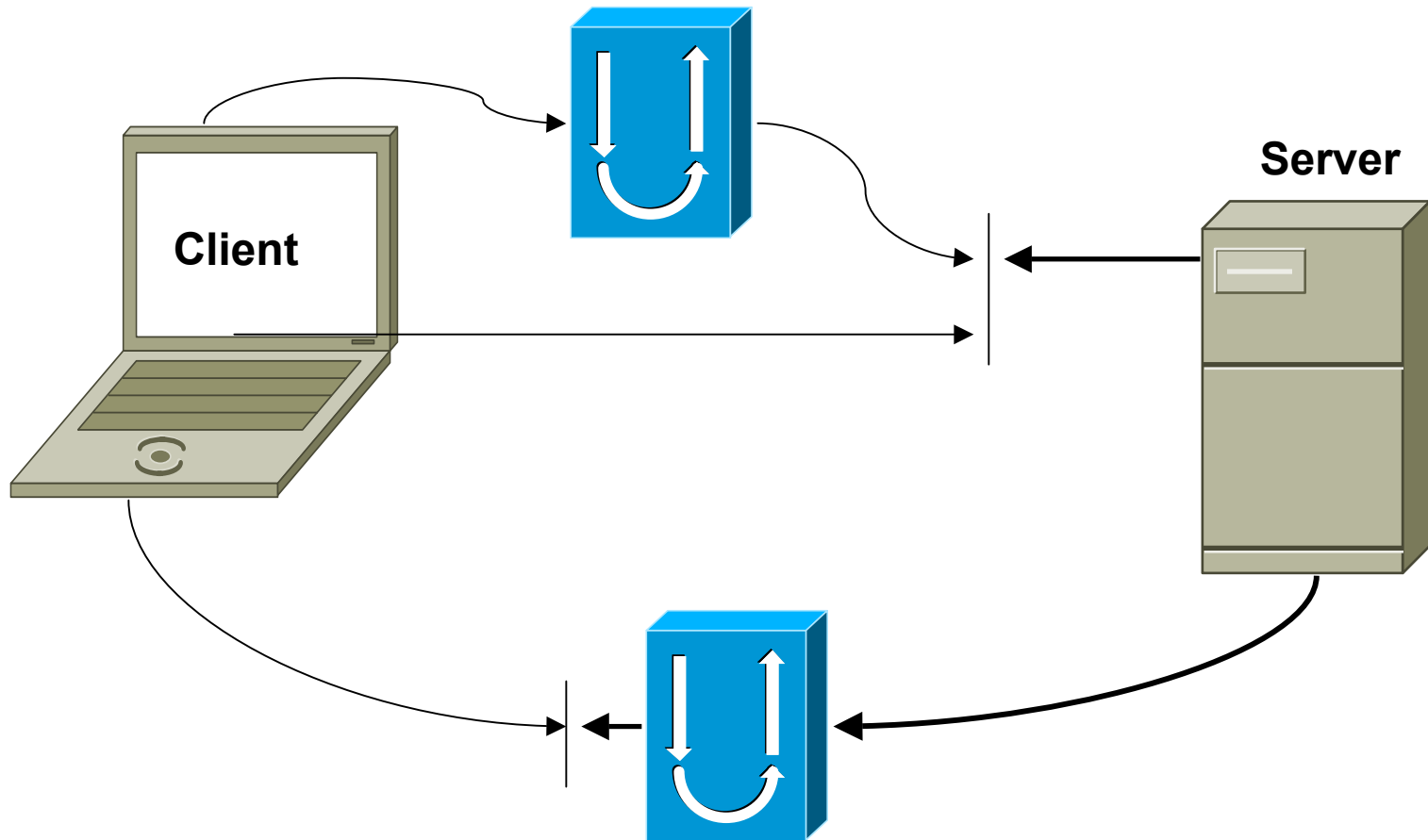
# Names And Addresses

- **DNS – one namespace for v4 and v6 hosts**
- **Client asks DNS for AAAA records and A records (and possibly MX records)**
- **Client chooses what to try to connect to**
- **Client chooses what to do if first attempt fails**

# Scenarios in IPv6 transition

- **Dual Stack Hosts**  
All hosts have v4 and v6 IP
- **Half-NAT hosts**  
Local v4, global v6
- **Hosts behind a gateway**  
NAT-PT
- **Hosts that don't care about IPv4**  
Not yet, or we wouldn't be talking.....

# Scenarios in IPv6 transition



- **Choice of source address**

**Interfaces have multiple addresses**

**A desire to use local addresses when possible**

- **Addresses have lifetimes**

**Expected to be "not a problem" – connections are expected to be shorter-lived than addresses**

# Application types and examples

- **Easy cases**
- **Irrelevant cases**
- **Hard cases**



# Easy case: Client/server programs

- **Connect using appropriate protocol & translators**
- **Experience with NAT tells us what works**
- **Only real problem: Retry on v4 if v6 doesn't work**
  - Should have done that with multiple A too
- **Some consideration needed when moving applications to be stack-agnostic**
- **Tricks available (BIA, BIS) for porting applications without telling them they moved**

# Irrelevant case: Address-relevant stuff

- **DHCP has to be different for v4 and v6**
- **Neighbour Discovery only exists in v6**
- **IGMP (multicast control) has to be different for v4 and v6**

# Hard case: Application meshes

- **SMTP: Message Routing**
- **DNS: Query referrals**
- **LDAP: Referral chasing**
- **Security (but that's always hard)**

# Example problem: SMTP

- **Works fine as long as all destinations list an IPv4 address**
- **When first recipient is v6-only, trouble.**
  - A is IPv4, B is IPv6 only**
  - A asks for A records. Gets none.**
  - What then?**
- **Temporary fix: Backup MX in v4 domain**
  - Good: Needs no change to v4 hosts**
  - Bad: Needs per-domain configuration**

# The Same Problem: DNS

- **V6-only hosts won't get very far**  
Most NS records are v4-only
- **Dual stack hosts can do whatever they want**
- **One V4-capable server in a domain is OK**  
Requirement applies to all levels of hierarchy
- **A pure V6-only domain can't be *resolved* from a v4-only client.**

- **Client-server protocols are (relatively) easy – just port, deploy, and run**  
**Take care to try all addresses.....**
- **Application meshes are more complex**  
**As long as all servers are dual-stack, few issues**  
**V6-only servers need to take care (for now)**

# References

- **RFC 2893 "Transition mechanisms"**
- **RFC 2766 "NAT-PT"**
- **Draft-shin-ngtrans-application-transition-01**
- **Draft-ietf-ngtrans-dns-ops-req-02**
- **Lots of other documents and mailing list discussions**