Current IPv6 Implementation and Future Perspective

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Topics

- Introduction
  - Myself
  - IPv6 implementation status
- IPv6-Fix
  - Activity to try addressing issues in the transition period
- Others (if time allows)

Introduction(1)
About Myself...

- Keio University
  - Assistant Professor
- WIDE Project
  - USAGI/WIDE Project
    - Development of IPv6 and related technologies on Linux
  - IPv6-Fix
- Linux Kernel Developer
  - Networking [IPv4/IPv6] Co-Maintainer

Introduction(2)
IPv6 Implementation Status

- Major players already support IPv6.
  - Core routers
    - Cisco, Juniper, Alaxala, ...
  - Operating systems
    - Linux, *BSD / Unix, Mac, Windows
  - Software / services
    - WWW, E-Mail, ...
- It *should* work, *mostly*...
  - It is designed to work, but...

Introduction(3)
Mostly?

- Yes, mostly.
  - IPv6 is designed to co-exist with IPv4.
- However...several *minor* issues have been reported.
- Minor or less frequent, but it is important to address them.
  - Falling back to IPv4 sometimes does not work...
  - Uneasy for ordinary users to debug.
  - Combined factor may turn out fatal...

IPv6-Fix Activity

- To try addressing issues during the IPv4-IPv6 transition period.

  1)Specification

  - e.g. "on-link assumption", error handling in TCP

  2)Implementation

  - e.g. DNS misbehavior

  3)Operation

  - e.g. tunnel, firewall

  4)Combined Factor

IPv6-Fix: DNS Misbehavior

- Servers
  - To ignore queries for AAAA RR
  - To reply with NXDOMAIN (or other errors) to queries for AAAA RR even it has data for A RR
  - To reply with bogus A RR to AAAA queries
  - To reply with inauthoritative response to AAAA queries, while to reply with authoritative response to A queries
- 0.1% of authoritative servers found
  - Cache servers does not count

IPv6-Fix: DNS Misbehavior (contd)

- Clients
  - To accept bogus response from servers
- Implications (selected)
  - Recursive cache servers may learn the failure (negative cache), to return NXDOMAIN, SERVFAIL etc.
  - To prevent resolvers from falling back to IPv4
  - To take looooooooo.....ng time to finish resolving a single name

IPv6-Fix: Combind Factor

- DNS server
  - To respond A RR to AAAA queries
- DNS client
  - To accept A RR for AAAA queries
- Captive portal site (e.g. in hotel)
  - To redirect initial web access to the portal site using hostname

-> To try to access the portal server infinitely...

Act Now

- People have tended to disable Ipv6.
  - Operational work-around
- “Work-around” is not an option.
  - Complex cases
  - IPv6 is available by default
    - Uneasy for ordinary users to disable it
    - Automatic tunnel
      - 6to4, Teredo
- Listen to people and act *NOW*.

IPv6-Fix Resources

- Further information is available at:
  - Homepage: http://v6fix.net
- Send any comments, symptoms / tips ... to:
  - E-Mail: contact _*AT*_ v6fix _*DOT*_ net

Summary

- IPv6 infrastructure is now ready to board.
- A few, minor but important issues regarding the transition period have been reported.
  - A single issue might not be a problem but complex and fatal problem may occur by combined factor.
  - It is important to be prepared.
- We need to listen people for any symptoms and to act now.

Other Topics

- Multi-prefix and address selection
  - Interaction among between administrative (or network) policy (including filtering) and local policy (or preference).
- DNS and routing scalability
  - Number would be doubled...
- Demands for less expensive home routers