Rapid Transition Model for IPv6-accessible Contents

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Current Situation for ICP Transition

- The lack of IPv6-reachable contents becomes one of the main obstacles in IPv6 development.
- ICPs are facing great challenges to upgrade to IPv6 natively
  - Numerous application systems have been designed based on IPv4 address inherently.
  - Content providers are lack of implementation/operational experience for IPv6, including IPv6 service provision, user management, security, etc.
  - Most ICPs are reluctant to take action on IPv6 transition without explicit profit, especially for small-to-medium ones.
Our Field Trial Practice on IPv6

• China Telecom has started the field trial in Changsha and Wuxi ever since 2010.
• We have deployed end-to-end dual-stack field trial and have more than 200,000 IPv6 subscribers.
• However, since existing IPv6 accessible contents are still far from enough, the overall IPv6 network is near empty.
Our Purpose is to Fill the Gap

IPv6 user → IPv6 Internet

How to break?

We really need IPv6 traffic and more IPv6 accessible contents to give us confidence again.
Model-1: IPv6 client to IPv4 server scenario

- Provide attractive low-cost method to increase the IPv6-accessible contents rapidly
Deployment considerations (1)

• Address Mapping

  – To save global IPv4 addresses which become scarce resources, private blocks, for instance 10.0.0.0/8 may be used for the Stateful NAT64 in most cases.

  – Two modes:
    • 1:1, one IPv6 address is mapped to one IPv4 address with no port mapping, better scalability
    • N:1, each of the IPv4 addresses will be shared by multiple IPv6 users from Internet with port mapping
Deployment considerations (2)

• DNS implementations
  – Add Static synchronized AAAA records in authoritative DNS servers.
  – Additional tools to automatically synchronize AAAA records are offered to reduce the burden of manual configuration.

• Traffic Logging
  – 1:1 mode:
    • Subscriber-based logging {IPv6 address, IPv4 address, timestamp}
  – 1:N mode:
    • Subscriber-based logging with port set is recommended to greatly reduce the logging burden, especially for large-scale operators
Deployment considerations (3)

- Geographically aware services
  - A separated geo-location server would maintain the same address binding records as logging server.
  - An open web-service API is offered to content providers, which will retrieve the original IPv6 address for a given translated IPv4 packet from geo-location server.

- ALG issues
  - Since the application types in a certain IDC can be known in advance, limited ALGs will be needed in this case.
Deployment considerations (4)

- Security
  - When deploying stateful NAT64 in server-side, it is hard to apply source-based filtering policy.
  - It is necessary to detect the status of NAT64 states, including consuming speed, occupied proportion, etc.
Model-2: IPv4 client to IPv6 server scenario

- Encourage native IPv6 deployments in a well-controlled manner
Deployment Considerations(1)

• Mapping and Addressing
  – IPv6-only server should be configured with an IPv4-translatable address.
  – A specific prefix to synchronize the IPv6 address should be announced in IDC.

• DNS
  – A records which are extracted from IPv4-translated addresses should be added directly on authoritative server.
  – Other considerations are similar with Model-1.
Deployment Considerations(2)

• Logging
  – No logging issue

• Geographically aware services
  – Content providers should be firstly configured with a pre-defined prefix for stateless translation
  – Identify IPv4-converted IPv6 address among IPv6 packets
  – Extract the embedded IPv4 address which would reflect its original IPv4 geographical information.

• ALG issues
  – It is the same with Model-1.
Our Deployment Experience

- We have deployed carrier-grade ICP-transition platform, located in the exit of IDC.
User Statistics

- More than 15 thousands different IPv6 users ever accessing the above six Content Providers.
Deployment and Experiment

• We have tested TOP100 websites for IPv6-only users.
  – Over 90% of video websites (like youku, tudou, etc) have ALG problem which embedding IPv4 address directly.

• Possible Solutions:
  – Apply HTTP-ALG in NAT64 gateway
  – Upgrade CDN to support IPv6
Next step...

• We would like to ask for adoption of WG item.
• Comments and contributions are welcome
Q&A