IPv6 Addresses as Content Names in Information-Centric Networking

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1. Determine IPv6 address space of Provider.com
   8079:ef09:ffbc:d6ce:xxxx:xxxx:xxxx:xxxx

2. Determine IPv6 addresses of content
   /index.html = 8079:ef09:ffbc:d6ce:eacf:331f:ffc:35d4
   /image.jpg = 8079:ef09:ffbc:d6ce:d5b:1c4c:7f72:f69

3. Issue HTTP request to IPv6 address
   http://8079:ef09:ffbc:d6ce:d5b:1c4c:7f72:f69/

Reverse lookup of IPv6 address. If no content:
(1) Pass request upstream or
(2) Issue a regular HTTP request, cache it.
This will involve creating a new IPv6 address on a virtual interface.

Returns HTTP content to the browser

The architecture diagram of our IPv6 content addressing system. In our system, the regular browser makes a HTTP request through a proxy, which translates HTTP requests to an IPv6 content addressing system. The request is sent out over the network, until a router on path that has the content responds to the request. The proxy then translates the retrieved content back into a HTTP response to the user's browser.

IPv6 Features That Are Useful for Content Networking

- IPSec: security
- Multicasting: streaming video
- No packet fragmentation
- Better mobile support
- Jumbograms
- IPv6-over-IPv4 bridging mechanisms: use of our IPv6 content naming proposal in archaic or today's networks

Sample Name to IPv6 Mappings

- 8079:1b37:2650:3af8:1d78:a723:dee0:2522
  http://TheEpochTimes.com/content/video.mp4
- 8079:1b37:2650:3af8:eacf:331f:ffc:35d4
  http://TheEpochTimes.com/index.html

Currently implemented

- Content address registry as a web service (built in PHP) connected to a MySQL database.
- Requests to set/get content names and their corresponding IPv6 address mapping are done through simple put and get requests. We do plan to make this more scalable and hierarchical in the future.

Current/Future Work

- Starting work on the full implementation of the IPv6 content naming architecture.
- Use netfilter, particularly libnetfilter_queue and its Python language bindings, to handle and serve IPv6 content naming and addresses.