Shaping a New Architecture by Architectural Principles

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ICNRG Interim Meeting
Yokohama, Japan, November 1, 2015
A Number of Ongoing Discussion Topics on Mailing List

- Important questions, seemingly confusing concepts
  - ID-locator separation
  - Routing is location

- To get right answers: Start from first principle

- ICN: proposed as a new networking architecture
  - Must be a general one, to serve all future applications
ICN as a New Architecture

◊ Must not only consider static content
  o At the time of IP design, had we tailored it only to support email, IP would not succeeded

◊ Must not only for infrastructure-supported environment

◊ Must be clear what is architecture, and what is engineering solutions for performance optimization
  o Those engineering solutions are not part of the architecture
    ▶ e.g. LINKs, manifest
ICN and “ID-Locator Separation”

◊ IP: packets can only name communication endpoints
  o Since IP cannot identify other things that people want to talk about, hence “ID-locator separation”

◊ NDN: “The name in an NDN packet can name anything – an endpoint, a data chunk in a movie or a book, a command to turn on some lights, etc.”
  o This generalization removes the notion of “ID-locator separation”
Routing Announcement and “Location”

- Whether a given name prefix is/not announced in routing protocol does not change it from “name” to “locator”
  - When a producer announces its prefix (cnn.com), does that make CNN a locator?

- A prefix in the RIB helps steer interests toward where data is likely to be found
  - An interest is looking for data, not location
  - As soon as it finds the data (perhaps from a router cache), it brings data back, without going to the location

11/1/15
Power of ICN Comes From Names

- Name as defined by application, provides:
  - Scope (e.g., /localhost)
  - Context

- Only data with name can define which scope it belongs
  - manifest as name hash lost scope.

- Only data with name can define its application context
  - which can be used to set up security and reason about it
Engineering Solutions
(Not Part of ICN Architecture)

◊ LINK is an engineering solution to assist Interest forwarding if Interest name not in RIB
  o non-popular data on global scale
  o mobile upload
  o NOT needed for popular data
    ▶ /google, /netflix, /hulu, ...
  o NOT needed in many specialized environments
    ▶ vehicular networks, sensor networks, IoT

◊ Name mapping service (NDNS) is an engineering solution to assist LINK lookup to retrieve non-popular data on the global scale
ICN: Using Names to Fetch Data

◊ Naming in ICN ties together 3 basic things
  o Application uses it to identify data
  o Security uses it in security policies
  o Forwarding uses it to decide where to forward

◊ Our 5-year experience with NDN research shows that naming is one fundamental piece of ICN research
  o Exploit naming and naming conventions
    ▶ To ease application development
    ▶ To achieve goals that are otherwise difficult to achieve