NRS Discussion Kickoff

Dave Oran, Börje Ohlman, Dirk Kutscher

Note: summary from the discussion email we sent out a while back

Lots of things an NRS *Could* do

- Names can be related to other names in a variety of ways:
  - Collections of named objects
  - Alternative names for the same data
  - Indirection (e.g. *"link objects")*
  - Discovery anchors via prefixes or other means
- Each of these "name computation" or "name lookup" functions could be provided in a number of ways,
  - application-specific function on a per-application basis,
  - function-specific lookup service (e.g. "link objects")
  - discovery services
- Purpose of this NRS discussion is not the above it is:
- **We need a set of functions that manipulate names in order to enable scalable routing in an ICN**

Scalable Routing – role of NRS?

- Forwarding Information can be built leveraging different information sources:
  - name-based routing
  - name resolution function or service
  - SDN control
  - static configuration etc.
- Sometimes, none of this is needed (for example in broadcast or local rendezvous-based systems). In other cases, a combination of different inputs and mechanisms could be useful.
- NRS approach potentially brings many benefits but we need deeper understanding of what these are
  - And the tradeoffs in other areas like complexity, security, etc.

Some (hopefully relevant questions)

- Do we always have to resolve names to identifiers in a different namespace?
  - Conversely, is a name resolution system ever needed to map names to a different namespace (specifically the namespace of lower-layer services such as IP or Ethernet).
- What are the privacy and security properties?
  - Whenever a level of indirection is added to a system, there is potential to expand the attack surface dramatically, as now there are opportunities to attack the provenance of the input namespace, the output namespace, *and* the translation mechanisms and protocols themselves.
- Who does the resolution? Consumers? Routers? Both?
- Do we need new protocols and/or semantics in current ICN systems?
- Does NRS imply some mutability of Interest messages (name rewriting?) and what would be the implications?.

Relationship to Routing/Forwarding

- What is the level of integration with the routing system?
  - Are the results of an NRS operation intended to be used just to construct tunnels (e.g. the routing system is oblivious other than possibly calling the NRS to identify tunnel endpoints)
  - or is the routing system intimately entwined,
    - as it would be with routing hints in Interest messages

Name-based routing issues

- Some of these are general in the sense of fundamental to the scaling of routing state times rate; others are specific to the structure of namespaces in an ICN architecture. These issues include, but are not limited to:
  - Global scalability of routing
  - Producer mobility
  - Finding off-path cached objects
  - Security (specifically authorization) of routing information injected from outside the routing system.
- These same issues present themselves if one chooses an NRS
  - Need to understand where the NRS is superior to NBR and why