Architectural Considerations of ICN using NRS
draft-hong-icnrg-icnnrs-00

ICNRG Interim meeting in London

Jungha Hong
ETRI
Draft purpose

• This document discusses architectural considerations and implications of ICN related to the usage of the NRS

• It describes that how ICN architecture changes and what implications are in the routing system when NRS is utilized in ICN
# Table of Contents

1. Introduction ................................................. 2
2. Conventions and Terminology .............................. 2
3. Background ................................................. 3
4. Implications of NRS in ICN ................................ 4
5. ICN Architectural Considerations for NRS ............... 4
   5.1. Resolution ............................................. 4
   5.2. Protocols and Semantics ............................ 5
   5.3. Routing System ...................................... 5
6. Security Considerations .................................... 5
   6.1. Name Space Separation .............................. 5
   6.2. NRS System .......................................... 6
   6.3. NRS Protocols and Messages ......................... 6
7. Acknowledgements .......................................... 6
8. References ................................................ 6
   8.1. Normative References ................................. 6
   8.2. Informative References ............................... 6
Background

• The name based routing in ICN poses a number of issues, such as
  • global scalability of routing
  • producer mobility
  • off-path cache
  • etc.

• In order to address these issues, the name resolution function as a NRS has been applied to several ICN projects and literature
Implications of NRS in ICN

• In general, NRS is not mandatory in an ICN architecture
• Thus adopting a NRS would change the ICN architecture at least on
  • **Procedure**
    • The procedure of the name resolution has to be added
    • When added, need to consider who and how the resolution does
  • **Latency**
    • The additional latency of the resolution obviously occurs
      • The total latency could be minimized if the nearest copies or off-path caches can be found
      • trade-off between the resolution latency and inter-domain traffic reduction
  • **Security**
    • authentication of NRS messages and name spaces
    • protecting NRS entities from DoS or DDoS attacks
ICN architectural considerations for NRS: Resolution (1/3)

• Who does the resolution?
  • can be done by consumer, routers, or both

• How does the resolution?
  • might be always resolved to identifiers in a different namespace just like DNS lookup
  • a NRS is ever needed to map names to a different namespace
ICN architectural considerations for NRS: *Protocols and Semantics (2/3)*

• In order to develop NRS system, new protocols and semantics should be designed to manage and resolve in between different name spaces

• NRS can be implemented by
  • extension of basic ICN TLV format and semantics
  • using its own protocols and semantics
ICN architectural considerations for NRS:
*Routing System (3/3)*

- How to process the resolved information by NRS lookup
  - can be used just to construct tunnels resulting in NRS identifying tunnel endpoints
  - Can be used as routing hints in request messages
    - In this case, request message needs to be re-written by the resolved information including the original name that was requested by consumer to check the data integrity
Security considerations

• Name Space Separation
  • Secure management of namespaces
  • Secure mapping in between different namespaces

• NRS System
  • Security on new entities of NRS system
    • Can be a single point of failure

• NRS Protocols and Messages
  • Security on NRS messages such as lookup, registration, update, etc.
Looking for contributors!
Questions and comments?