Deployment Considerations for ICN

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https://tools.ietf.org/html/draft-rahman-icnrg-deployment-guidelines-02

Introduction

- The ICNRG charter identifies deployment guidelines as an important topic area for the ICN community

- Specifically, the charter states that defining concrete migration paths for ICN deployments which avoid forklift upgrades, and defining practical ICN interworking configurations with the existing Internet paradigm, are key topic areas that require further investigation

- This draft attempts to address this topic

Revision History

- Rev-00: Presented in IETF-98 (Chicago) and received good feedback
- Rev-01: Addressed feedback from IETF-98 (Chicago)
- Rev-02: Addressed detailed comments from Dave Oran

Summary of Key Changes (1/2)

- Main Changes between Rev-00 and Rev-02:
  - Title changed from “Configurations” to “Considerations”
  - Reworked definitions (section 2) to refer to existing RFCs and ICN-terminology draft
  - Added more details on ICN-in-a-Slice (section 3.4)
  - All deployment trial experiences (section 5) grouped under either “ICN-as-an-Overlay” or “ICN-as-an-Underlay”
  - Added ICN2020 trial summary (section 5.1)
  - Generalized ICN gaps to potential protocol effort only (section 6.4)
    - Removed all references to potential IETF WGs/BoFs

Summary of Key Changes (2/2)

- Main Changes between Rev-00 and Rev-02 (continued):
  - Expanded Conclusion (section 7) to cover points from all major sections
  - Added Security Considerations (section 9)
    - Referenced key deployment related points from RFC 7945 (ICN Evaluation and Security Considerations), as well as new issues
  - Added more references
  - Many editorial changes

Table of Contents of Draft

Deployment Configurations (1/3)

1. Wholesale Replacement
   - “Clean-slate” approach where existing IP infrastructure (e.g. routers, services) is replaced

2. ICN-as-an-Overlay
   - Also referred to as “tunneling” approach
   - Support ICN over existing IP infrastructure, e.g.:
     - ICN-over-UDP
     - ICN names mapped to IPv6 addresses
     - Convergence layer to map ICN semantics to HTTP

Deployment Configurations (2/3)

3. ICN-as-an-Underlay
   - Support ICN infrastructure islands (at the edge or the core network) that integrate with existing IP-based services and infrastructure through Network Attachment Points (NAPs)
   - Protocol mapping at ingress/egress NAPs of, e.g.,
     - Edge HTTP/CoAP/IP onto core ICN messages
     - Edge TCP/IP to core TCP/ICN messages
     - Edge ICN messages onto core HTTP/CoAP/IP messages
   - Allows backward-compatible introduction of ICN infrastructure while reaping ICN benefits of multicast delivery, fast indirection, etc.

Deployment Configurations (3/3)

4. ICN-as-a-slice
   - With the introduction of network slicing (e.g. 5G), the deployment of ICN as a network slice composed on virtual or physical resources (P4/POF) becomes a viable option
   - The ICN network and service functions themselves may be overlaid over IP or realized over L2 (5G RAN, Ethernet etc.)

Public Trial/Experiments Summary

- ICN-as-an-Overlay (tunneling over IP) configuration:
  - FP7 PURSUIT
  - FP7 SAIL
  - NDN Testbed
  - ICN2020
- ICN-as-an-Underlay (in discrete infrastructure islands) configuration:
  - H2020 POINT/RIFE
  - H2020 FLAME
  - CableLabs Content Delivery system
- Note: Not focusing on simulations in this summary

Next Steps

- Does the RG think that draft is ready to be adopted as a WG draft?
  - As per email suggestion from Dave Oran (with chair hat off)
- Any other feedback?