Anchorless Mobility Management through Hybrid Information Centric Networking (hicn-AMM)
draft-auge-dmm-hicn-mobility-00
draft-auge-dmm-hicn-mobility-deployment-options-00

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Rationale for ID-native routing

• Forwarding typically based on locators & mobility added on top (M-IP, GTP)
• **Loc/ID separation** has been proven to simplify mobility management
  • still it requires a (distributed) **mapping system** for Loc/ID binding
  • challenging to operate at scale: latency, cache consistency, etc. [Evolving5GRouting]

• Move Loc/ID one step further...
  • remove ID-Loc mapping by forwarding directly using IDs
  • native ID-oriented routing suggested in [draft-vonhugo-5gandip-ip-issues-03]
  • no data plane anchors, no control plane anchor

• ... by applying ICN principles
  • Hybrid ICN (hICN) = ICN within IPv6 [draft-muscariello-intarea-hicn-00]

[Evolving5GRouting] https://www.ietf.org/mail-archive/web/ila/current/pdfsTy2hnL69I.pdf
Overview of Hybrid ICN (hICN)

- hICN = ICN within IPv6 (all ICN features, names into IPv6 addresses)
  - Transparent integration within IP network
  - Insertion via a few selected nodes

- A request/reply communication paradigm
  - Requests are forwarded by name (ID) using FIBs
  - Replies are forwarded on the reverse path using state left by requests (label swapping) see [draft-muscariello-intarea-hicn-00]

- Mobility of consumers is natively supported
  - Simply reissue pending requests (support from packet caches)

- The draft describes how producer mobility is supported
  - See [draft-auge-dmm-hicn_mobility-00]
Ensuring connectivity via data plane mechanisms*

- Use distributed forwarding updates to manage mobility
  - MAP-Me protocol [draft-irtf-icnrg-mapme]
  - Repair path to producer through data plane mechanisms (previously proposed to handle link failures)
  - Lightweight FIB update process
  - Both forward and mobility management are purely ID/name-based

- No interaction with control plane
  - No mapping to contact or update, no new node to deploy and provision
  - No caching staleness / latency tradeoff

- Fully anchorless, mobility handled at L3 (HetNet)
  - Pointers to analysis of scaling, flow performance, offloading capabilities
  - Optimizations for latency-sensitive traffic

Benefits of hICN deployment (MEC deployment)

Edge caching: Low latency

Edge caching: Multicast delivery

Seamless mobility across HetNet

Bandwidth aggregation - Multi-source
Benefits of N9 replacement

- Anchorless mobility & Offloading of local communications
- Resulting from ID-based forwarding & mobility
- No traffic towards the core
- Dynamic UPF selection
Benefits & deployment trade-offs

From hICN transport

- Edge caching: low-latency, multicast
- Seamless mobility across HetNet
- Bandwidth aggregation
- Multihoming / multisource / multipath

In 5G: integration in MEC / UPFs

- Partial hICN insertion strategy
  - few selected nodes at edge
  - use SRv6 data plane for increasing reach
- Requires hICN in endpoints
  - userspace agent / browser plugin
  - or proxies

From ID/name-based forwarding

- Anchorless mobility
- Offloading D2D communications
- Dynamic hop-by-hop forwarding policies
- Localized mobility (disaster recovery)

In 5G: N9 replacement (+N3)

- Non-hICN traffic also benefits from anchorless mobility

[draft-auge-dmm-hicn-mobility-deployment-options-00]
Conclusion

• New forwarding and mobility paradigm purely based on ID

• Build on Hybrid ICN: an incremental deployment within IPv6
  • Consumer mobility is native and comes at no cost
  • Producer mobility through lightweight, ID-based, data plane updates

• Benefits from ID-native & hICN mechanisms
  • Several deployment strategies and trade-off analyzed in draft
  • 3GPP 5G perspective

• A general purpose forwarding & mobility architecture
  • Anchorless; Support from HetNet
  • Opportunities to insert hICN transport (userspace networking, TAPS, etc)
Overview of Internet drafts

Submitted drafts:

draft-auge-dmm-hicn-mobility-00

- New mobility management paradigm based on (h)ICN
- Benefits of ID-native routing + hICN transport
- In particular Anchorless Mobility / HetNet support

draft-auge-dmm-hicn-mobility-deployment-options-00

- Options & tradeoffs for deployment in 3GPP 5G architecture

+ Contributions to:

draft-bogineni-dmm-optimized-mobile-user-plane-01