

NDN/CCN Harmonization:
Identifying NDN/CCNx1.x Commonalties and Differences
A High-Level Discussion Summary

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Where we all came from



2010: NSF funded Named Data Networking project

- PARC was part of the NDN team and received \$1.8M
- Until Jacobson resigned in October 2012

Since then

- ◇ NDN team:
 - Jacobson continues leading NDN development
 - take application-driven architecture development direction: at the end of beginning now?
- ◇ PARC: simplifying implementation, optimizing performance
- ◇ Different goals → spec partied the way

CCNx 0.8 as common starting point

- ◇ binary XML format
- ◇ allow data fetching by prefix
- ◇ with Selectors support
- ◇ data packet carrying “FreshnessSecond”
 - relative time, not assuming sync’ed clock
- ◇ Packet Naming
 - Full name : “/foo/bar” + implicit digest
 - Exact name : “/foo/bar”, 0 components after
 - Prefix name : “/foo/*”, 0 or more components afterwards

PARC's Protocol Changes

- ◇ Changed binary XML to fixed-header plus TLV
 - fixed header for end-to-end network layer with optional TLVs that can be added/modified HBH
 - followed by TLVs that describe ICN packet
 - TLV with fixed length field
- ◇ Encoded Interest Selectors into name
 - implication on data naming
- ◇ Support data fetching with exact match between Interest and data packet names only
 - Assuming synchronized clocks among all routers
 - Changed CS semantics from fresh/stale Data packets (CS can keep stale) to alive/dead (CS must remove dead)
- ◇ Introduced heavy use of manifest
 - but nameless objects do have name (the hash)
- ◇ Intentionally use the same exact name for different data as the protocol needed
- ◇ Added HopLimit in Interest packets
- ◇ Removed Nonce from Interest packets

NDN's progress

- ◇ Trying out the architecture by developing a wide range of apps
 - exploring new design patterns
 - fill in missing pieces (e.g. gaining further understanding of naming conventions)
 - identify new issues and develop solutions
- ◇ single out security effort: a great challenge, with great progress made
- ◇ intentionally did not emphasize optimization
 - NFD Guideline: “emphasize modularity over performance, to enable others to experiment with the new architecture by adding new modules or modify existing ones”

Protocol changes

- ◇ WashU early work showed Exact name match between Interest-Data, with what we know today, enables significant performance gain (INFOCOM 2014 paper)
 - NDN team decided staying with fetching data by prefix, WashU developed new solutions