CCNx 1.0 Motivations & Overview

Computer Science Laboratory
Networking & Distributed Systems

March 2014
CCN - Motivation
Computer networks started as wires or virtual wires.

**Fig 1.** A simple TYMNET virtual circuit.
Then evolved to distributing content
We no longer connect (virtual) wires

We move content
Please send me the invoice
Por favor, envíenme la factura
Vă rugăm să trimiteti-mi factura
Lähetä minulle laskun
الرجاء ارسال لي الفاتورة
Խնդրում եմ ուղարկել ինձ ապրանքագիր

Application
Presentation
Session
Transport
Network
Link Layer
Physica
Unified Field Theory

Unified Network Addressing

/parc/csl/presentations/CCN Intro.ppt/slide06/v3/c0
Dynamic Adaptation
Build applications around their data, the network organically adapts.
CCN - Core idea
“Please send me the invoice”

Chunks 0 - 3

“Please send me the invoice”

Chunks 0 - 3

Verify a trusted signature

Fragment to the MTU

Core Protocol
Core Protocol Everywhere
Layered Name-based Protocols
CCN Names

/gparc/ccnx/presentations/slide10/v=2/c=0

- globally routable name segments
- application dependent name segments
- protocol dependent name segments
Success is a Journey, Not the Destination
Data no longer tied to hosts
Provenance part of data
Secure the data, not the pipe
Core Protocol

One interest packet gets one content packet
Transport protocols can do parallel requests
Routes point to authoritative sources

Routes are set up pointing to F for prefix /parc
Interests leave state

Interest leaves reverse path state in the network
Content follows reverse path

Content packet follows reverse path and consumes state
Each interest can go to a different content provider
Intrinsic multi-path
Works around hotspots
Works around failures
Load balances
Mobility
Any node can cache

Node G requests same content, gets it from a cache in D
G authenticates content via the content signature, not the sender
Data lives where its used
Network adapts to usage
CCN also names the network sized chunks
The stream descriptor is the metadata for the stream.
Secure single chunk

CCN names and signs every chunk
Name Encapsulation
Unites Routing and Transport
Intrinsic Authentication
Unites Data and Trust
CCN - 1.x
Forwarding Primitives

- Name
- KeyId (optional)
- ContentObjectHash (optional)
- Scope (local, 1 hop, all)
- PIT Lifetime (msec)

Compute Hash *

- Name
- KeyId
- CryptoSuite [PublicKeyLocator] [ProtocolInfo] [Payload] Signature
Forwarding on Names
Simple and fast
Secure
Protocol Specifications

1. CCNx 1.0 Protocol Specification Roadmap
2. CCNx Semantics
3. TLV Packet Format
4. CCNx Messages in TLV Format
5. Labeled Segment URIs
6. Labeled Content Information URIs for CCNx
7. CCNx Content Object Caching
8. CCNx End-to-end Fragmentation
9. CCNx Content Object Segmentation
10. CCNx Publisher Clock Time Versioning
11. CCNx Publisher Serial Versioning
12. CCNx Selector Based Discovery
13. CCNx Hash Forwarding
Well specified Name protocols
Multiple vendor support
Extensible
CCN - Summary
Data no longer tied to hosts
Provenance part of data
Network adapts to usage
Simple and fast
Secure
Well specified
Multiple vendor support
Extensible
Thank you

http://www.ccnx.org/
http://www.parc.com/ccn