ICN Beyond the Lab
An IPTV Case Study

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Overview

- IPTV
- ICN and IPTV
- ICN Deployment
- Migration to ICN
INTEGRATED SET OF VOICE, DATA & VIDEO SERVICES OVER CONVERGED PLATFORM
Video Services

- Broadcast digital TV & radio
- Video on demand
- Pay-per-View
- Personal video recorder (PVR)
- Time-shifted TV
- Parental control
- Favorite channels
- Layout personalization
- Multiple languages
- Advanced search
Telephony Services

- Analog or IP telephony
- Caller ID
- Call history
- Phone directory
- Voice-mail
- E-mail
- Instant messaging
Data Services

- 3rd party services
- Emergency Alert Messaging
- On-line billing
- Subscriber self-care
- On-line browsing
- Tele-commerce
- Presence notification
System Architecture
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IP

- Custom system for catalogue (web app)
- Ingestion of metadata via 3rd-party APIs or manual replication
- Proxied access to catalogue

ICN

- Publication adds automatically to catalogue
- Ad-hoc searching and scoping of catalogue
- Metadata mostly disjoint from content
- Inherent access to catalogue - content
Content Distribution

IP
- Either unicast (HTTP) or native multicast (RTP) streaming
- Manual network dimensioning, over-provisioning, and traffic classification
- Dedicated caching infrastructure

ICN
- Multicast possible for HTTP
- Resilience via anycast
- Path setup and source routing can support QoS
- Inherent caching and cache management (allows non-popular content)
Content Management

- **IP**
  - Custom and fully managed creation (publication), updating, and deletion
  - Operations are ACID (atomic, consistent, isolated, and durable)
  - Metadata is pulled from external systems

- **ICN**
  - Publication is a native process
  - Updating and deletion are hard due to high distribution and caching
  - Metadata can be part of publication and name resolution
Logging

- **IP**
  - Custom identity management enables billing
  - Proxied access simplifies content access logging
  - Consumption performance measured via SNMP or RTCP

- **ICN**
  - Minimal work on logging
  - Distributed content resolution system could log access
  - Consumption devices could publish analytics
Content Protection

- **IP**
  - Content scrambled with industry standards
  - Isolation discourages attacks
  - Content owners perform technology audits

- **ICN**
  - Securing the content rather than the channel
  - Key management complicated due to high distribution
  - Poisoning of catalogue and caches is possible
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Who gets the ICN bill?

- End User (EU)
- Network Service Provider (NSP)
- Content Service Provider (CSP)
Pay for deploying ICN.
  - Why? Build it and they will come? Will others do it?

Reduce management expenses.
  - Is it self-managing?

Reduce transit traffic expenses (with caching).
  - Make transit NSPs angry so they will sabotage ICN.

Increase revenue with content services to End User.
  - Better than intra-domain CDN?

Increase revenue with distribution services to CSP.
  - Risk revenue from CDN providers. Added value for CSP?
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IP over ICN: Architecture

Gateway Approach

- IP-only Receiver UE
- NAP
- RIOT-enabled IoT device
- ICN
- ICN Border GW
- IP Border GW
- IP Router
- IP-only Sender & Receiver UE

Handle various abstractions here!
IP over ICN: Platform

![Diagram of IP over ICN Platform](image)
Summary

- IPTV is an established **commercial** technology
- ICN can make IPTV **dynamic** and **robust**
- **Incentives** for ICN deployment are unclear
- IP over ICN constitutes a **migration** strategy
thank you