NetInf architecture -- key features

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The SAIL Project
(Scalable & Adaptive Internet Solutions)

- EU Call FP7-ICT-2009-5
  - 25 partners
  - 30 months duration
  - 12.4 M€ EU funding in 2.5 years (total ~20M€)

- SAIL’s main objective
  - Design concepts and technologies for the networks of the future
  - Develop techniques to move from today’s to future networks
Scalable Adaptive Internet Solutions

On-demand usage of network resources

- **Cloud Networking**: Tying Cloud Computing and Network Virtualization together
- **Open Connectivity**: Efficient use of multi-path, multi-protocol and multi-layer networking – over any fixed and mobile networks
- **Network of Information**: Shift of focus from network nodes to information objects
Outline

- ICN security model
- NetInf naming and object structure
- NetInf Name Resolution Service (NRS)
- NetInf Application Programming Interface (API)
- Conclusions and next steps
Traditional node centric networking

Connect to Server X and get object B

Trusted Server

Secure Connection
Information centric networking

- Get object B
- Trustable copy of object B
- Untrusted connection
- Untrusted server

Untrusted

- Get object B
- Trustable copy of object B
- Untrusted connection
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NDO Structure

Object Name

ni:///sha-256;B_K97zTtFuOhug27fke4_Z...

Object in Message

- multipart/mixed
- application/json

Object management data

- multipart/mixed
- application/steam-meta+xml

Named data object

- application/steam-meta+xml

Application-specific meta data

- application/binary

Actual object bits

SHA-256 hash coverage

ni-naming: draft-farrell-decade-ni
An information-centric Waist

Applications
application-specific names

Name Layer

ICN name layer for naming Information Objects

API

domain-specific schemes

Transport

Forwarding
Object Lock-in per Application

Object lock-in per application
Comparable to host lock-in per network before Internet
Application Development on a Common Naming and Reachability Infrastructure

Seamless communication between objects of all types

- **naming**
- **reachability**
- **caching**

Information centric network

NetInf API

- App X
- App Y

- sensor
- person
- content
- any type

= object

**NRS & RVS**

- Name Resolution System
- Rendezvous System

**SCALABLE & ADAPTIVE INTERNET SOLUTIONS**
Conclusion

- Some characteristics of Networking of Information (NetInf)
  - **Secure information-centric architecture** by embedding security into identifiers
  - **Scalable** name to locator resolution for $10^{15}$ objects and beyond
  - A **common infrastructure and API** for accessing all types of objects (including real world objects), regardless of their location
References

- ICN Survey
  - IEEE Communications Magazine July 2012

- SAIL Project: [www.sail-project.eu](http://www.sail-project.eu)

- URI naming scheme based on NetInf ideas is on the RFC track in IETF naming things with hashes, i.e. Named Data Objects (NDO)

- NetInf Architecture and Protocol Details
  - Deliverable on *NetInf Content Delivery and Operations*
Mail download in traditional node centric networking

Get Mail X from IMAP Server

Mail X is downloaded multiple times over wireless link

Two Windows mail clients
1. Outlook
2. Thunderbird

Three Mac mail clients
1. Mail
2. Outlook
3. Thunderbird

iPhone mail client

iPad mail client

Get Mail X from IMAP Server

Mail X is downloaded multiple times over wireless link

IMAP Server

Mail X
Mail download with Information Centric Networking

Get Mail X from IMAP Server

iPad mail client

Mail X is downloaded only once over wireless link

Local cached copies are found and used

IMAP Server

Mail X

Two Windows mail clients
1. Outlook
2. Thunderbird

Three Mac mail clients
1. Mail
2. Outlook
3. Thunderbird

iPhone mail client