

Publish-Subscribe Internet Routing Paradigm

PSIRP

Project presentation

Observation

Fundamentals of the Internet

- Collaboration
 - Reflected in forwarding and routing
 - Cooperation
 - Reflected in trust among participants
 - Endpoint-centric services (mail, FTP, even web)
 - Reflected in E2E principle
- ⇒ **IP, full end-to-end reachability**

VS.

Reality in the Internet Today

- Phishing, spam, viruses
 - There is no trust any more!
 - Current economics favor senders
 - Receivers are forced to carry the cost of unwanted traffic
 - Information-centric services
 - Do endpoints really matter?
 - Endpoint-centric services move towards information retrieval through, e.g., CDNs
- ⇒ **IP with middleboxes & significant decline in trust in the Internet**

Hypothesis: Clean-Slate Design Required

- What stood at the beginning
 - Collaboration
 - Cooperation
 - Endpoint-centric services does not seem enough
- What about:
 - Trust?
 - Information centricism?
 - Legitimacy of E2E?
 - Role of overlays?



Clean-slate design...

- Question ALL fundamentals
- Challenge our thinking
- Take nothing for granted, including industry structures
- Clear vision

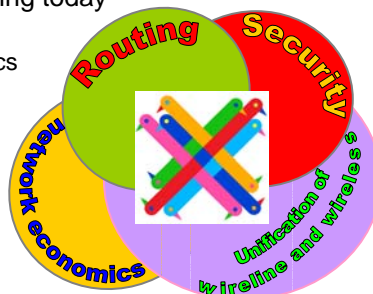
...with late binding (to reality)

- Consider migration and evolvability in separate work items
 - How to get our design into real deployments, e.g., overlay vs. IP replacement?
- Even consider necessary evolution of industry (& regulatory) structures
 - How do industries need to evolve in certain scenarios?

Vision

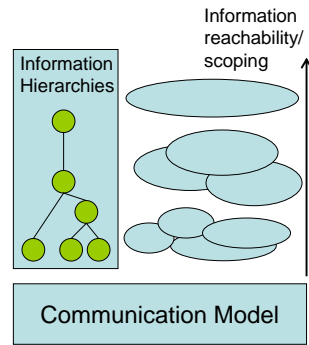
Envision a system that dynamically adapts to evolving concerns and needs of their participating users

- Publish-subscribe communication paradigm promises to address many of the problems we are facing today
 - e.g., publish–subscribe restores the balance of network economics incentives between the sender and the receiver
- Recursive use of publish-subscribe paradigm enables dynamic change of roles between actors



Main PSIRP design principles

- Information is multi-hierarchically organised
 - Higher-level information semantics are constructed in the form of directed acyclic graphs (DAGs), starting with meaningless forwarding labels towards higher level concepts (e.g., ontologies).
- Information scoping
 - Mechanisms are provided that allow for limiting the reachability of information to the parties having access to the particular mechanism that implements the scoping.
- Scoped information neutrality
 - Within each scope of information, data is only forwarded based on the given (scoped) identifier.
- The architecture is receiver-driven
 - No entity shall be delivered data unless it has agreed to receive those beforehand, through appropriate signalling methods.



Potential Impact of our Work

User

- Relevant Information at your fingertips
 - Pubsub allows for explicit expression of intention
 - > address attention scarcity
 - Wherever, from whoever, through whatever access, on whatever device
- Emulates sensing, processing, actuation
 - > More natural form of communication
- Ability to avoid information overload
 - Tackle attention scarcity problem
- Increased security & privacy
 - Only relevant information gathered & provided to user

Industry

- Entry of new players, e.g., information brokers & bankers, information processing providers
- Content providers likely to become more powerful
- New technology means potential for new business
- Increase in (information-centric) communication needs will increase need in solutions
- Enable cross-value chain scenarios
 - retail, health, finance, ...

Project Objectives

- Specify, implement and test an internetworked pubsub architecture
 - follow **clean-slate design** approach
- Perform qualitative and quantitative evaluation
 - Security and socio-economics important!
 - Migration and incentive scenarios important (e.g., overlay)!
- The results will be widely published
 - Open source code for the Future Internet
 - Targets specifically SMEs opportunities in Future Internet
- Engage with FI community
 - Cooperate with FIRE (Onelab2) to test on large scale
 - Engage openly through public Wikis

Project Overview

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- Nokia Siemens Networks Oy (FI)
- Institute for Parallel Processing of the Bulgarian Academy of Science (BG)
- Athens University of Economics and Business (GR)
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WP1 Management (TKK-HIIT)

WP2 Architecture Design
(TKK-HIIT)

WP3 Implementation,
Prototyping & Testing (LMF)

WP4 Validation and Tools
(BT)

WP5 Dissemination and
Exploitation (NSNF)

Project website: www.psirp.org