DEVELOPING INFORMATION NETWORKING FURTHER:
FROM PSIRP TO PURSUIT

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Outline

- Motivation
- PSIRP
- The Ψ Publish-Subscribe Architecture
- PURSUIT
- Conclusions and Future Work

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Motivation

- End-to-end communication not the prevailing paradigm
  - Information-centric use of the Internet

    E.g. CDNs, proxy-servers, cloud computing, etc.
  - Overlay content delivery structures ignore network topology & data location
- Imbalance of power in favor of the sender
  - The network will forward anything a sender will inject
  - Leads to attacks such as Dos and Spam
- No trust
  - E.g. phishing,viruses, worms, etc.
- No inherent mobility, multicast support

PSIRP

- EU FP7 STREP (http://www.psirp.org) ended 09-2010
- A Pub-Sub based clean slate architecture for the Future Internet
- Everything is information
- T2T principle
- Multicast will be the preferred delivery method
- Mobility will be considered from the early stages of the architecture design
- Security and caching will be native components of the architecture

- Helsinki University of Technology (TKK) - Helsinki Institute for Information Technology (HIIT)
- RWTH Aachen University
- BT
- Oy LM Ericsson Ab (LMF)
- Nokia Siemens Networks Oy (NSNF)

- Institute for Parallel Processing, Bulgarian Academy of Science (IPP-BAS)
- Athens University of Economics and Business (AUEB)
- Ericsson Hungary Ltd. (ETH)

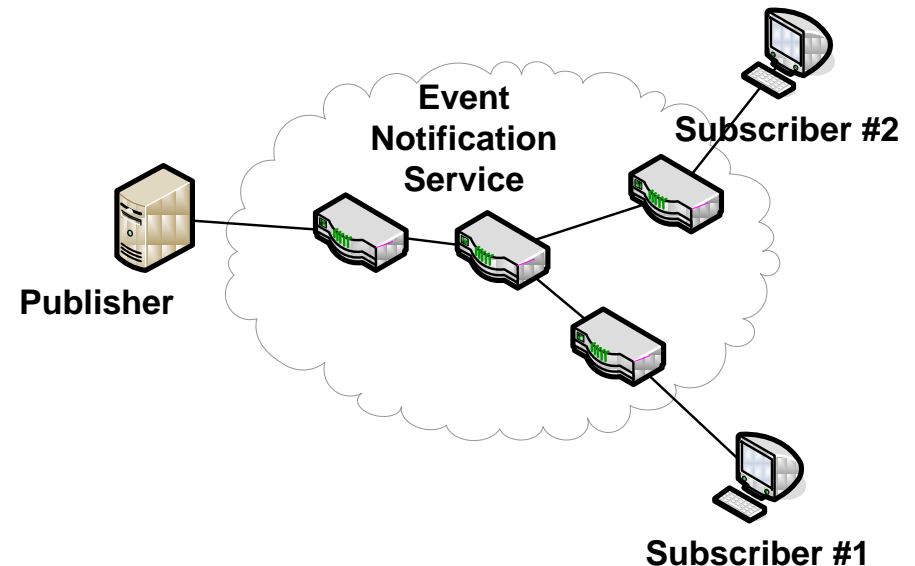Developing Information Networking Further: From PSIRP to PURSUIT
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The Pub-Sub Paradigm

- **Publishers (data producers/owners)**
  - Provide pieces of information in the form of publications
- **Subscribers (data consumers)**
  - Express interest in pieces of information via subscriptions
- **Rendezvous Network**
  - Puts Publishers and Subscribers in touch
- **Endpoint (pub-sub) decoupling**
  - Publishers-Subscribers need not be aware of corresponding Subscribers-Publishers
  - Asynchronous communication
- **Multicast**
  - Multiple subscriptions can be grouped, and data streams can be merged
  - Norm in pub/sub
- **Caching**
  - Pub-sub state and multicast suitable for in-network caching

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The Ψ architecture
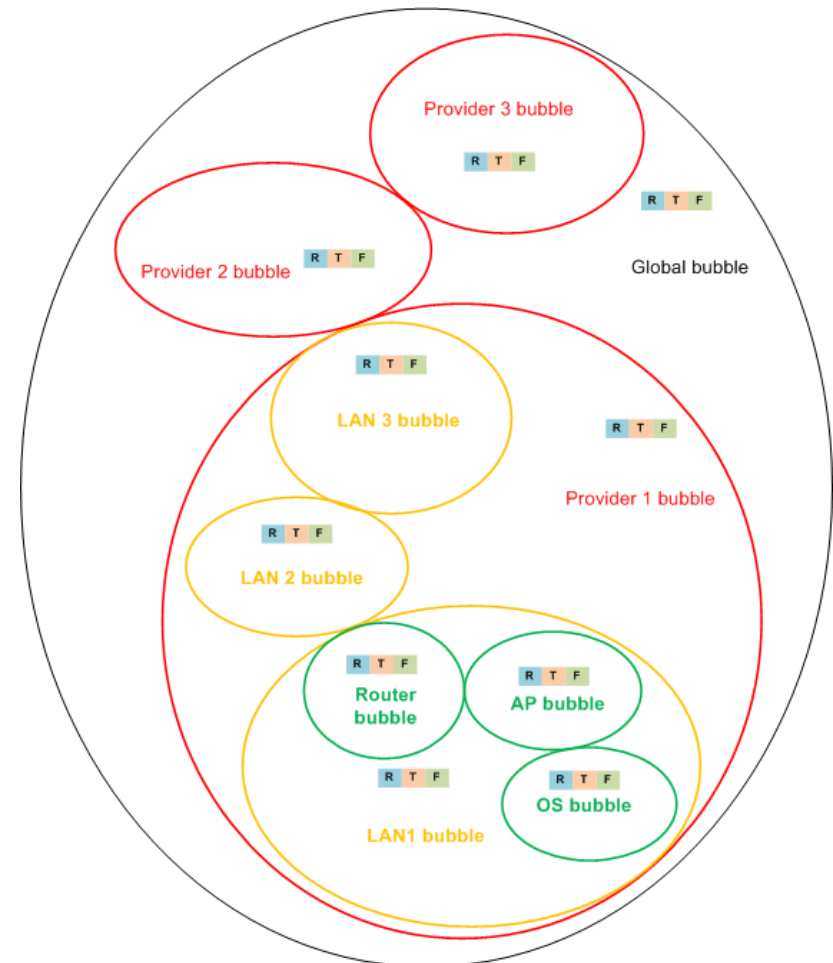
- Publish-Subscribe Internet (PSI) architecture, or Ψ

- Information is everything and everything is information

- Information items are identified using flat self-certified identifiers

- Information items are hierarchically organized using **Scopes**
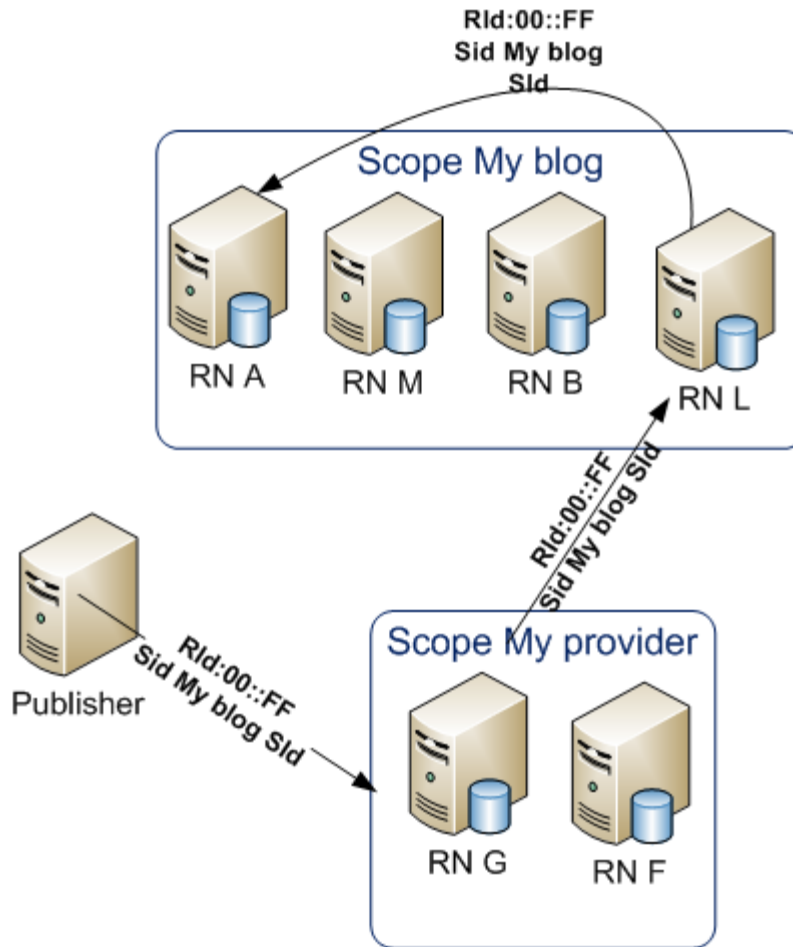
- The architecture is receiver-driven

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Ψ's Basic Functions

- **Rendezvous**: Matches publications with subscriptions and initializes the forwarding process

- **Topology**: monitors the network and it creates information delivery paths

- **Forwarding**: Implements information forwarding
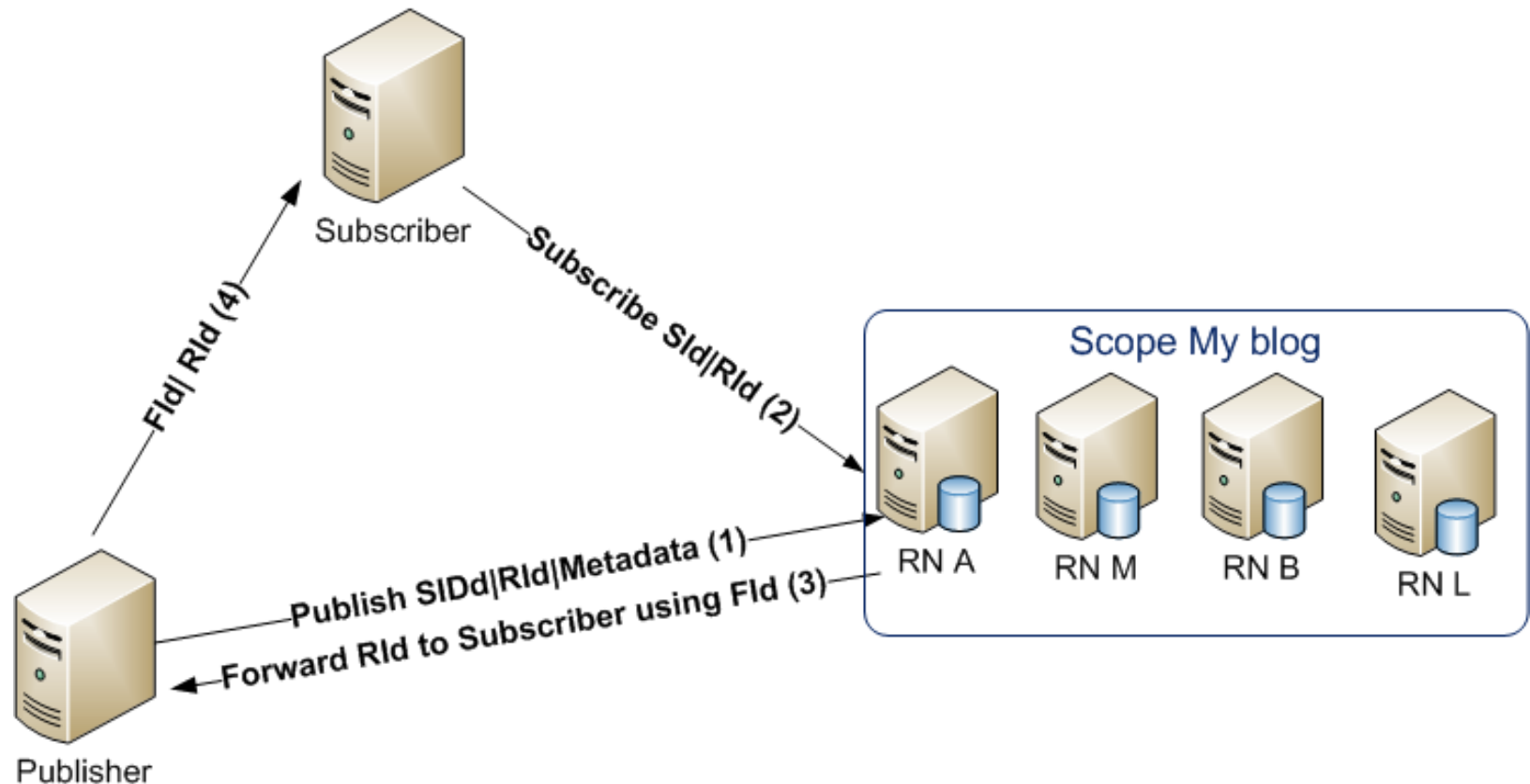

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Publishing Information in Ψ

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Subscribing to Information in Ψ

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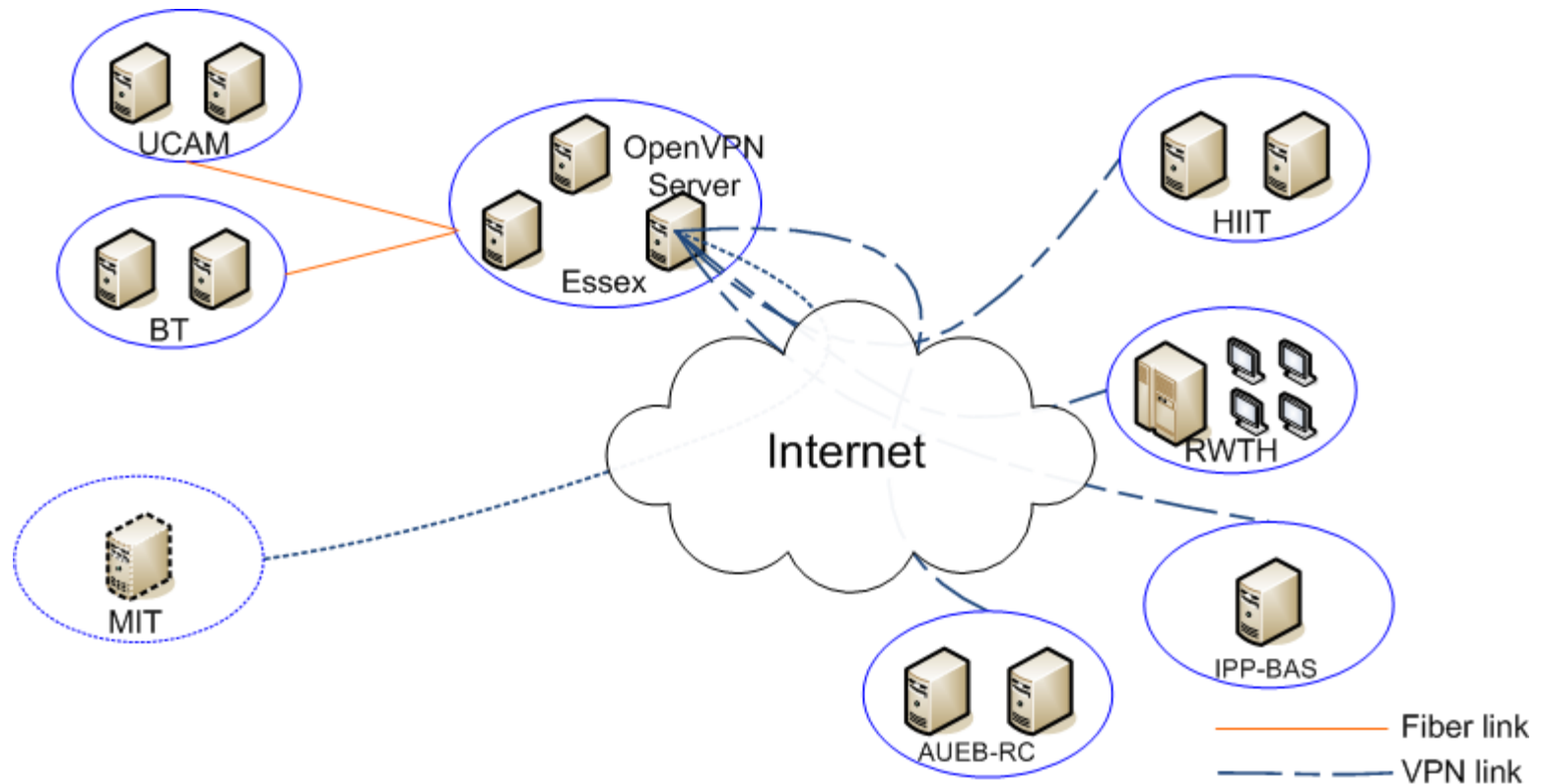
PSIRP's key outcomes

- Flat identification of information items
- Line speed label-based forwarding
- Identification of the security requirements for a publish-subscribe based Internet architecture
- Overlay implementation that:
  - Shows the advantages of the Ψ architecture when it comes to multicast and to mobility
  - Enables incremental deployment
- Application development in its own testbed

PSIRP's Testbed

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PURSUIT

- EU FP7 STREP (http://www.fp7-pursuit.eu/) stated 09-2010, Duration 30 months

- Revisit the Ψ architecture

- Use a "Design for Tussle" approach

- Better resource utilization

- Bring trust, privacy and information accountability being in the spotlight

- Aalto University (Aalto-HIIT)
- Athens University of Economics and Business (AUEB)
- Cambridge University
- Centre for Research and
- Technology Hellas (CERTH)
- CTVC
- Essex University
- Ericsson Research (LMF)
- RWTH Aachen (RWTH)

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PURSUIT Expected Outcomes

- A suite of information-centric protocols, solutions and mechanisms

- A new form of network access based on the application an information-only approach to the physical as well as to the link layer

- New models and tools regarding security and privacy

- Estimation and evaluation of the socio-economic impact

- Prototypes which, with the appropriate APIs, will allow researchers to develop new solutions

Conclusions and Future Work

- PSIRP project, has developed a clean-slate information-centric architecture for the future Internet, based on pub-sub primitives

- PURSUIT will further refine and expand PSIRP's technologies, eventually leading to a more complete architecture and protocol suite and more extensive performance evaluation and investigation of scalability

Thank You

- PSIRP FP7 Project (**www.psirp.org**)
- PURUIT FP7 Project (**www.fp7-pursuit.eu**)
- Follow us on Twitter **@fp7pursuit**
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