PSIRP
Publish-Subscribe Internet Routing Paradigm

Mohammad.Hovaidi.Ardestani@aalto.fi
08-Oct-2012

Reference material

- The Publish/Subscribe Internet Routing Paradigm (PSIRP): Designing the Future Internet Architecture by Sasu Tarkoma, Mark Ain, Kari Visala.2009

- http://psirp.org/publications.html

- http://psirp.org/files/Deliverables/FP7-INFSO-ICT-216173-PSIRP-D2.3_ArchitectureDefinition.pdf

- http://psirp.org/files/Deliverables/FP7-INFSO-ICT-216173-PSIRP-D2_4_ArchitectureUpdateAndSecurityAnalysis.pdf

Aalto University
School of Electrical
Engineering

Roadmap:

- **Introduction**
- **PSIRP's objectives**
- **Conceptual Architecture**
- **Identifiers**
- **Components**
- **Summerizing**

Introduction:

- The current model of IP networking requires that both the relevant data and explicitly addressed network locations be known in order to transparently stream information between two endpoints.

- It is suffering from increasing traffic.

- Sender_Driven
  - imbalance of powers in favor of the sender of information, who is overly trusted.

PSIRP's objectives:

✓ Information_centric Networking

✓ Receiver_driven,Publish/subscribe

 – Users express their interest on data

 – Data is asynchronously delivered to users

 – senders "publish" what they want to send and receivers "subscribe" to the publications that they want to receive.

✓ Implement innovative multicasting and caching features to optimize performance and efficiency.

✓ Implement baseline security functionality as a native core component of the architecture.

Conceptual Architecture:

✓ Component Wheel

✓ Networking architecture

✓ Service model

Aalto University
School of Electrical
Engineering

Component Wheel:

PSIRP Component Wheel
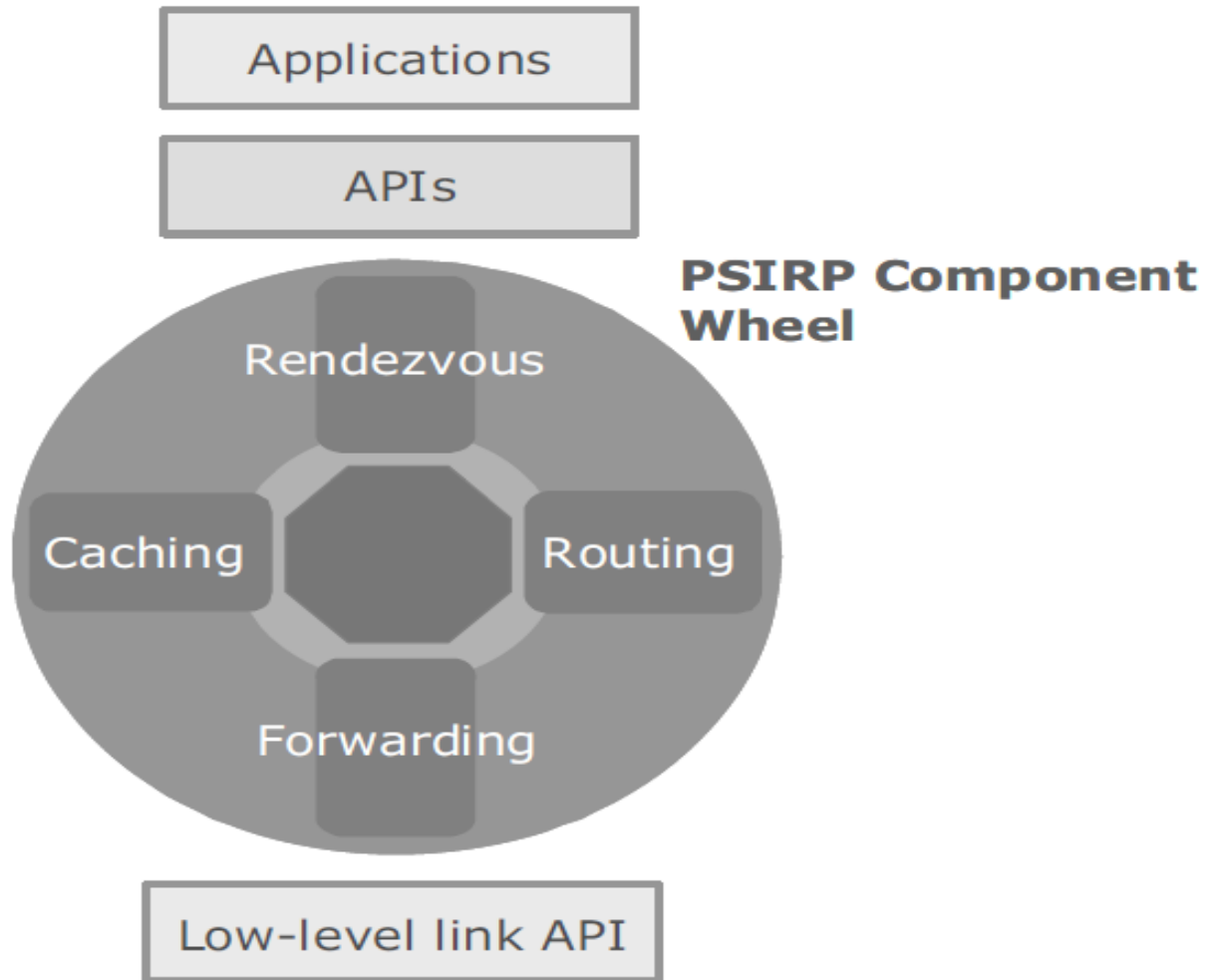
Networking architecture:

- ✓ *Identifiers*
- ✓ *Data and metadata*
- ✓ *Scoping information*
- ✓ *Subscribers and publishers*
- ✓ *Domains*

Aalto University
School of Electrical
Engineering

Identifiers:

- **Application identifiers**, used by publishers and subscribers.

- **Rendezvous identifiers**, network level IDs which identify the interest between publishers and subscribers in the rendezvous system

- **Scope identifiers**, aggregate a set of Rids into one group(scope)

- **Forwarding identifiers**, used to transport publications across networks.

Aalto University
School of Electrical
Engineering

Data and Metadata:

- **Data is in the center of attention**
- **Data :** picture data
- **Metadata** : information on picture size, date of picture taken or others.
- In Application level represents itself as plain data to the network level
- Network metadata is soft state within the network
  - access control, flow control, error notification, congestion notification

Concept of Scope
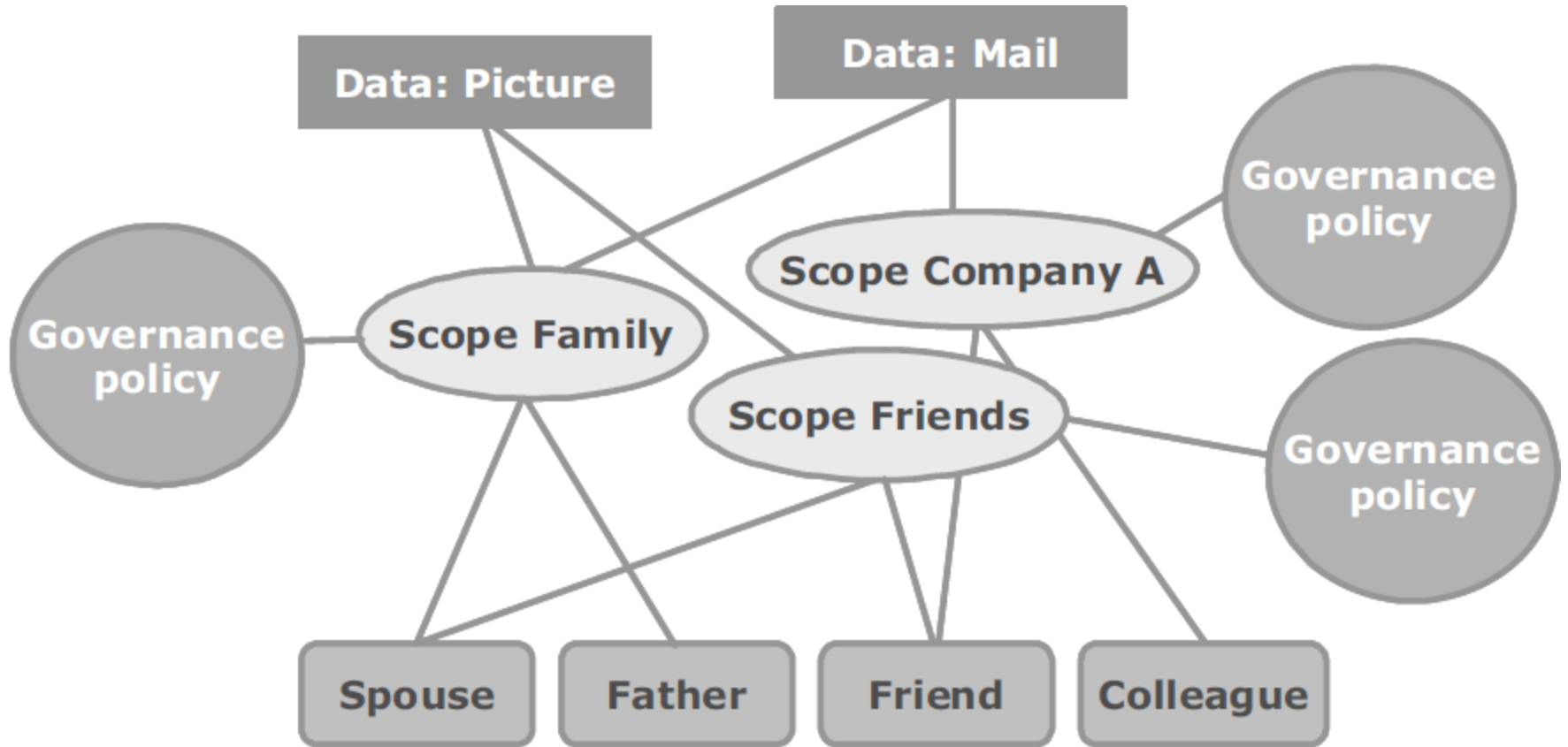
Subscribers and publishers

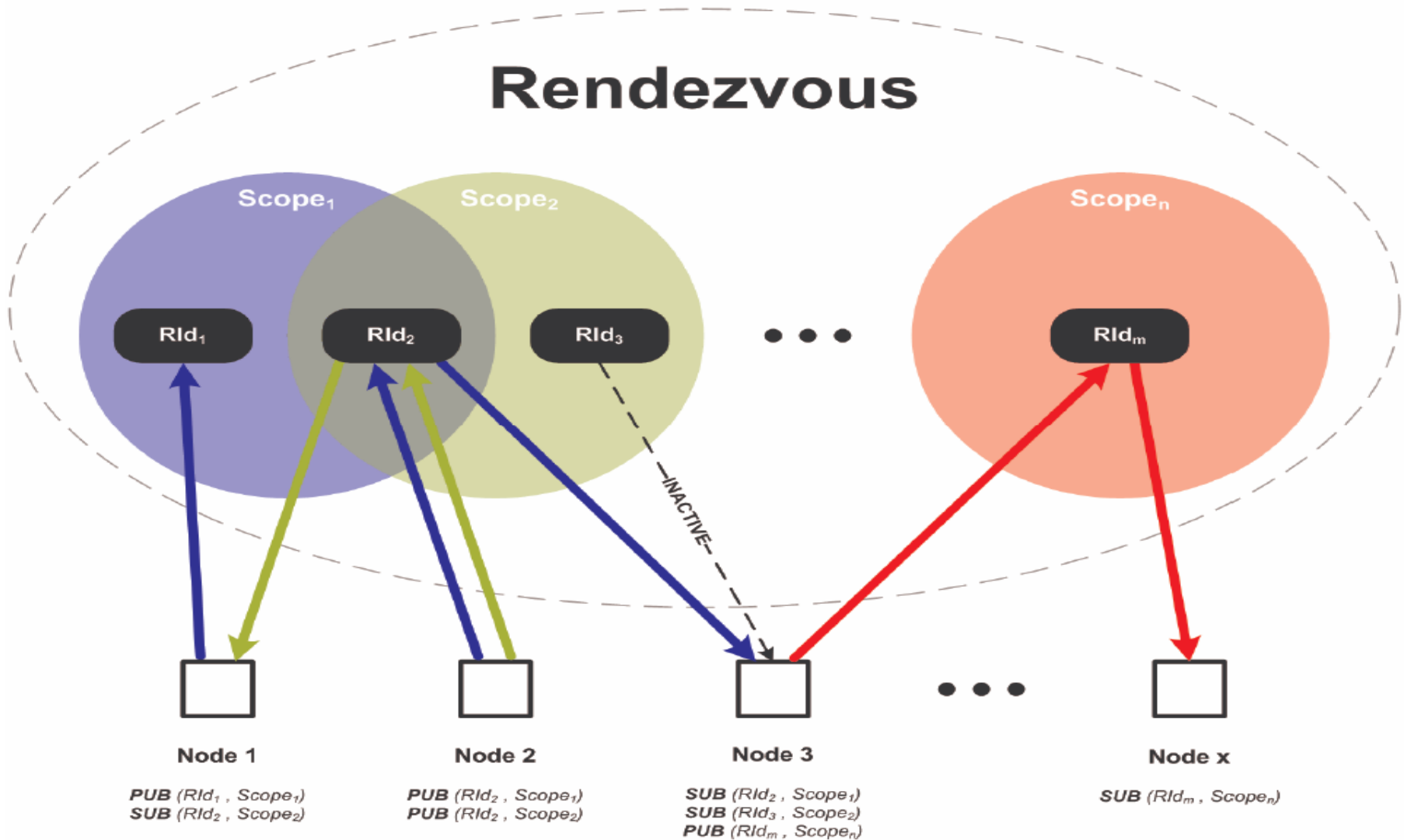- which create publications, and consume publications, respectively.

Aalto University
School of Electrical
Engineering

Domains

- which are administrative network areas that can be connected using the inter-domain forwarding architecture.

Aalto University
School of Electrical
Engineering

Key entities of the architecture
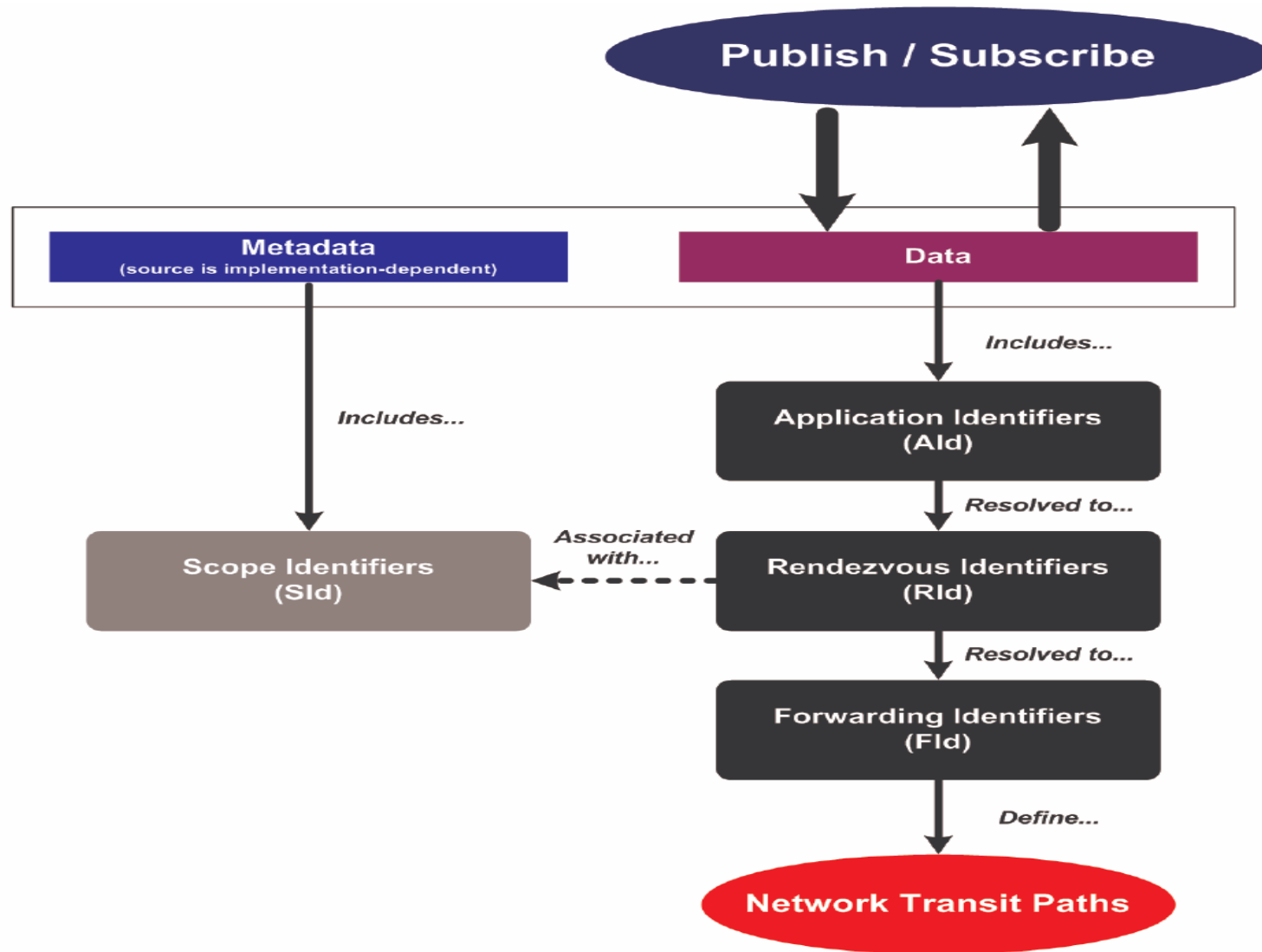
Pub/Sub Communication Model

Components:

- Rendezvous
  - matches the interests of senders and receivers
  - rendezvous should occur at locations within the network that are trusted to operate correctly in terms of communal, economical, and functional requirements.
  - Interdomain traffic policies and pub/sub scoping mechanisms define the optimal network locations
  - The rendezvous system ensures that neither traffic policies nor publication/subscription policies and scopes are violated.

Components:

• Intra-domain routing and forwarding

pertains to data delivery in an administrative domain. Intra-domain routing is concerned with local policies.

Components:

- Inter-domain routing and forwarding

pertains to data delivery in the global network, typically spanning several domains. The inter-domain routing system is configured through the rendezvous process and takes into account any inter-domain policies in effect.

Components:

- Forwarding and transport,

which pertains to data transfer between subscribers and publishers.

Components:

- Caching

  – is a network process offered by either the local system or any system on the communication graph over the network.
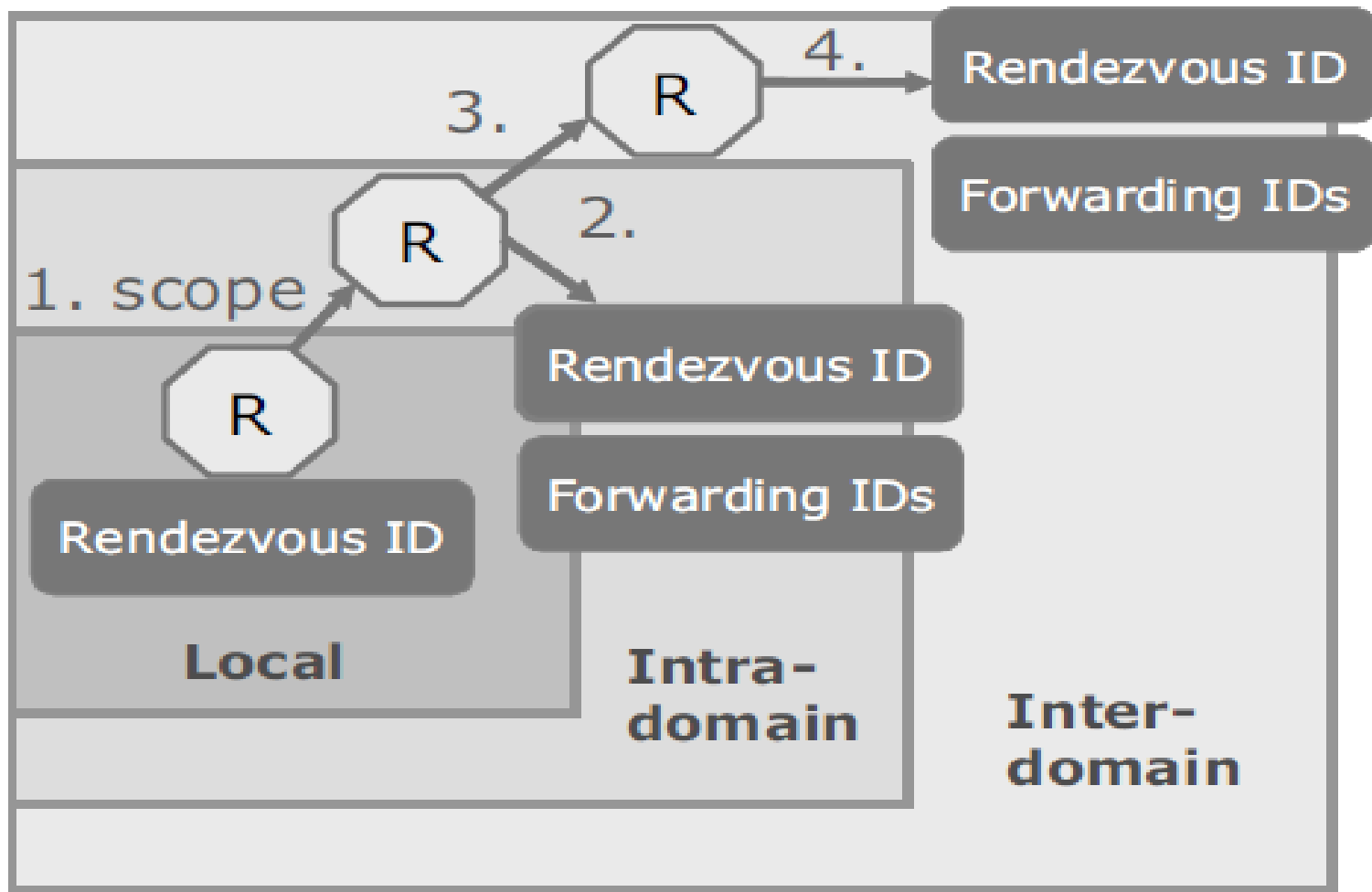
Caches are just alternative publishers

Components:

- Network attachment

is responsible for discovering network attachment points and configuring components in such a way that communication becomes possible.

Network architecture with rendezvous

Service Model:

- *publisher/sender*

    – how data can be sent to and over the network what primitives are offered by the network

- *subscriber/receiver*

    – defines an interest-registration service and the necessary upcalls for data reception

- *Network services*

    – monitoring and controlling points offered by the network for management purposes

publisher/sender Services:

- ✓ Metadata
- ✓ Publisher anonymity
- ✓ Multicast
- ✓ Data correlation
- ✓ Caching
- ✓ Anycast
- ✓ Scoping
- ✓ Accountability

Subscriber/Receiver Services:

- ✓ Subscription state removal
- ✓ *Publisher authentication*
- ✓ Data integrity
- ✓ *Accountability*

Aalto University
School of Electrical
Engineering

Summarizing:

- PSIRP is not (only) about architecture – it is about a new way to design systems.

- It wants to be able to name and address information rather than hosts or interfaces

- scoping of information reachability

- Rendezvous System
  - Matching interests between publishers and subscribers

Thank You for Listening!

Aalto University
School of Electrical
Engineering