Mobility Support by the Common API for Transparent Hybrid Multicast

draft-irtf-samrg-common-api-03

Project http://hamcast.realmv6.org

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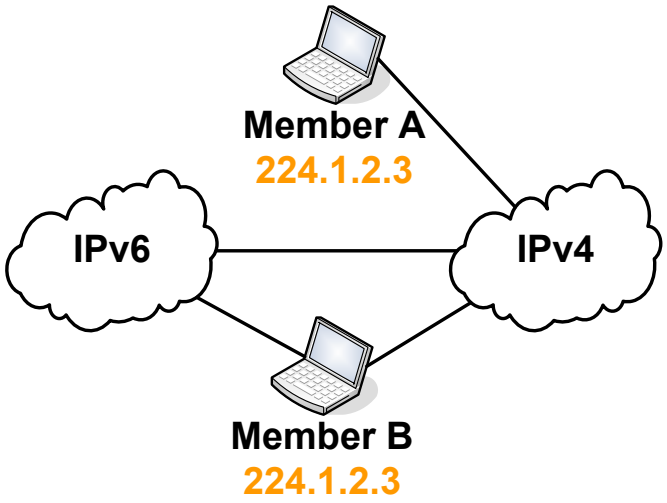
Problem: Group Communication

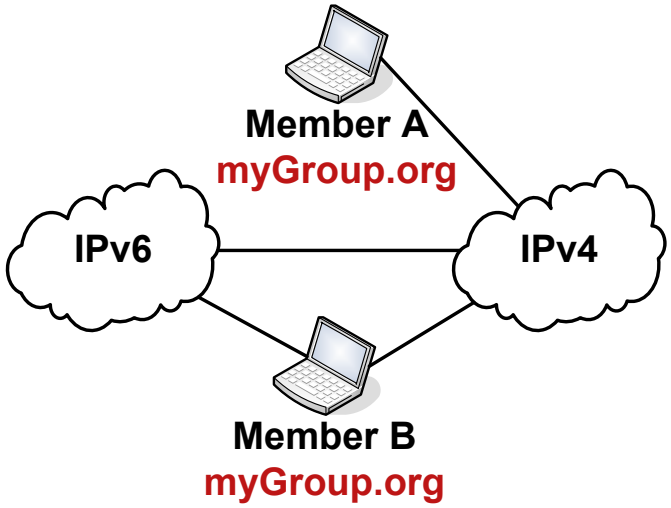
There are many forms of group communication:

- ASM, SSM, (restricted) Broadcast, Multi-destination Routing (XCast), Content-centric Pull …
- Two basic services:
  - Scalable packet distribution to a receiver group
  - Publish/Subscribe option with rendezvous process
- Universal, easy access requires an abstract notion

Problem: Multicast Technologies

- There are many multicast technologies
  - on different layers
  - on the same layer
- Programmers decide on its use
  - not even DNS helps
- Mobility bound to technology
- ! Problem: Identify same group in different technologies





Objectives

Provide a solution for group apps to be compiled once and run everywhere

- Make use of multicast technologies if available
- Allow for hybrid / pluralistic network conditions
- Provide a universal service access
- Decouple application success from infrastructure deployment
- Support "vertical" mobility across service instantiations

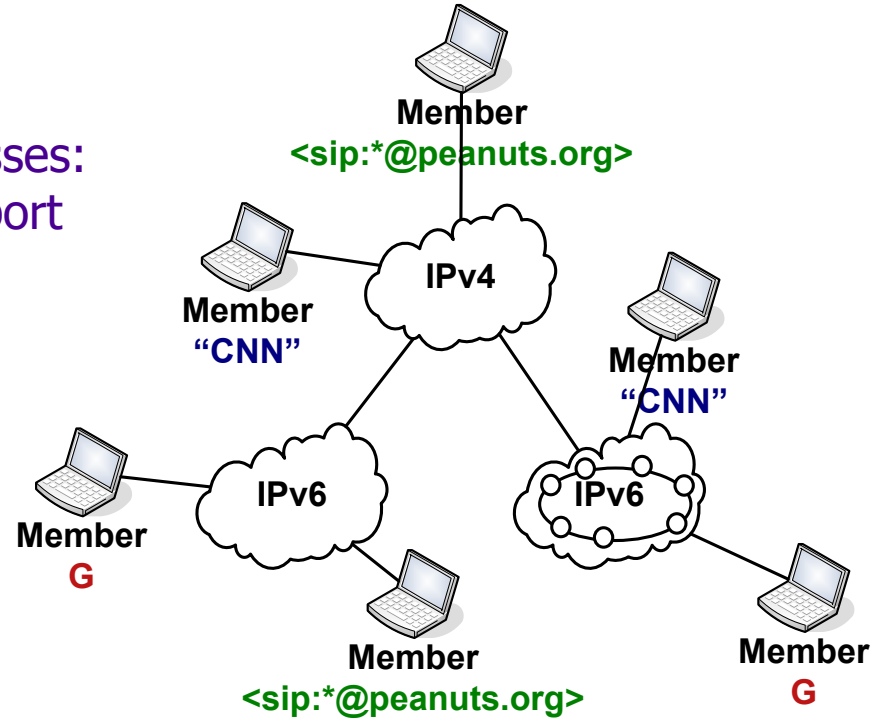
Naming and Addressing

"Multicast addresses are a set of distributed application names"

John Day (Patterns in Network Architecture)

Just use any application name?

- Problem of mapping to network addresses: out of control without namespace support
- Domains may run same technology but remain isolated
- Domains may run distinct technologies but host members of the same group
- High-level meta data type easy for programmers
- Proposal: Use abstract, namespace-aware data type - URIs for late binding + new API



Proposed URI Scheme

`scheme "://" group "@" instantiation ":" port "/" sec-credentials`

- `scheme`: specification of assigned ID
- `group`: identifies the group
- `instantiation`: ID of the entity that generates the instance of the group (SSM source, RP, overlay node)
- `port`: ID of a specific application at a group instance
- `sec-credentials`: optional authentication

Examples:

- `ip://224.10.20.30@1.2.3.4:5000/groupkey`
- `opaque://mygroup.org`

Common Multicast API Draft

Idea: Move complexity from application to the system level

The current draft provides …

- a common multicast API on app. layer that abstracts group communication from distribution technologies
- abstract naming and addressing by multicast URIs
- canonical mapping between naming and addressing
- definition of protocol interaction to bridge multicast data between overlay and underlay

Example: SIP conferencing (SSM)

```
INVITE sips:lucy@peanuts.com SIP/2.0
…
Contact: maddr=sip://hypnotic-talks@psychic.org
```

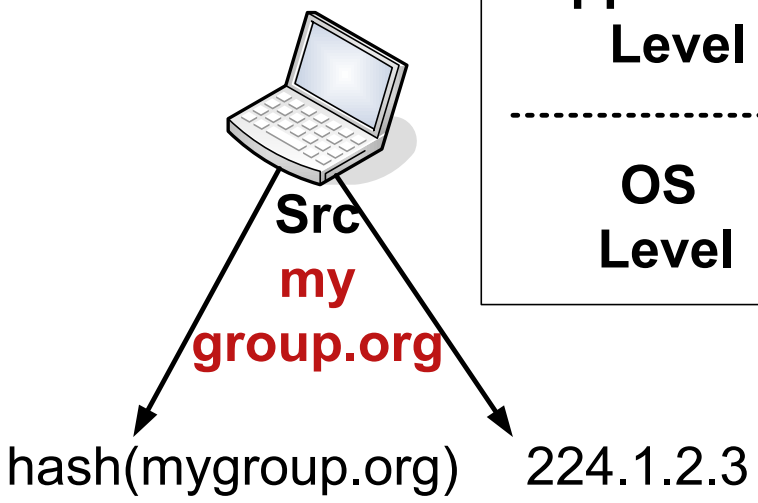
Application:

```
ms=createMSocket()
ms.join(URI("sip://hypnotic-talks@psychic.org"))
```

Aside:

allows extension for aggregation: `*-talks@psychic.org`

Common Multicast API & Middleware



Application Level	MulticastSocket msock =
	new MulticastSocket();
	msock.send(data,"mygroup.org");

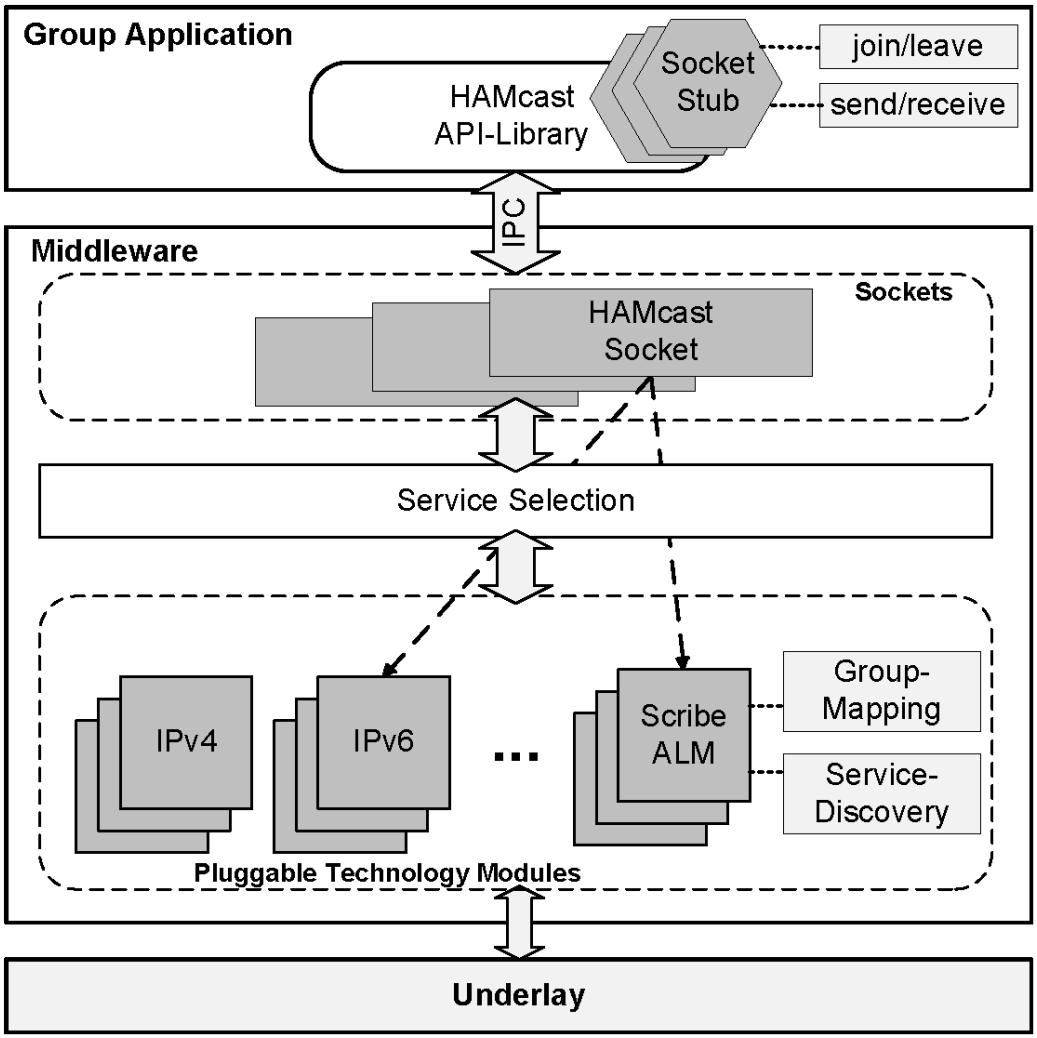
OS Level	1. Mapping of Group Name to Addresses 2. Send data to technology specific interfaces

- Mapping of names to technologies at run-time
- Late binding by ID Locator Split

Implementation: The HAMcast stack

- Application library:
  - Maps API calls & 'signaling' to OS layer
  - Easily integrates new programming languages (C++, Java)
- OS Middleware:
  - Separates generic multicast logic from technology-specific instantiations
  - User-space process, runs once per host (C++)
- Service Modules
  - Specific to multicast technologies, currently IPv4, IPv6, and Scribe-ALM

HAMcast Stack Overview



Mobility

- Application transparent due to ID-locator split
- Mobility management
  - within service module (horizontal handover)
  - at generic middleware (vertical + horizontal handovers)
- Middleware mobility
  - Holds abstract group logic (pub/sub states)
  - Can dynamically add/remove technology modules
  - Mobility is merely a task of the service selection
  - Generic approach: Find & improve group connectivity

Thank you ...

- More about this in the meeting of SAMRG

  Today 17:40 – 19:40

- Project Website:

  http://hamcast.realmv6.org

- Prototype for Download:

  Now version 0.3 (mobility yet to come)
  Check for updates