

On Naming, Addressing, and Programming in Multicast

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EuroView 2010, Würzburg, Germany

Agenda

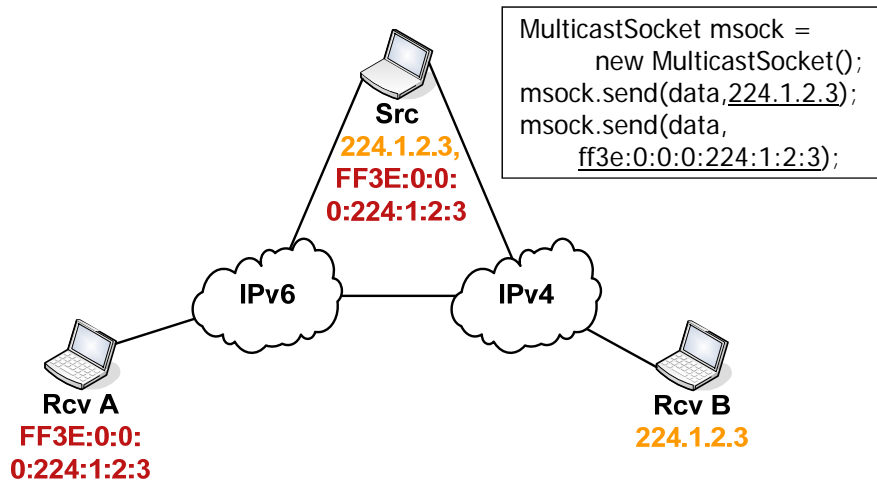
1. Motivation
2. Unicast vs. Multicast w.r.t. Naming & Addressing
3. Design Requirements
4. Naming Proposal for Multicast
5. Conclusion & Outlook

Current Multicast Diversity

Group communication services exist in a variety of:

- o Different flavors
 - Any Source Multicast vs. Source-specific Multicast
- o Different technologies
 - IPv4 vs. IPv6, multicast tunnels, etc.
- o Different layers
 - Native multicast vs. overlay distribution

Multicast Application Implementation (1)

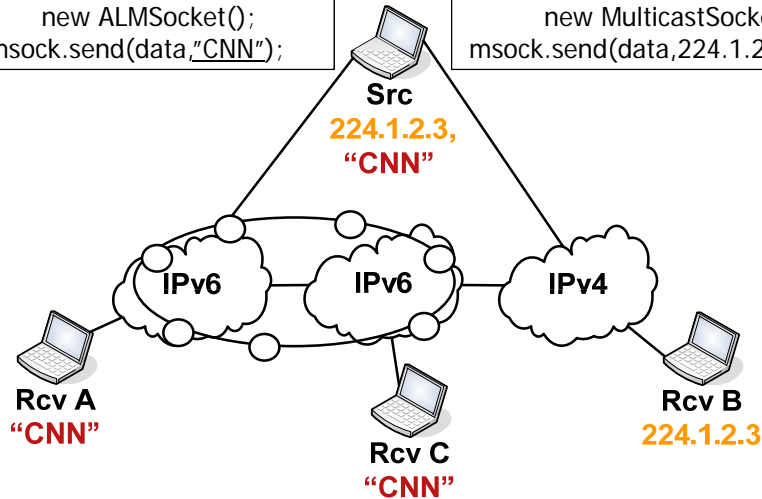


Additional problem: No global multicast deployment

Multicast Application Implementation (2)

```
ALMSocket almsock =
  new ALMSocket();
almsock.send(data,"CNN");
```

```
MulticastSocket msock =
  new MulticastSocket();
msock.send(data,224.1.2.3);
```



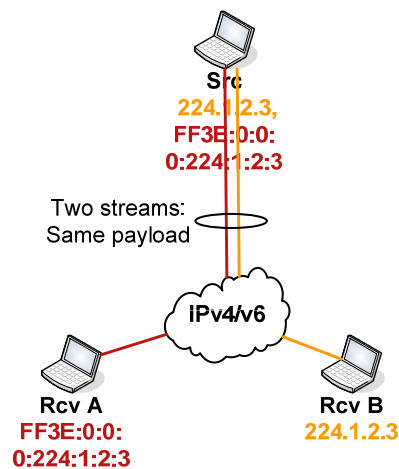
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Multicast Application Implementation (3)

- o Several distribution trees per technology
- o No lightweight option to merge redundant traffic
 - Aspect for future multicast routing?

All above examples show:

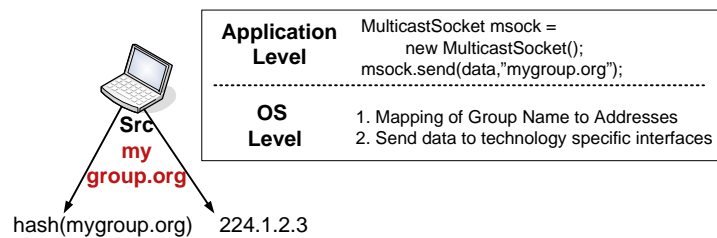
- ID abstraction between application and distribution paths is required



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Group Name

- o Applications subscribe to Group Name(s)
- o Group Communication stack maps Name to Group Address at run-time (late binding!)



- Decouples programming from technologies/
deployment state

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No ID/Loc Split without Mapping

Multicast differs from Unicast:

- o Multicast address is inherently delocalized
 - It addresses no interface, but a group of hosts
- o There is no feedback channel from receiver to source
 - Unicast programming transition techniques do not work properly
- o State full mapping requires write access for source **and** receivers
 - Group authentication is complicated

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How do we encode the Group Name?

- o Consistent encoding for different flavors & technologies required
- o Regain context of syntactically equal names
- o Wise choice is important for mapping function
- o A meta-data type that reflects identifier + namespace is an URI

Proposed URI Scheme

- o scheme "://" group "@" instantiation ":" port "/" sec-credentials
- o scheme: specification of assigned ID
- o group: identifies the group
- o instantiation: ID of the entity that generates the instance of the group, e.g., for SSM
- o port: ID of a specific application at a group instance
- o sec-credentials: used for optional authentication
- o Example: ip://224.10.20.30@1.2.3.4:5000/groupkey

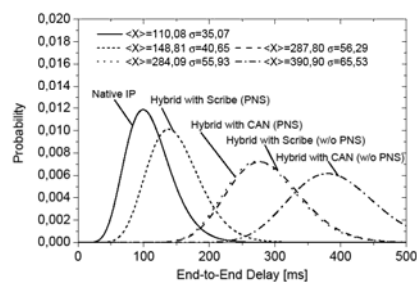
Ups ... Your scheme includes technology-specific IDs?

- o Scheme **does not** predefine routing layer
 - It is only used on the application side
- o Applications use context-specific names, anyway
- o Programming library may provide parsing functions
 - Automatic namespace identification
- o Again: Knowledge about the naming context may facilitate mapping significantly

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Conclusion & Future Work

- o Multicast is characterized by service pluralism
- o Global deployment needs easier handling at application side
- o Move complexity from application to the system level
 - Requires identifier and locator split for group services
- o Promising performance results for hybrid multicast
- o IRTF draft "A Common API for Transparent Hybrid Multicast", version 04 – please comment on that



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Thank you for your attention!

- o **More information:** <http://hamcast.realmv6.org>
- o **Coming soon:** 1st IEEE Workshop on Pervasive Group Communication at IEEE GLOBECOM, Miami, FL, USA, December 6, 2010



- o **Coming sooner:** Please, visit our demo (SE II) today!