

Pros of IP Multicast

- Simple communication paradigm.
- Useful in data centers:
 - data replication,
 - service monitors,
 - load balancers,
 - publish-subscribe systems.
- Widely supported.

Cons of IP Multicast

- No Policy Control
 - Any node can send to any group.
- No Group Scalability
 - NICs use small, imperfect filters.
 - Switches flood all ports if state is exceeded.
- No Traffic Rate Scalability
 - Multicast storms overrun the network.

Wishlist

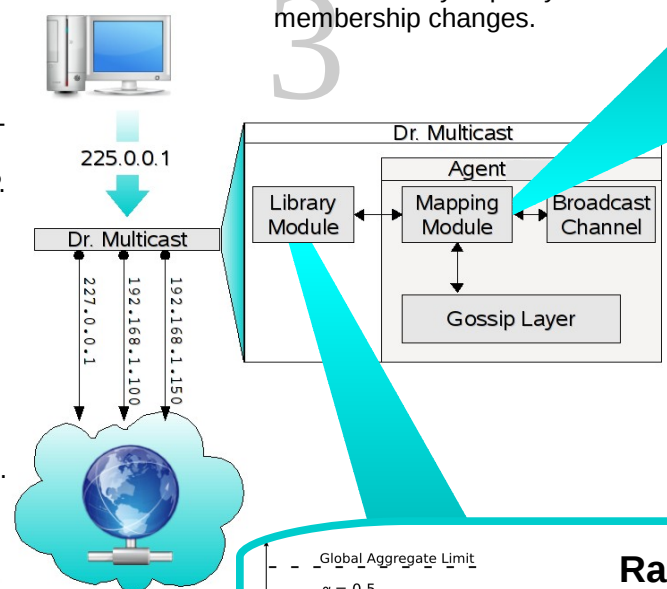
- Acceptable Use Policy (AUP)
 - Enable control of IP Multicast (IPMC).
- Optimized Resource Use
 - Use IPMC as far as it scales, then resort to another form of multicast.
 - Collapse similar groups.
- Rate-Limiting
 - Limit IPMC traffic in a fair way.



1
Transparent library layer between application and network. Enforces AUP.

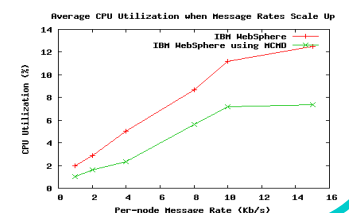
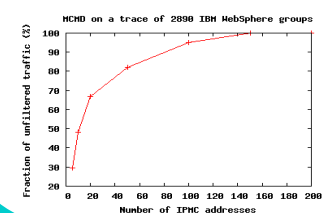
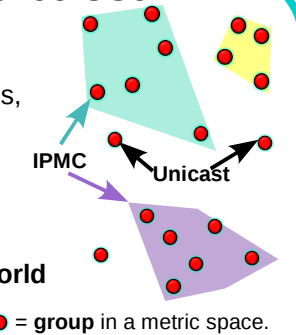
2
Logical groups are mapped to physical IPMC and/or unicast.

3
Gossip & broadcast channel ensure delivery of policy and membership changes.



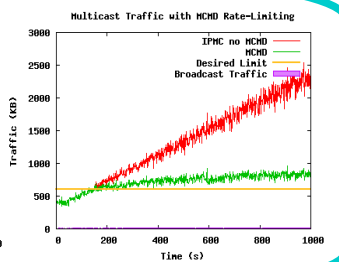
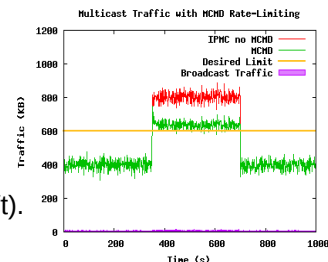
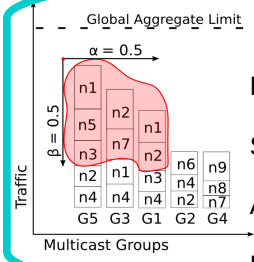
Optimizing Resource Use

- Global group membership service.
- Maps physical IPMC to "best" groups, others use unicast.
- Collapses similar groups using the k-means clustering algorithm (right).
- Compression opportunities in real-world systems, such as IBM Websphere:



Rate-Limiting

- Receivers monitor and report group rates.
- Senders slow down if traffic exceeds limit.
- A dynamic subset of senders slow down (left).



Experiments (right) indicate fast reaction.