**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.
- Flow Control
  - Limit IPMC traffic in a fair way.

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**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:
  - Maps physical IPMC to “best” groups, others use unicast.
  - Collapses similar groups using the k-means clustering algorithm (right).

**Flow Control**

- 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.