Integrated Services Approach to IP Multicasting over ATM

Goals

- Support dual traffic model
  - low rate, short session best-effort mc
  - high rate, long session, real-time mc
- Integrate RSVP into IP over ATM
- Support end-to-end ATM short-cut
- Simple implementation

Best-Effort

- Observation: IPmc router serves as multicast server for off-subnet sources, destinations
- Observation: need multicast servers to prevent "VC implosion" with many sources
- Observation: VC setup is often inappropriate for best-effort traffic
- Conclusion: let IPmc router do all subnet mc
  - already has proper VCs if any off-subnet sources
  - easy to implement: send all best-effort mc traffic to router
  - IGMP is sufficient to set up router-based VCs
  - eliminates "VC implosion" potential (only 1 VC/group)

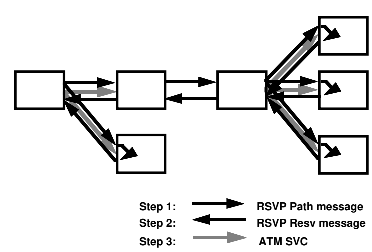
Integrated Best-Effort vs. MARS

- Integrated approach
  - advantages
    - » easy to implement: no new protocols, only needs router hack
    - » no new encapsulations
    - » solves "VC implosion" trivially
    - » no unneeded VCs set up
  - disadvantages
    - » only does IP multicast
    - » may not handle ATM multicast servers well
    - » assumes "reasonable" best-effort traffic volumes
    - » requires IPmc router
- MARS
  - advantages
    - » multiprotocol support
    - » handles ATM multicast servers
  - disadvantages
    - » new encapsulation
    - » new protocol in both hosts and routers
    - » managing multicast servers may be complex problem
    - » sets up unneeded VCs
    - » adds new network component (server)

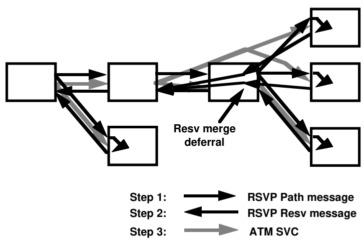
Quality of Service Support I

- Need QoS support for most IPmc applications
- RSVP is IP QoS setup signalling
- RSVP messages trace multicast tree, carrying QoS information
- Conclusion: Use RSVP Resv messages to trigger QoS-based VC setup
  - easy to implement
  - main problem: heterogeneous downstream QoS requirements
    - » fix by merging downstream requests into single VC
      - may need to tear down and setup VC for new requirements

Quality of Service Support II



ATM "Short-Cut" Path Setup



Open Issues (Future Work)

- Heterogeneous downstream VCs
- Alternative short-cut mechanism
- Short-cut merge-deferral decision algorithms
- Local subnet VC management
  - when many local groups in use by one application
- Multiple IPmc routers per subnet
- ATM multicast server support for best-effort
- MARS for best-effort