ATM Multicast Service Using BIB

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Outline

- Motivation
- Design Goals
- Implementation Details
  - Switch BIB Objects
  - Multicast Service Agent
  - Service Access Agent
- Future Direction

Motivation

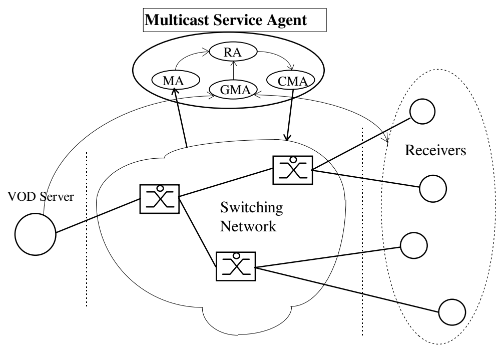
- Important Network Service
- Problems with ATM Multicast Today:
  - Limited Capabilities with today's Standard Signaling
  - Multi-vendor Incompatibility
- Great Example Service in Programming ATM Networks
- BIB+Algorithms Can Solve This?

Design Goals

- True Heterogeneous (switch, OS, protocol & QoS) Multicast/Unicast Service
- Support Multi-vendor Switch Environments
- Nice Features but also Possible Interwork with IP Later:
  - leaf-initiate, dynamic QoS & RSVP
- Scaleable Over Large Network

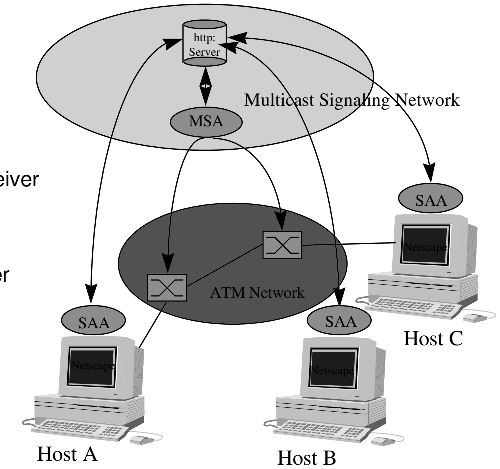
Multicast Service Architecture

- Monitoring agent
  - Collect link state information
- Group management agent
  - Manage the group membership
- Routing agent
  - Compute the multicast tree by using a shortest path algorithm
  - Compute strategic nodes for filter injection
- Connection management agent
  - Signaling the switches for setting up the links.
  - Injecting filters



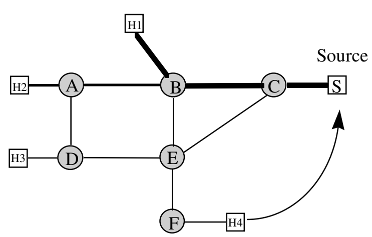
Multicast Services Offered

- Service Classes
  - Multicast service
    - Join as sender
    - Join as receiver
    - Join as sender & receiver
  - Unicast service
    - Unidirectional sender
    - Unidirectional receiver
    - Bidirectional
  - Third party signaling



Service Capability Over UNI/NNI Approach

- Openness
  - Multicast Service Over Multi-vendor Switches
  - Integrate with Other Algorithms (e.g. Handover for Wireless)
- Flexibility
  - Heterogeneous QoS
  - Dynamic change of QoS
  - Selective data transmission
- Speed
  - Parallel connection setup

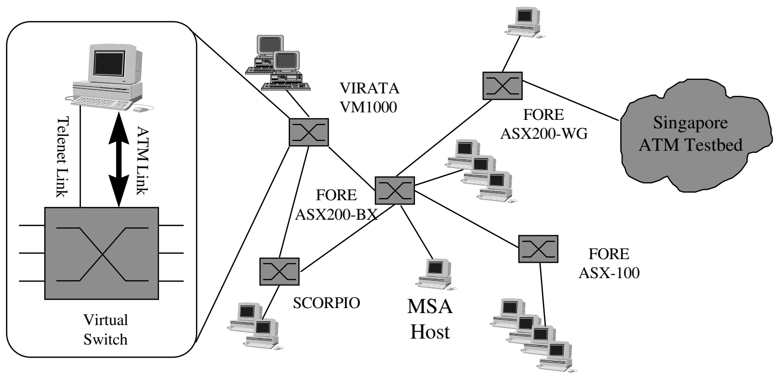


- Less signaling messages
  - Number of signaling message doesn't explode with number of leaves
- Many-to-Many multicast can be supported easily

Implementation Details

- Use Multi-threaded "Virtual Switch" to Achieve:
  - Dynamic, Heterogeneous QOS
  - Data Filtering
  - Data Merging
- Use RSVP-based Signaling
  - Interwork with Internet
  - Support IP Multicast
- Web-based Service Access Agent
- Several Trial Deployments Done

An Example Deployment



Switch BIB Objects

- Model Switch with CTR Virtual Switch BIB
- AddVC (inport, vpvci, qos, outport, vpvci, qos)
- RemoveVC (inport, vpvci, outport, vpvci)
- ModifyVC (inport, vpvci, qos, outport, vpvci, qos)
- Switch-dependent “drivers” Control Switch via Switch Management Interface

Multicast Service Agent

- Provide RSVP-like Interface to Host Applications
- MSA Depends on Topological Information File
- MSA Maintains Link-state Database (LSD) for Each Physical Link
- LSD Contains VCVPIs, QoS Information
- Available VCVPIs Range Switch-Dependent
- Performs Shortest-Path Routing
- Federated MSAs for Large Scale Network

Future Directions

- Large-Scale Deployment by Simulation
- Extend Work to Support Wireless-ATM
- Help to Realise Interesting ATM-based Multimedia Services!