RSVP over IP over ATM

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Joint work with:

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Sponsored by: Sprint

Other Directly Related Work:

[1] Milliken, W., Integrated Services IP Multicasting over ATM, Internet Draft.

[2] Borden, M., Crawley, E., Davie, B., Batsell, S., Integration of Real-time Services in an IP-ATM Network Architecture, RFC1821.

[3] Birman, A., Firoiu, V., Guerin, R., Kandlur, D., Provisioning of RSVP-based Services over a Large ATM Network, IBM Research Report RC 20250.

Also:

RSVP Working Group - rsvp@isi.edu

RSVP Working Group Home Page -
http://www.isi.edu/div7/rsvp/rsvp.html

RSVP meets first afternoon session Wednesday

Outline

Project overview

RSVP basics

Unicast RSVP over IP over ATM

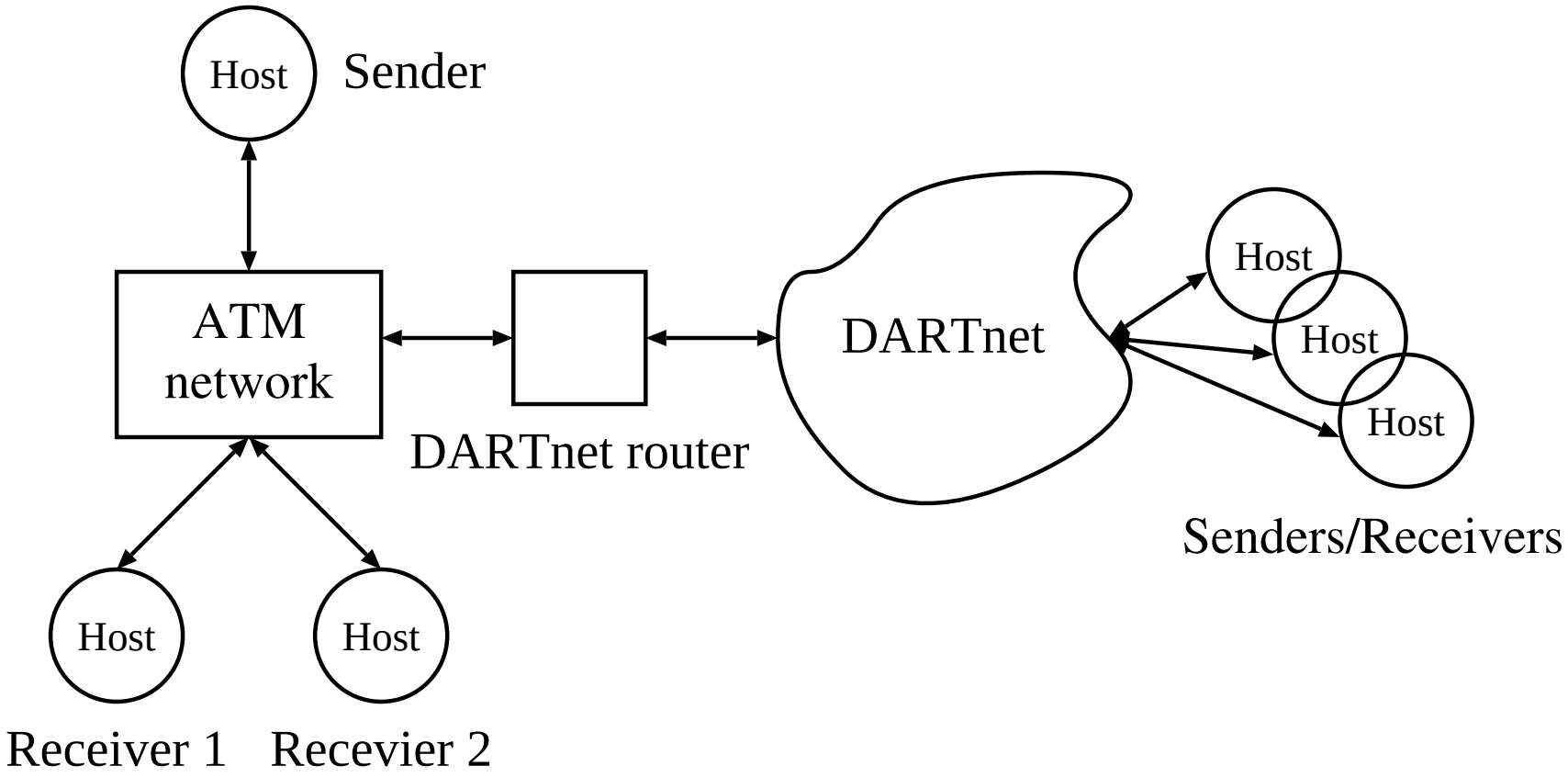
Multicast with 1 receiver

Multicast with multiple receivers

Summary of issues

Miscellaneous

Prototype testbed plan



What is RSVP?

RSVP is IP signalling

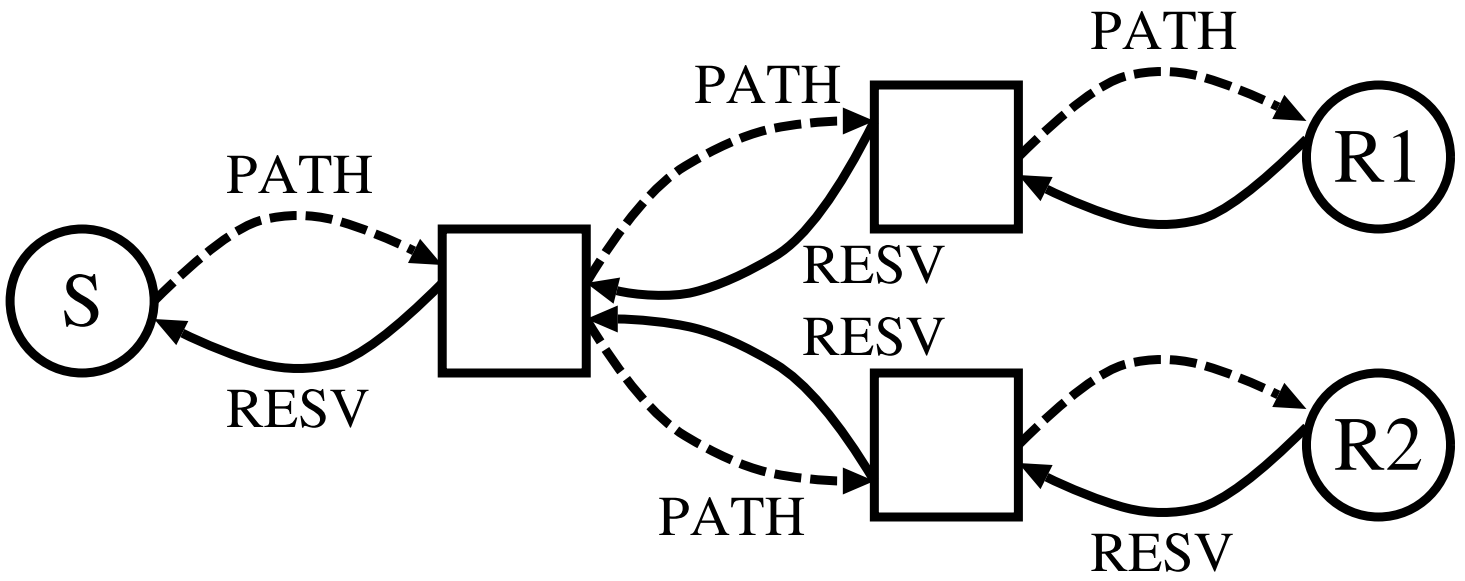
RSVP features:

- Receiver oriented
- Supports heterogeneity
- Dynamic
- Multiple reservation styles
- Simplex
- "Soft state"

RSVP is NOT a routing protocol

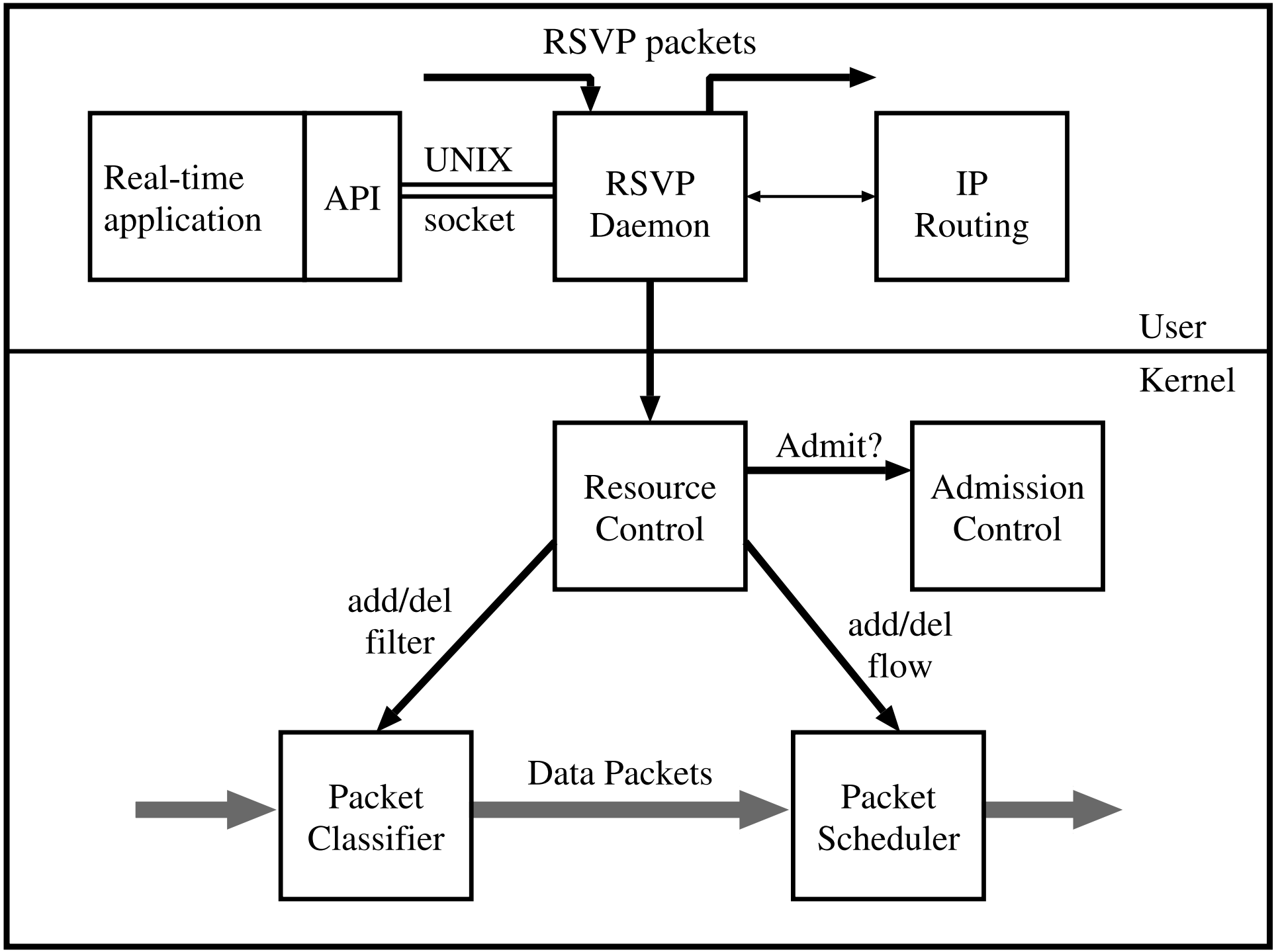
RSVP is NOT traffic management

RSVP message flow

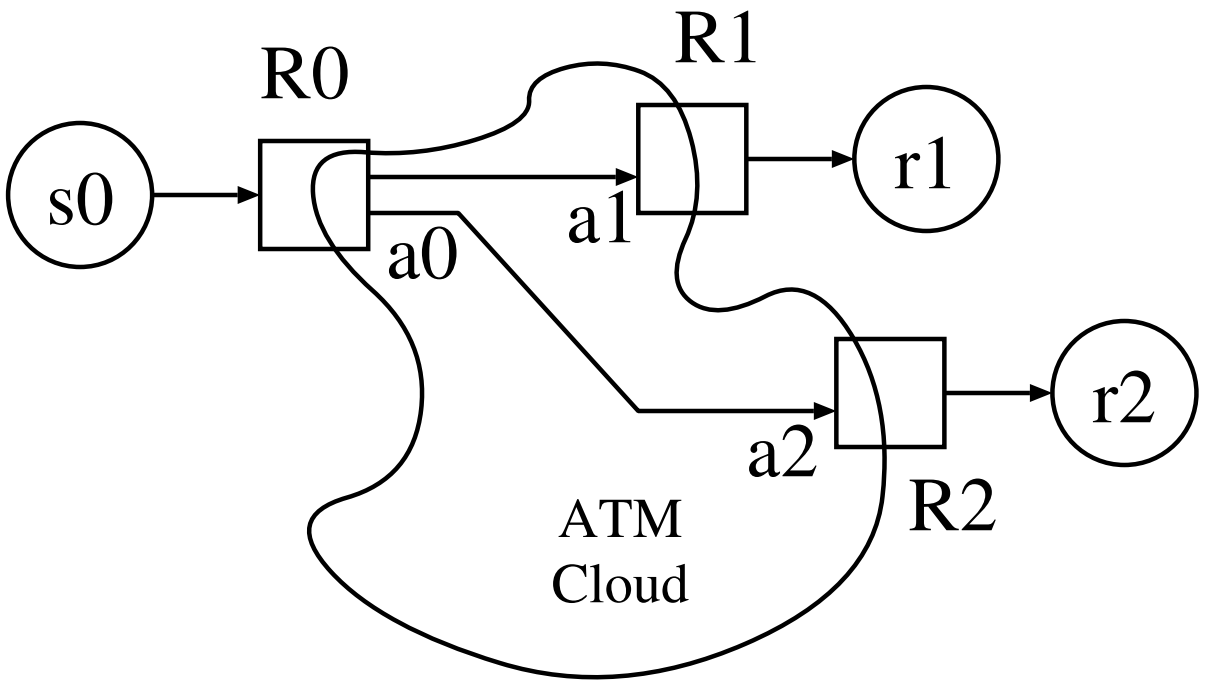


Path message

Reservation message


RSVP packets
Real-time application
API
UNIX
socket
RSVP Daemon
IP Routing
User
Kernel
Resource Control
Admit?
Admission Control
add/del filter
add/del flow
Packet Classifier
Data Packets
Packet Scheduler

RSVP over IP over ATM



1. r1 joins G
2. s0 send PATH to G
3. r1 sends RESV to s0
4. s0 sends data to G
5. r2 joins G

s0 is a sender

a1, a2 are atm addresses

R0, R1, R2 are routers

Basic steps in making reservation

1. r1 joins multicast group G
    a. r1 sends IGMP to local router R1
    b. Multicast routing protocol propagates join to R2, R0
    c. R1 sends MARS_JOIN, (G, a1) in table

2. s0 sends RSVP path message to G
    a. R0 sends MARS_REQUEST
    b. MARS responds (G,a1)
    c. R0 uses (opens?) VC to a1 with RSVP_QoS
    d. R1 (and r1) receive path message

3. r1 sends RSVP reservation message for (s0, G)
    a. R1 does ATMARP for R0
    b. R1 uses (opens?) VC to a0 with RSVP_QoS
    c. R1 sends reservation message to R0 (and s0)

4. s0 sends data packets to G
    a. R0 does ATMARP for G
    b. R0 opens VC with proper QoS as needed
    c. Data packets are then forwarded on this VC

Basic steps in making reservation - II

5. r2 joins group G
    a. r2 sends IGMP to R2
    b. Multicast routing protocol propagates join to R0, R1
    c. R2 sends MARS_JOIN, (G, a1, a2) in MARS table
    d. MARS multicasts new information
    e. R0 adds a2 to its VC

Reservation Styles

Reservations

Sender Selection	Distinct (e.g. video)	Shared (e.g. audio)
Explicit	Fixed-Filter Style (FF)	Shared-Explicit Style (SE)
Wildcard	(none defined)	Wildcard-Filter Style (WF)

Reservation Styles determine the number of VCs

Assume m sources and 1 receiver

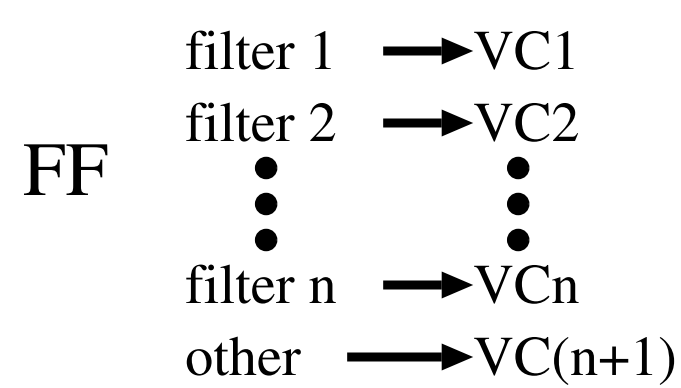
Assume n filters in explicit style reservation

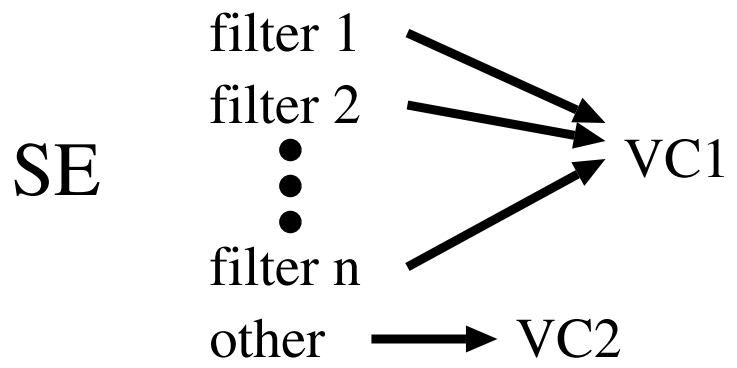
A filter specifies a traffic source,
e.g. (IP address, source port)

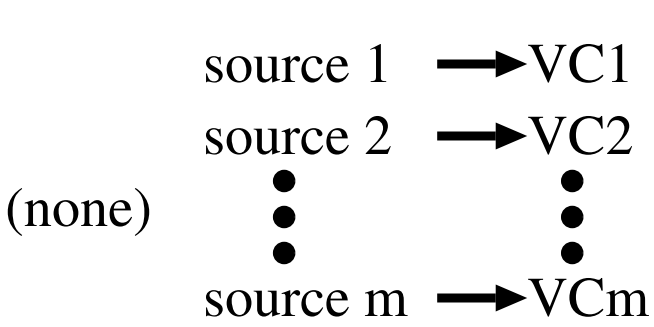
FF style	SE style	WF style	Distinct/Shared
n+1 VCs	2 VCs	1 VC	m VCs

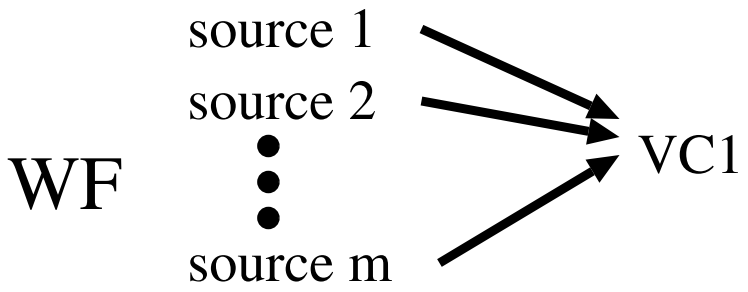
Filters determine which VC a packet uses

Reservation Styles

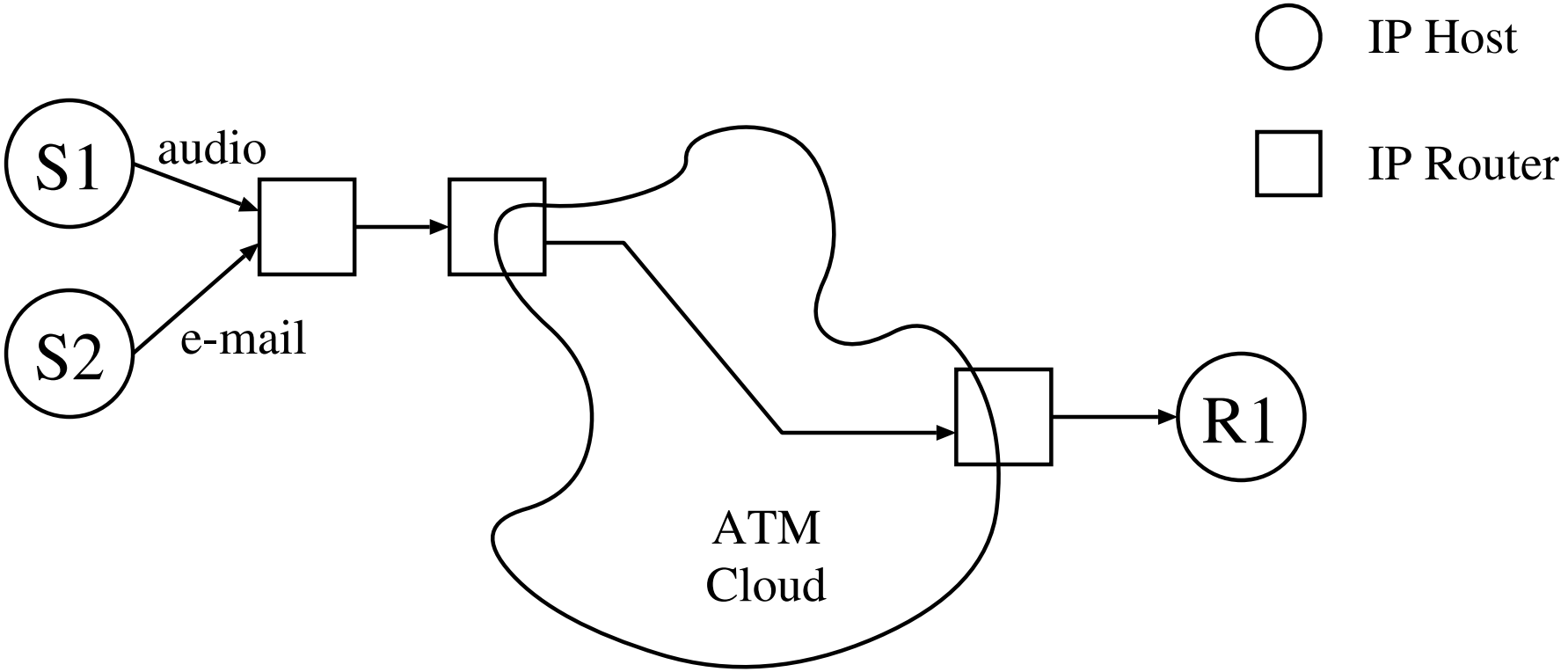






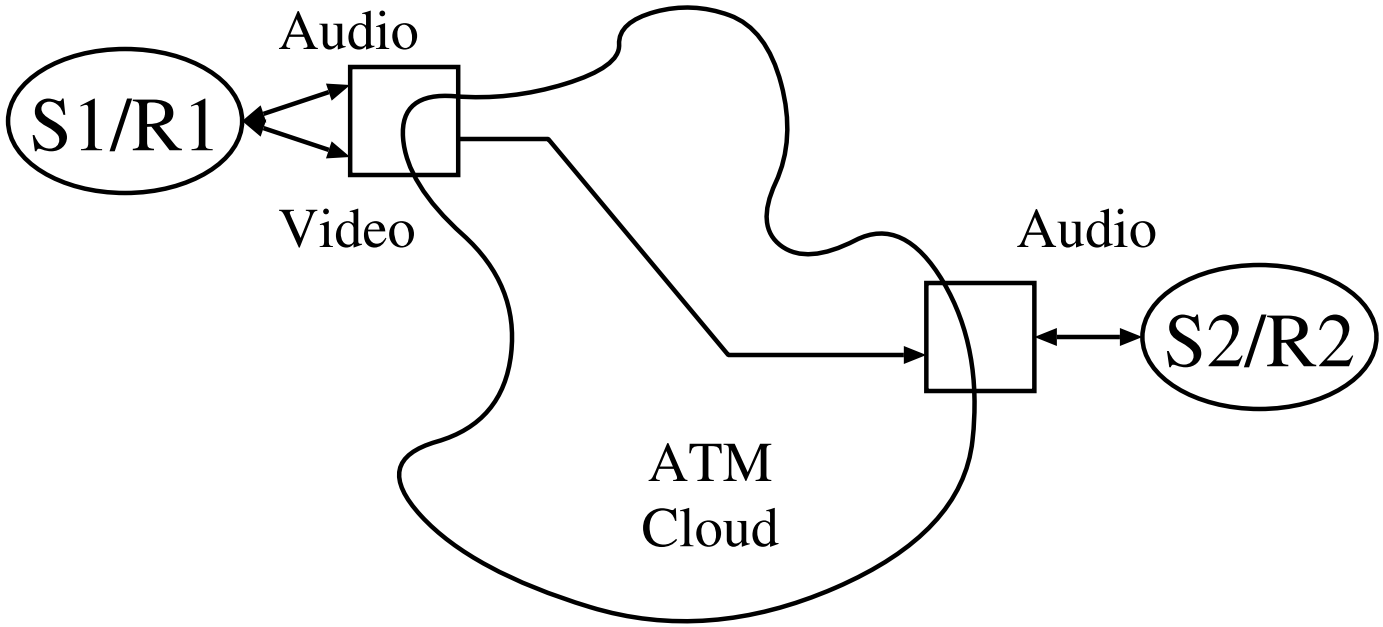


Unicast RSVP - wildcard sender selection



Session = (destination IP address, IP protocol, destination port)

Unicast RSVP - Simplex reservations

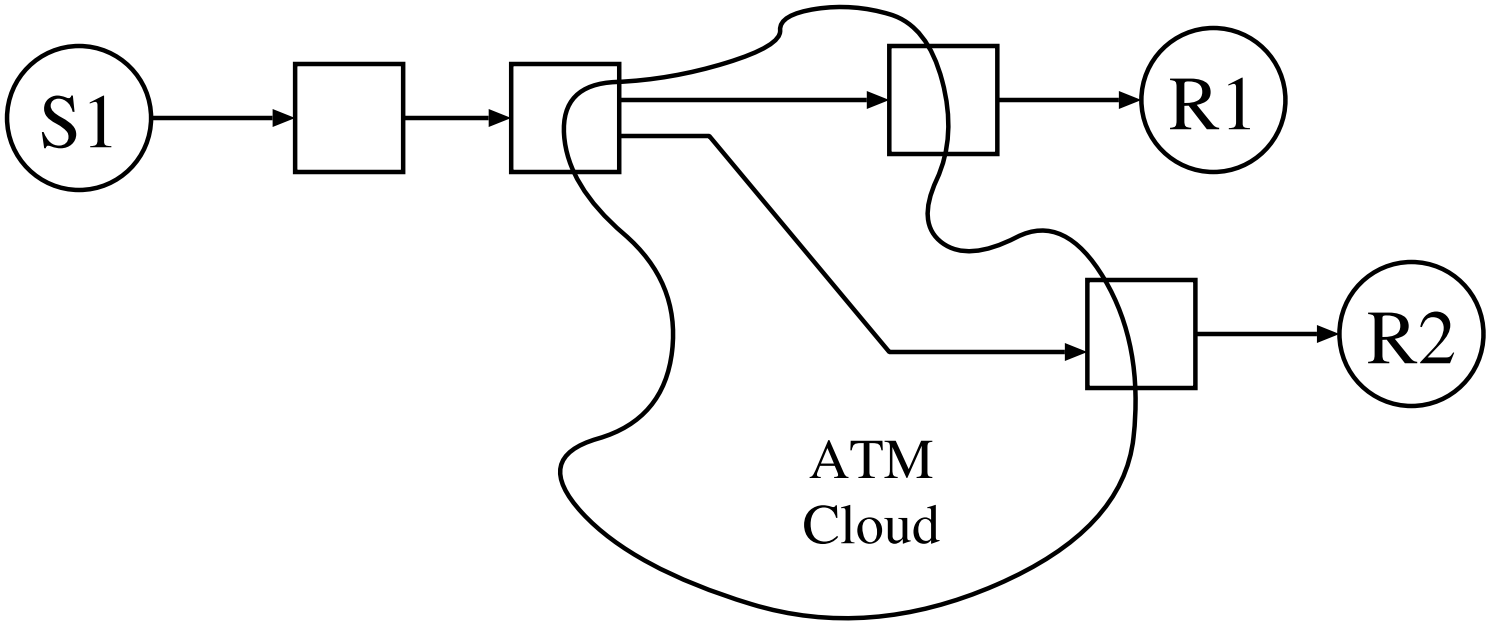


Which "return" VC should S2 use? None

RSVP wants simplex connections, i.e.

1. Resources should not be reserved on the reverse path
2. Separate VCs should be set up if needed in reverse

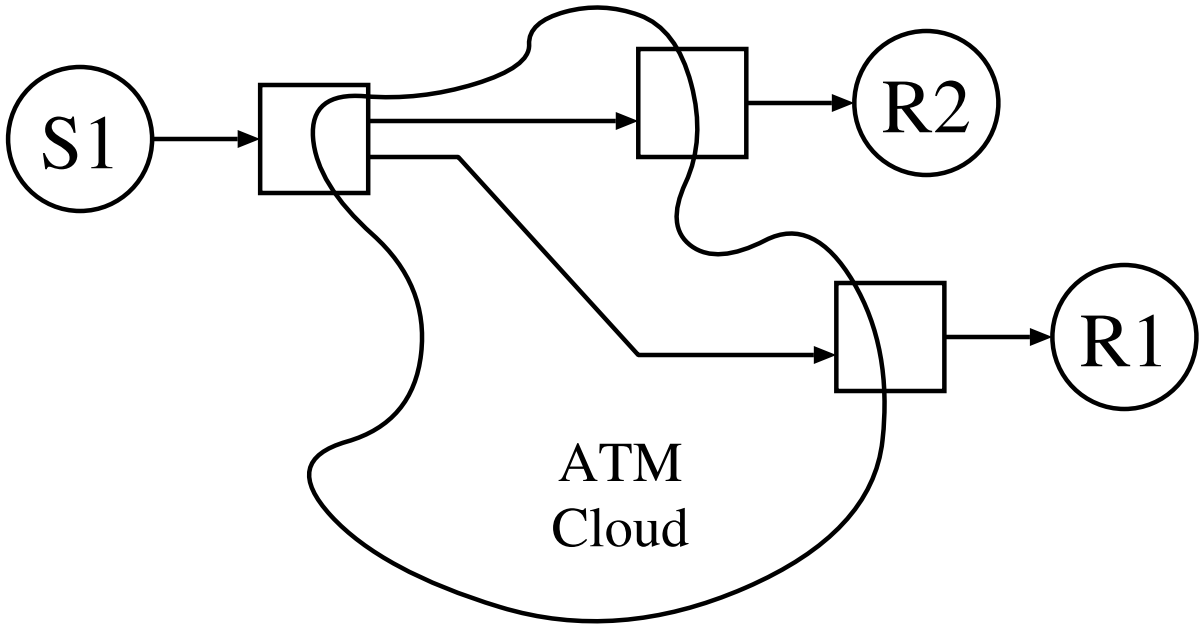
Multicast RSVP - dynamic reservations



R1 can change its reservation OR
R2 can merge with R1 for a larger reservation OR ...

Need to set up new VC (and tear down old)

Multicast RSVP - Supporting heterogeneity



If R2 fails to join point-multipoint call from S1,
R2 does not receive best effort traffic
A best effort VC should be set up for R2 in addition to the VC for R1

Similarly, R2 may request a QoS different from R1,
and a second VC with different QoS should be set up for R2

Summary of issues

1. Simplex calls for unicast

2. Finer control on VCs

   source IP address, source port -

   explicit sender selection/filtering

   destination IP address, IP protocol, destination port -

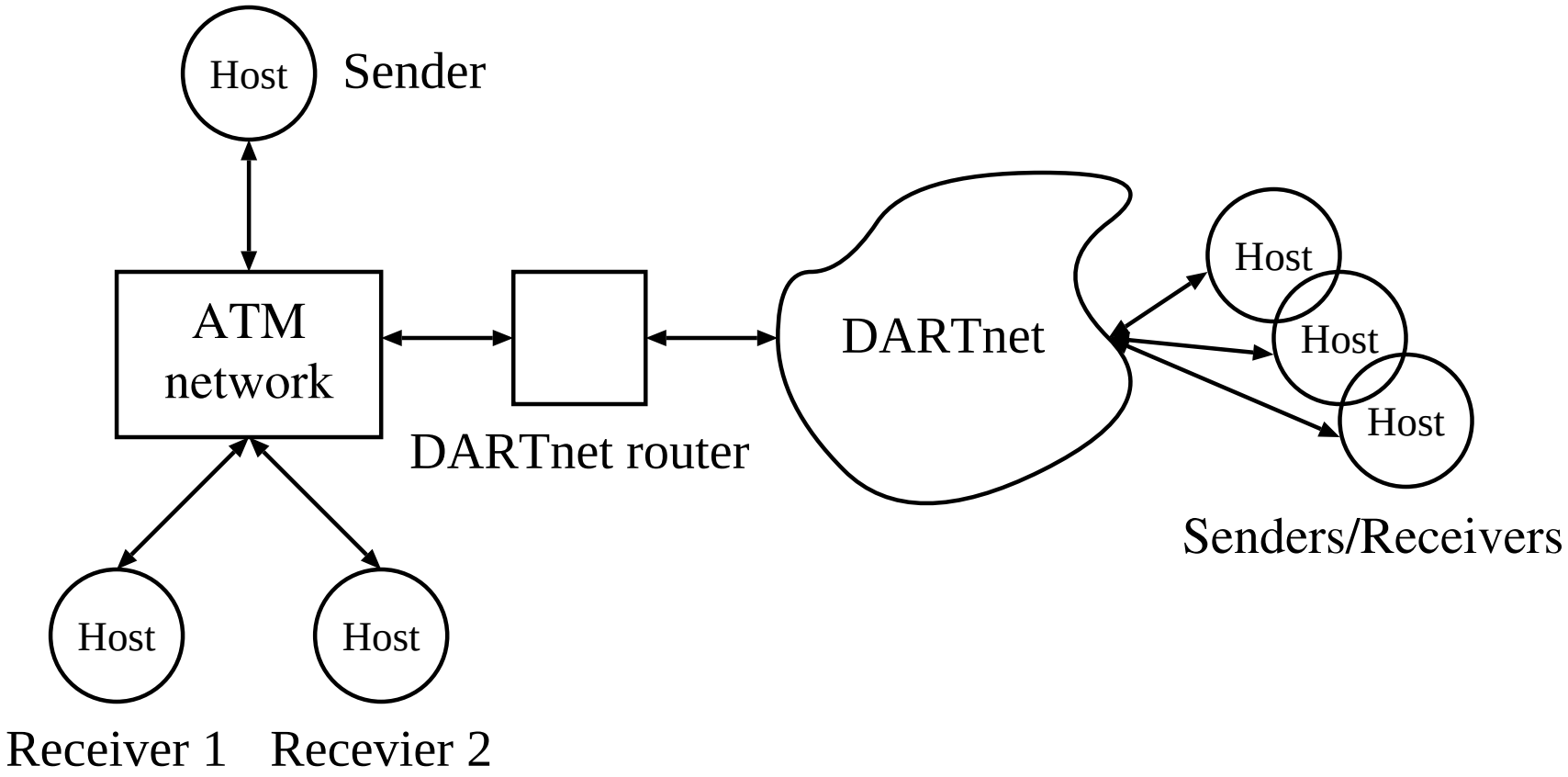
   wildcard sender selection

3. IP multicast traffic into multiple VCs

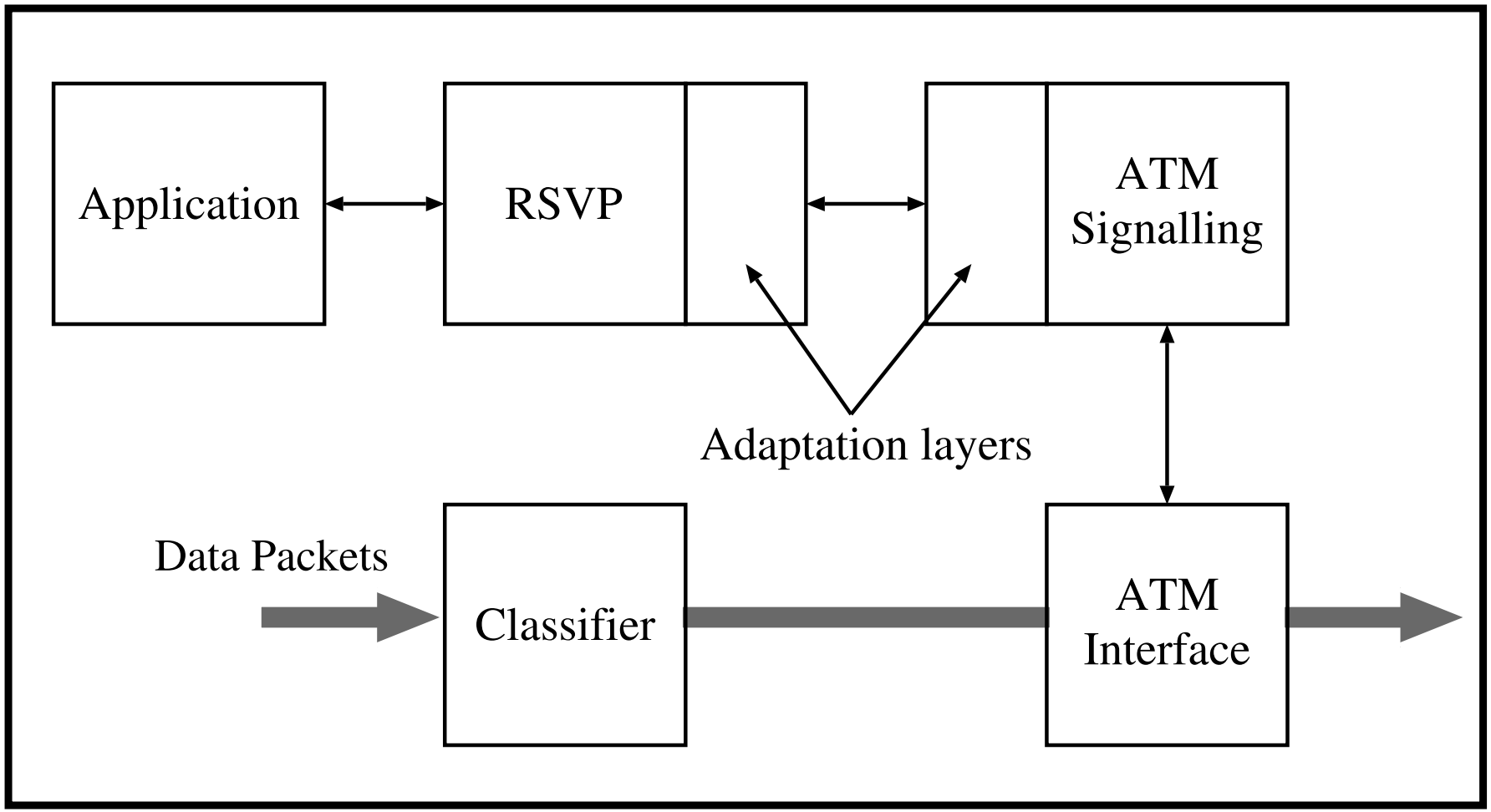
   QoS heterogeneity

4. Modifiable QoS on VCs

Prototype testbed plan



Prototype host architecture



RSVP Traffic Control Interface and Signalling

New reservation invokes

TC_AddFlowspec(session, filterspec, flowspec, tspec)

1. registers the parameters with ATM layer
2. translate QoS?
3. sets up the VC
4. returns a handle (or error)

Modified reservation invokes

TC_ModFlowspec(handle, flowspec)

1. translate QoS?
2. sets up the new VC
3. registers new parameters
4. tears down old VC

Traffic Control ...

Delete reservation invokes

TC_DelFlowspec(handle)

1. tears down VC

Adding a filter to a reservation invokes

TC_AddFilter(handle, filter)

1. Add the filter to the VC parameters

Deleting a filter from a reservation invokes

TC_DelFilter(handle, filter)

1. Delete the filter from the VC parameters

Miscellaneous issues

Translating IP QoS to ATM QoS

Short cut routing

VCs for RSVP

Multicast server vs. mesh

Aggregation on ATM "large pipes"