SCRIBE FOR LECTURE 13 ON RSVP(resource ReSerVationProtocol)

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Internet : Best effort service does not support real time applications well
Integrated services : extension to internet architecture to support integrated services Like real time applications e.g., Packet voice, packet video, distributed simulation.
ISPN (Integrated Services Packet Network) : network which supports integrated services.

Integrated services:
Adv : an end system can request a particular quality of service (QoS)
e.g., bounded end-to-end queuing delay, for a particular data flow.
Difficulty : providing QoS requires reservation of network resources in routers s along the path(s) of the flow as well as in the end hosts.

In order to provide a requested QoS, the nodes of an ISPN must perform
- reservation setup,
- admission control,
- policy control,
- packet scheduling,
- and packet classification functions.

Figure 1 illustrates these functions in an ISPN router.

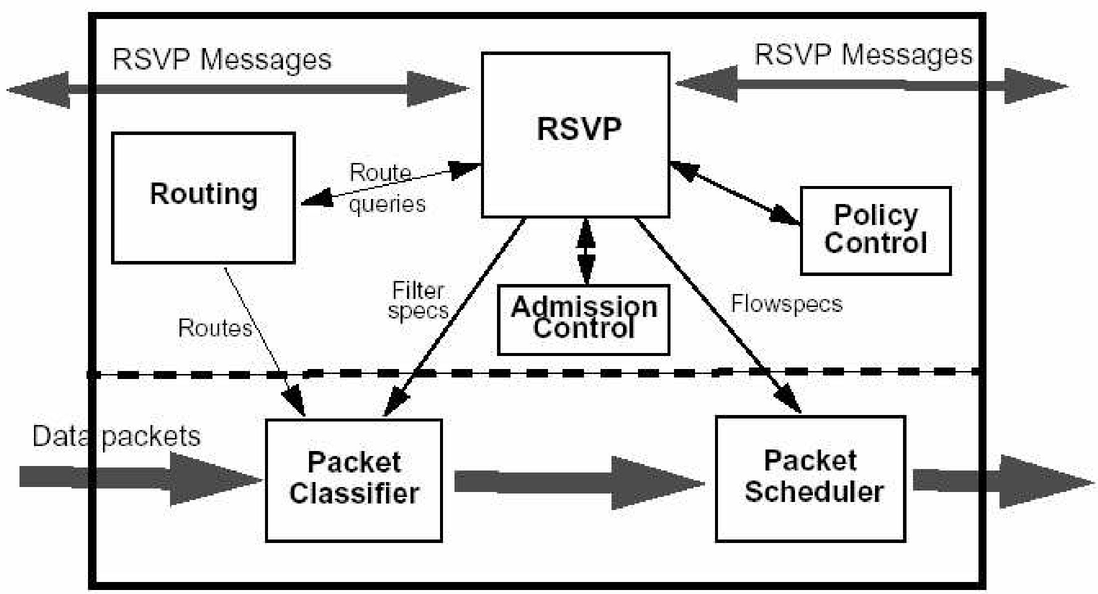

Figure 1: Integrated Services Components in ISPN Router

1. Reservation Setup

A reservation setup protocol is used to pass the QoS request originating in an end-system to each router along the data path, or in the case of multicasting, to each router along the branches of the delivery tree. In particular, **RSVP was designed to be the reservation setup protocol for an ISPN.**

An RSVP reservation request is basically composed of

Flowspec (defines the desired QoS)

Filterspec (defines the subset of the data stream, i.e., the flow, that is to receive this QoS.)

2. Admission Control

At each node along the path, the RSVP process passes a QoS request (flowspec) to an *admission control* algorithm, to allocate the node and link resources necessary to satisfy the requested QoS. If admission control accepts the request, the necessary state is established for it; otherwise, an error message is sent.

3. Policy Control

Before a reservation can be established, the RSVP process must also consult *policy control* to ensure that the reservation is administratively permissible.

4. Packet Scheduler

Assuming that admission control and policy control both succeed, the RSVP program installs state in the local *packet scheduler* or other link-layer QoS mechanism, to provide the requested QoS. The packet scheduler multiplexes packets from different reserved flows onto the outgoing links, together with best-effort packets for which there are no reservations.

5. Packet Classifier

The RSVP process also installs state in a *packet classifier*, which sorts the data packets forming the new flow into the appropriate scheduling classes. The state required to select packets for a particular QoS reservation, known as a *filter*, is specified by the filter spec.

1.2 RSVP Architecture

RSVP was designed to provide

robust,

scalable,

flexible,

and heterogeneous resource reservation

These design requirements led to a number of basic architectural features:

(1) a multipoint-to-multipoint communication model,

(2) receiver-initiated reservations, (adv : easy scaling for large number of receivers)

(3) cached (“soft”) state management in routers, and

(4) separation of reservations from routing.

2. OVERVIEW OF THE RSVP PROTOCOL

Data Flow Definitions

Flow definition is divided into two parts, the session definition and the filter spec.

Session specifies the destination and the filter spec specifies the “rest”.

RSVP Messages

RSVP creates and maintains state by periodically sending control messages in both directions along the m-to-n data paths for a session. RSVP messages are sent as IP datagrams and are captured and processed in each node -- router or host -- along the path(s), to establish, modify, or refresh state.
There are two primary RSVP message types: **Resv** and **Path**.
Resv (Reservation request) messages travel upstream (opposite to data stream)
Path message is initiated by a sender and travels downstream, to create *path state* in each node.
ResvTear (Reservation Teardown) messages
PathTear (Path Teardown) messages
ResvErr (Reservation Error) messages
PathErr (Path Error) messages

RSVP State

contains information about Reservation State and Path State

Distributed State Management

RSVP is designed to create “soft” state, which times out if it is not refreshed soon enough. The only permanent state is in the end nodes. The algorithms for refreshing and timing out state are a fundamental aspect of RSVP.

3. RSVP Design Issues

Data Selection

The fundamental design decision was made that:
* Routing determines *which* packets are forwarded, but
* RSVP determines *how* they are forwarded,

Heterogeneity

RSVP supports
“downstream heterogeneity” : heterogeneous QoS requests from different receivers.
This requires merging flowspecs when **Resv** messages are forwarded,
“upstream heterogeneity” : senders with heterogeneous traffic flows

Killer Reservations

The *“killer reservation”* (KR) problem is a denial of quality-of-service that can result from merging two different flowspecs; thus, it is a result of heterogeneity.

Non-RSVP Regions

To be useful, RSVP must be deployable in the real Internet. Deployment will be gradual, and at any time there will be paths and regions of the Internet that do not support RSVP. Therefore, RSVP was designed to work transparently through arbitrary non-RSVP-capable (*non-R*) routers.

Liveliness and Local Repair

Refresh messages make the RSVP state self-healing. If a route changes, for example, the next refresh will (try to) re-establish a reservation along the new path.

Source :
http://www.isi.edu/rsvp/rsvp2.project.summary.html

Some other references :

http://www.isi.edu/div7/rsvp/overview.html
http://citeseer.nj.nec.com/zhang93rsvp.html
http://www.cisco.com/univercd/cc/td/doc/cisintwk/ito_doc/rsvp.pdf
http://www.ietf.org/rfc/rfc2205.txt