RSVP als generelles Signalisierungsprotokoll

Outline
- QoS in the Internet
- RSVP
- Performance
- Generalized RSVP
- Application Scenarios
- Market Managed Multi-service Internet (M3I)

Summary & Conclusions

Martin Karsten

TU Darmstadt - Darmstadt University of Technology,
Dept. of Electrical Engineering and Information Technology
KOM - Industrial Process and System Communications, Tel.+49 6151 166156, Fax. +49 6151 166152
Merckstr. 25, D-64283 Darmstadt, Germany, Martin.Karsten@KOM.tu-darmstadt.de
Outline

QoS in the Internet

Performance

Application Scenarios

Market Managed Multi-service Internet (M3I)

Summary & Conclusions
QoS in the Internet

Outline
QoS in the Internet
RSVP
Performance
Generalized RSVP
Application Scenarios
Market Managed Multi-service Internet (M3I)
Summary & Conclusions

RSVP als generelles Signalisierungsprotokoll

QoS in the Internet

E: edge node
C: core node
—— QoS signalling & charging

Admission Control at Edge Nodes
Performance of Edge Nodes?
Flexibility of QoS Signalling?
RSVP

IntServ’s signalling protocol **ONLY**?

**Features**
- high flexibility (heterogeneity, multicast)
- robustness
- decoupled from services
- decoupled from routing

...result in a certain complexity.

⇒ RSVP as General Signalling Protocol
- bandwidth broker signalling
- per-flow signalling
- security signalling
- etc.

⇒ Extensions needed
Performance Comparison: ISI, basic KOM, tuned KOM

- 450 Mhz Pentium III
- standard PC hardware, FreeBSD 3.4
- cost: ~600 Euros + ~50 Euros per NIC
Generalized RSVP

Hop Stacking (sink-tree based reservation aggregation)
- stateless PATH messages

PATH message

destination
hops

F
A
F
B
F
C,B
F
D,C,B
F
E

A → B → C → D → E → F

phop state

B
C, B
D, C, B

Compound Prefix Addresses
- network addresses, CIDR prefixes
- multiple addresses
- scoping style

session: A
sender: B, C
service: 2 MBit/s

BR: border router

BR: border router

BR
B
C

ip_telco.fm 6 25.January.01
Generalized RSVP (2)

Remote API
- reduced complexity for end systems
- \(\Delta\) RSVP, size of executables: \(~100K\)
- \(\Delta\) RSVP, runtime memory: \(~200K\) (at \(\sim2000K\) total allocation)
- no attempt for specific optimization, so far

Oneway Reservations
- simplified usage
- reduced signalling effort
- new message type: PathResv

Duplex Reservations
- new object: DUPLEX (sender’s receiving port and vice versa)
- further simplified usage, reduced signalling effort
Application Scenarios

DiffServ
- see IETF ISSLL work
- Bandwidth Broker
  - communication via COPS, or
  - forwarding of RSVP messages
  - aggregation needed
⇒ RSVP allows for decentralized or centralized admission control.
- hierarchies of bandwidth brokers

Inter-Domain Trunk Signalling
- see BGRP and its analysis (cf. Pan & Schulzrinne)
- RSVP + Refresh Reduction + Prefix Addressing + Hop Stacking
- Advantage: Homogeneous Protocol & Interface

Others
- Edge Admission Control + ECN-priced subnet (cf. Kelly)
- RSVP seems well feasible
Market Managed Multi-service Internet (M3I)

EU 5th Framework, Programme IST, Project 11429
"Load Management through Market Mechanisms"
- HP Labs, AUEB (Athens), TUD, BT Research, ETH Zürich, Telenor

General System Architecture
- network layer
- pricing mechanisms, especially price communication
- charging and accounting system

HCI experiments

Scenarios
- market management at packet level
  - ECN pricing à la Kelly
  - agent-based dynamic price reaction at end systems
- market management at flow level
  - RSVP auctions
- combination
  - synthesize predictable service from ECN-priced best-effort
  - RSVP over ECN
- etc.
Summary & Conclusions

General QoS Signalling
• accommodates heterogeneity and uncertainty
• applicability of RSVP

RSVP
• good performance
• significant potential for further performance gains
• extensions for increased applicability
  • scalability: hop stacking, CIDR addresses
  • simplicity: oneway (duplex), remote API
• BUT: maybe the child needs a new name!

Further Work
• integration of QoS subnet technologies
  • DiffServ
  • ECN-priced best-effort
  • goal: elaborated testbed
• see http://www.kom.e-technik.tu-darmstadt.de/rsvp/
• see http://www.m3i.org/