SEQUIN and Premium IP

Service Quality Over Independently Managed Networks
IST-1999-20841

EU-sponsored research project under the IST (Information Science Technologies) programme

Participants: DANTE, INFN, UKERNA, DFN, RENATER, SWITCH (with UniBE as a subcontractor), GRNET, PSNC

Goal: Implement QoS-enhanced service based on the IETF's Differentiated Services (diffserv) architecture over technically and administratively diverse networks.

In particular: "Premium IP" over GÉANT and the connected NRENs (National Research and Education Networks)

Diffserv

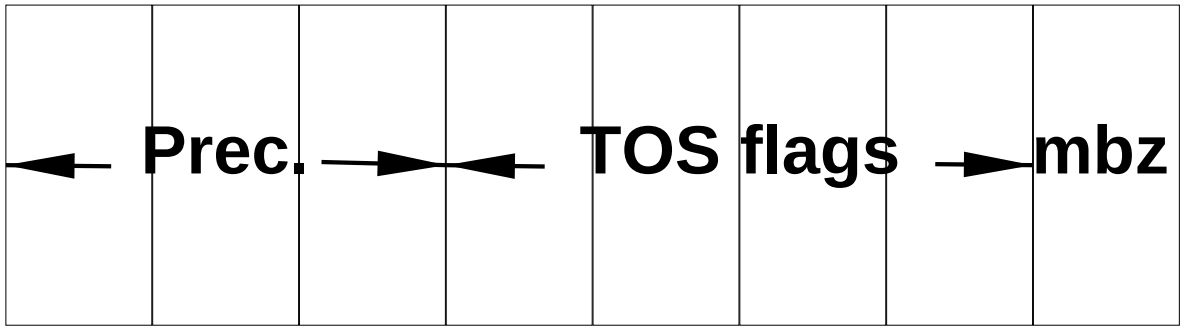
A scalable architecture for differentiated services being standardised in the IETF (Internet Engineering Task Force)

Redefines the “TOS byte” from the IP header to contain a 6-bit DSCP (Differentiated Services Code Point).

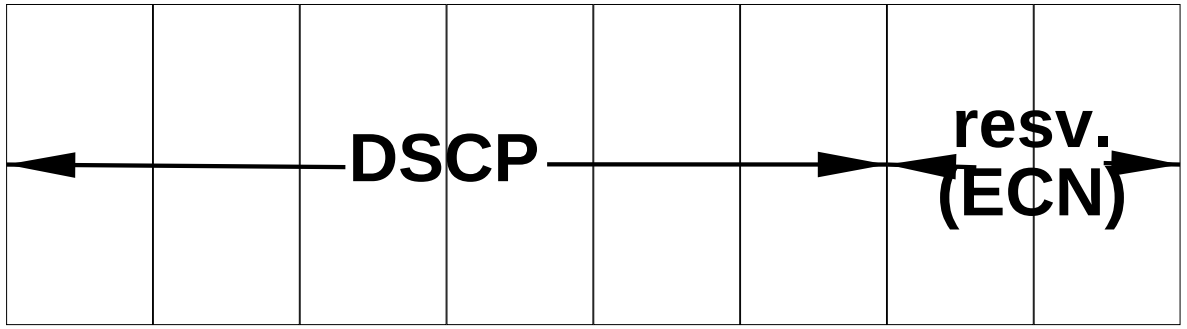
Routers use the DSCP to select a “PHB” (Per-Hop Behaviour) for each packet. PHBs can include particular priority, queuing, shaping, re-marking treatment.

Diffserv: TOS byte

old



new



Premium IP

Low-delay low-jitter service with strict rate limit

Useful for e.g.

- “Leased line emulation” (for VPNs etc.)
- IP Telephony
- Real-time audio/video
- Multicast transmissions

Potential to replace ATM-based “managed bandwidth” services such as those offered in TEN-155 and SWITCHng

Premium IP Implementation

Implement “EF PHB” (Expedited Forwarding Per-Hop Behaviour) in all routers, for traffic with the DSCP for Premium IP (46, or CS=5)

Implement strict policing at all ingress points to the Premium-enabled part of the network, to ensure that there can never be too many Premium packets at any router.

Premium IP: Policing

This policing is done at boundaries between administrative domains, such as

- between a university's campus network and SWITCH
- between SWITCH and GÉANT
- between GÉANT and an NREN in another country
- between that NREN and a regional network/MAN
- between the regional network/MAN and another campus network. . .

Premium IP: What you have to do to use it

- Send your packets with a special DSCP (46)
- Send them at a steady rate (well-shaped)
- Make sure that no-one can send “rogue” Premium traffic!

Marking and *shaping* can be done either by the sending host (application) or by a router close to it.

Policing has to be done at all borders of the Premium-capable part of your network. At most ports you can simply drop all packets that have the Premium tag (DSCP=46).

Project Status

March 2001: Interviews with potential user groups (network researchers, known videoconferencing users, campus networkers) to learn about perceived user requirements

April 2001: Definition of Quality of Service

May-August 2001: Work on implementation schemes and SLA/SLS (Service Level Agreement/Specification) issues

September 2001: “Laboratory” tests between Poznan and University of Berne over an ATM link

November 2001 (planned): “Pre-production” tests over the new GÉANT network between H.323 users in France, Italy and Switzerland (SWITCH). *This should include configuration of Premium IP support on all GÉANT routers.*

Future Work

- Extend Premium-capable region outward, starting from GÉANT, reaching into (some) NRENs, adding (parts of) campus networks.
- Think about monitoring (both device and SLA) and network management
- Think about pricing schemes
- Study other services. Interesting example: “less-than best-effort” service (Internet^2 Scavenger Service[a])

[a] http://qbone.internet2.edu/qbss/

More Information About SEQUIN

- SEQUIN “official” Web page[a]
  - project description
  - deliverables accepted by the EU
- SEQUIN “technical” Web page[b]
  - deliverables (including drafts)
  - conference presentations
  - configuration examples (hopefully soon)

[a] http://www.dante.net/sequin/

[b] http://www.switch.ch/lan/sequin/