

Admission Control over DiffServ using Pre-Congestion Notification

[draft-briscoe-tsvwg-cl-phb-02.pdf](#)

[draft-briscoe-tsvwg-cl-architecture-03.txt](#)

Philip Eardley, Bob Briscoe, Dave Songhurst - BT
Francois Le Faucheur, Anna Charny, Vassilis Liatsos – Cisco
Kwok-Ho Chan, Joe Babiarz, Stephen Dudley – Nortel
Georgios Karagiannis - University of Twente / Ericsson
Attila Bader, Lars Westberg - Ericsson

IETF-66 tsvwg 10th July 2006

Summary

- Aim:
 - End-to-end Controlled Load (CL) service without flow state or signalling in the core / backbone
- Solution:
 - Pre-Congestion Notification (PCN) builds on the concepts of ECN, RFC 3168, “The addition of Explicit Congestion Notification to IP”.
 - PCN-router marks packet “earlier” than ECN-router (bulk marking, not per flow)
 - admission marking
 - pre-emption marking
 - Feedback of these markings used in a particular network framework to achieve flow admission control and flow pre-emption
 - Applied to real-time flows (such as voice, video and multimedia streaming) in DiffServ networks.
- History
 - Drafts from BT, Cisco, Nortel & Ericsson - working together intensively

Drafts -

'Pre-Congestion Notification marking'
draft-briscoe-tsvwg-cl-phb-02.pdf

'An edge-to-edge Deployment Model
for Pre-Congestion Notification:
Admission Control over a DiffServ
Region'
draft-briscoe-tsvwg-cl-architecture-03

Controlled environment

further deployment models
using PCN (future work)

- end-to-end / Open
- others?

Signalling extensions

- RSVP, draft-lefaucheur-rsvp-ecn-01
- NSIS (future work)

Border anti-cheating (related work)
draft-briscoe-tsvwg-re-ecn-border-cheat-01

- extending CL-region across operators

PCN over MPLS (related work)

- MPLS & ECN/PCN, draft-davie-ecn-mpls-00

Recent work

- Understanding behaviour of PCN better
 - Sensitivity to measurement accuracy, reaction timing & choice of parameter settings
 - Further simulations
 - Supplementing those reported last time
 - On-going & will be reported at the next ietf
- Investigating algorithm variants
 - we believe the current algorithms are reasonably good
 - On-going work to assess if alternatives are better
 - eg would like same algorithm to work in other deployment models
- Understanding & addressing known “corner cases”
 - New Section 5 in [draft-briscoe-tsvwg-cl-architecture-03](#): Limitations of PCN & potential solutions
- Otherwise drafts have (just) had clarifications & corrections, eg due to comments received (thanks)



ECMP

- PCN mechanism works well when all packets between a pair of ingress and egress gateways follow the same path
- With ECMP (Equal Cost Multipath Routing) congestion-level-estimate is averaged over several paths
 - Therefore if paths have different pre-congestion level, the reaction is not quite accurate.
 - Similarly for Sustainable-aggregate-rate
- Can avoid problem by tunnelling from ingress to egress (so get a path-specific Congestion-level-estimate)
- Investigating other possible alternatives:
 - Eg (for flow pre-emption), only select from sub-set of flows that have actually had a Pre-emption Marked packet (or Router Marked packet)

Sub-optimality

1. Global fairness:

- 'Beat down' effect: if more than one router congested, some aggregates may pre-empt more flows than they need to
 - Common problem for congestion control algorithms eg TCP, XCP
 - Could just accept it

2. Bi-directional sessions:

- flow pre-emption for Aggregate $A \Rightarrow B$ independent of $B \Rightarrow A$.
 - But if pre-empt flow in only one direction of a voice call, session is still torn down
 - End result: too many flows are pre-empted
- Could just live with these sub-optimality?
- Investigating a number of possible enhancements

Next steps & future work

- Progress PCN marking draft
 - Standards track
 - get feedback / support
- Progress deployment model draft
 - Informational track
 - CL-region: Edge-to-edge / Controlled
 - Do limited work on this doc
- Signalling extensions for NSIS
 - To be discussed at NSIS meeting
 - Please say if you'd like to work on this
- Other deployment model
 - End-to-end / Open
 - le fewer flows per link, and may be some non-PCN-routers
 - Not working on at the moment, but trying to ensure that marking (algorithms & encoding) wouldn't preclude the End-to-end/Open deployment model

Comments please!