

PCN Encodings

Steps towards a final decision?

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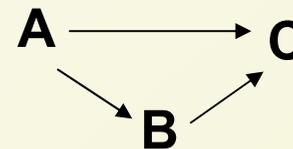
Motivation

- Aim of this talk is to discuss open issues raised in previous talk
- Next stage aims to meet charter milestone for standards track encoding document
- Aim of this presentation is to move forward on making decision
- draft-chan will lead to informational RFC tracking history of decision making

Encoding Requirements

- CL
 - Unmarked, admission-marked, termination-marked
- SM
 - Unmarked, termination-marked
- 3sm
 - No-pre-congestion, admission-stop, excess-traffic
- LC-PCN
 - Unmarked, Affected_Marked, PCN_Marked

Thus maximum of 3 encoding states required (A, B, C) requiring the following transitions



Terminology

- There are a wide range of terminologies in use for PCN. This presentation will use the following (not necessarily my preferred option):

PCN traffic is in PCN traffic class (charter requires this to be indicated using a DSCP)

NP Not Precongested – traffic in PCN class that hasn't been pre-congestion marked

AM Admission Marked – indicate ingress to stop admission

TM Termination Marked – indicate need to terminate flows

Af.M Affected Marked – indicate traffic that shares path with marked traffic

3 classes of encodings

All valid encoding options belong to one of 3 classes:

1. Use only DSCP codepoints
2. Use one DSCP codepoint + other codepoints from ECN
3. Use two DSCP codepoints + limited ECN codepoints

- Each of these will be described briefly
- Then will introduce major constraints
- Then discuss pros and cons
- Then attempt to reach consensus on which option the WG favours

1) Using only DSCPs

- Each of the states will be given a different DSCP.
- All DSCPs indicate traffic is PCN
- Use 2 or 3 DSCPs to indicate the PCN states (as required by the particular solution)

2) Using 1 DSCP & ECN

- DSCP indicates traffic is PCN. ECN codepoints indicate which PCN state
- Numerous variations proposed.
- draft-chan-pcn-encoding-comparison-03 lists several variants

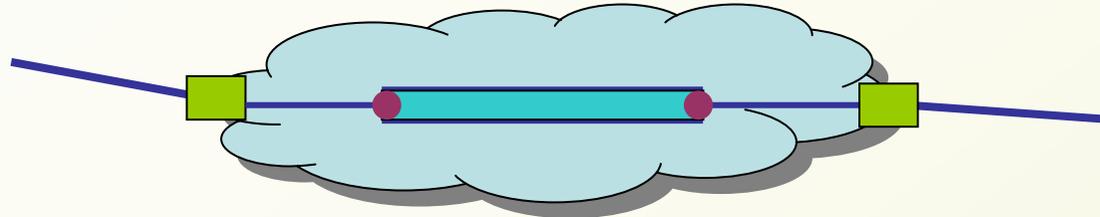
2) Using 1 DSCP & ECN

- DSCP indicates traffic is PCN. ECN codepoints indicate which PCN state
- Numerous variations proposed. Following is an example

3) Using 2 DSCPS & limited ECN

- DSCP indicates traffic is PCN. Limited ECN codepoints in conjunction with DSCP indicate which PCN state
- This proposal very new and not yet discussed in draft-chan-pcn-encoding-comparison-03
- Following slides introduce motivation behind this particular encoding class.

Tunneling – A **MAJOR** constraint



<i>incoming inner</i>	<i>incoming outer</i>			
	00	10	01	11
00	00	00	00	drop
10	10	10	10	11
01	01	01	01	11
11	11	11	11	11

- This constrains us not to use 00, 01 or 10 for carrying AM or TM (as these will get lost on decapsulation)
- Also can't use 00 for NP since if the inner header is 00 & outer is 11 decapsulator drops the packet

3) Using 2 DSCPs & limited ECN

- CE-bits in inner header of a tunnelled packet cannot be overwritten by the decaps node
 - Transition from 11 to 01/10 cannot be preserved by decaps node
 - Only the following transitions possible
- Codepoint for NP MUST reach codepoints for AM and TM
 - Reuse of 01/10
- Codepoint for AM should minimize impact of DSCP switching on ECMP
 - Use the same DSCP
 - Reuse of 11
 - \Rightarrow No rerouting for PCN rate < PCN upper threshold (normal operation)
- Only 1 reachable codepoint for TM

	01/10*	11
DSCP1		
DSCP2		

	01/10*	11
DSCP1	NP	AM
DSCP2	–	TM

Pros & cons for option 1

All DSCPs

Pros:

- Support for tunnels
- Allows transparent carrying of ECN

Cons:

- Requires at least 2 DSCPs (for 2 codepoint solutions) require at least $2n$ DSCPs for n precedence classes
- Possibility of undesirable interactions with ECMP
- Requires router to check existing marking before applying new marking (mustn't remark TM \rightarrow AM) for some solutions

Pros & cons for option 2

1 DSCP and ECN field

Pros:

- Plentiful codepoints

Cons:

- **Impossible** with the tunneling constraint identified above

Pros & cons for option 3

2 DSCPs + partial ECN

Pros:

- Support for some tunnels
- Requires less DSCPs requires $2n$ DSCPs for n precedence classes
- Not susceptible to ECMP interactions under normal operation

Cons:

- ECN can only be carried using IP in IP tunnels or moving it to a non-PCN class
- Possible ECMP interactions with TM marking

Pros and Cons - Discussion

- Previous slides not exhaustive list of pros/cons
- Have decided to ignore issue of leakage as only relevant to misconfigured routers
- Option 2 *could* become feasible if we re-write rules on encapsulation of ECN – see Bob's ID (currently on hold):
 draft-briscoe-tsvwg-ecn-tunnel-00.txt
 - However this is too long term for initial PCN charter...
- Need contributions from floor about which encoding choice is best

DISCUSS!