Some Congestion Experienced (SCE)
An RFC3168 backward compatible approach to high fidelity ECN signaling and congestion control


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The problem

• Transports spend most of their time either:
  - Building a bottleneck queue → high delay
  - Under-utilising the path capacity → low goodput

• The network doesn’t give them enough information!
  - Binary signal per RTT → oscillation
    • Bang-bang control theory
The solution

- Congestion should be explicitly signalled earlier than loss
- ECT(1) is unused, treated identically to ECT(0)
  - RFC 3168, actual measurements in the wild (RFC 8311)
- Rename ECT(1) as SCE, ECT(0) as ECT
  - Some Congestion Experienced
- Other ECN codepoints retain current meaning & semantics
Two Congestion Signals

- **SCE (some congestion experienced)**
  - High fidelity congestion information
    - 100% marking when CE threshold reached
    - Less marking means less congestion

- **CE (congestion experienced)**
  - Coarse congestion information
    - Continue using as defined now
    - May be encountered without SCE (existing middleboxes)
State Diagram

Not-ECT       SCE

00   +---->01  
     /       |  
     /       |  
     /       |  
     /       v  
 10      11
ECT------>CE

Not-ECT: Not ECN Capable Transport
ECT: ECN Capable Transport
SCE: Some Congestion Experienced
CE: Congestion Experienced
SCE marking example

CE marks & CWR response

ECE flags

SCE marking probability
Experimental Plan

- Experiment #1 – SCE marking basics – success!
- Experiment #2 – middlebox AQM tests - ongoing
- Experiment #3 – check our maths
- Experiment #4 – integrate with transport protocols
  - Requires a feedback path receiver → sender

More details on our web site at:

http://www.bufferbloat.net/projects/ecn-sane/wiki/