ECN (Explicit Congestion Notification) for FREEDM – Protocol Message Format

Jonathan Ng (jn12g@my.fsu.edu)

Florida State University

1. When the OPNET simulation would drop a UDP packet, it should generate a multicast UDP packet on all switch interfaces, port 51871. [1]
2. The multicast group used is 224.0.0.1. [2]
3. The multicast packets should have a configurable "cool down" period (i.e. a packet should only be generated on a given interface every 250ms). [1]
4. Fields of ECN message: [1]
   0x00-0x07 should contain "ECNDGI00"
   0x08-0x08 should contain 0 if the packet that caused the ECN would be a soft drop, 1 for a hard drop.
   0x09-0x12 should contain the four byte ip address of the device that originated the packet
   0x13-0x16 should contain the four byte ip address of the destination for the packet
   0x17-0x18 should contain the destination port expressed as two bytes.
   0x19-0x22 should contain the current average queue size for the red algorithm.
5. When programming in C in OPNET, the fields are encapsulated in the packed format of a struct, containing in total 23 octets. [3]
6. When ECN messages are transmitted from one host to another, the numbers of each meaningful field from 0x08 – 0x22 in the message are first converted from the host byte order to the network byte order individually (i.e. they are not treated as one large number of 15 octets but are 5 numbers of different sizes to convert separately). When they arrive at the destination host, they should be converted back from the network byte order to the host byte order.

References:

1. Jackson, Stephen. “Re: Fw: ECN Protocol information”. Message to Jonathan Ng. 29 March 2016. E-mail.
2. Jackson, Stephen. “Re: Fw: Fw: FW: ECN Protocol information”. Message to Jonathan Ng. 28 June 2016. E-mail.
3. Ng, Jonathan. “Re: Fw: Fw: FW: ECN Protocol information”. Message to Stephen Jackson. 23 May 2016. E-mail.