Proposal of reporting scheme considering FEC overhead

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Background

In April meeting, there is an argument regarding Report function, especially considering FEC overhead.

The camp supporting that FEC overhead should be calculated by OLT:

(1) Efficiency of upstream bandwidth

The camp supporting that FEC overhead should be included in report sent by ONU:

(1) Compatibility with DBA method of existing 1G-EPON
(2) IEEE802.3ah specifies "ONU should report including FEC overhead"

d) Queue #n Report.
 This value represents the length of queue# n at time of REPORT message generation. The reported length shall be adjusted to account for the necessary inter-frame spacing and FEC parity data overhead, if FEC is enabled. The Queue #n Report field is an unsigned 16 bit integer representing transmission request in units of time quanta. This field is present only when the corresponding flag in the Report bitmap is set.

*: excerpted from 64.3.6.2 REPORT description in 802.3 std.

Investigations

We had a simulation regarding efficiency of upstream bandwidth to compare the two solutions. The result told us it depends on the number of queues.
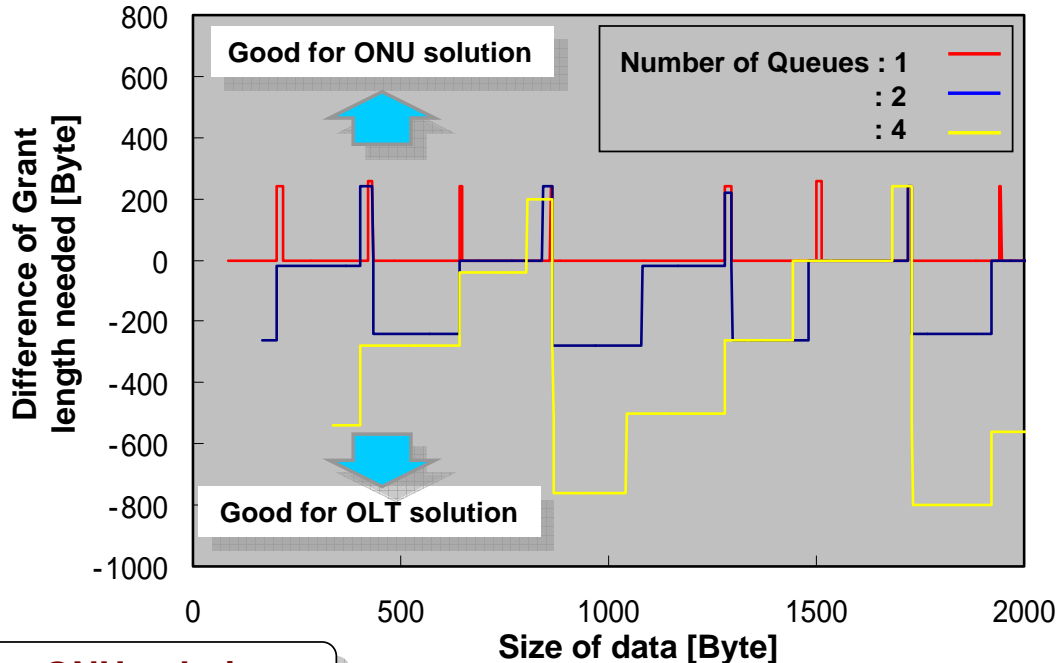
Conditions:

1) FEC algorithm RS(255,223)

  (32byte parity per 216byte data)

2) Number of logical link : 1 per ONU

3) Reporting unit is TQ

4) Not considering burst overhead

Calculations:

The difference

 = Grant length needed in OLT solution

 - Grant length needed in ONU solution

ONU solution

➢   OLT allocates grants in accordance with Report value
➢   ONU sends Report per queue including the FEC overhead

Better in case that number of queues = 1

OLT solution

➢   OLT allocates grants including additional band of FEC overhead
➢   OLT may add extra grants for "bytes rounded up to TQ

Better in case that number of queues > 1

Points of the issue

(1) Number of priority queues
  -> Implementation matter
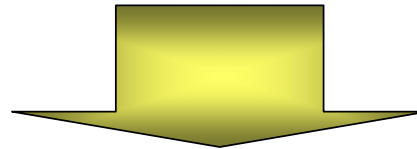(2) Compatibility with DBA method of existing 1G-EPON
  -> Implementation matter
  -> We haven't known how much the common function is used
    in 10G system
(3) Complexity in ONU circuits vs calculation power in OLT
  -> We don't have the answer, it is hard to evaluate shortly

We cannot decide which is better, at this point .

Points of the proposal

(1) We can use either solution for reporting

It might be implementation option
a. ONU sends report per queue including FEC overhead (ONU solution)
b. ONU sends report per queue without FEC overhead (OLT solution)

(2) We can implement either mixed or unified system

Mixed system : OLT should know which ONU supports which way
Unified system : It might be a system specification
-> ONU should have a function to indicate which option it supports

option a: Extend the discovery information
option b: Define a new message
-> Option a is better !
Merit 1) Easy to modifying the draft
Merit 2) OLT can know earlier than by any other ways

Modifications of discovery information

GATE MPCPDU Discovery Information Fields

Bit	Flag Field	Values
0	OLT is 1G upstream capable	0 - OLT supports 1 Gb/s reception 1 - OLT does not support 1 Gb/s reception
1	OLT is 10G upstream capable	0 - OLT does not support 10 Gb/s reception 1 - OLT supports 10 Gb/s reception
2-3	reserved	Ignored on reception.
4	OLT is opening 1G discovery window	0 - OLT can receive 1 Gb/s data in this window 1 - OLT cannot receive 1 Gb/s data in this window
5	OLT is opening 10G discovery window	0 - OLT cannot receive 10 Gb/s data in this window 1 - OLT cannot receive 1 Gb/s data in this window
6-7	reserved	Ignored on reception.
8	OLT is asking report mode of each ONU	0 - OLT doesn't ask ONU which report mode it supports 1 - OLT asks ONU which report mode it supports
9-15	reserved	Ignored on reception.

REGISTER_REQ MPCPDU Discovery Information Fields

Bit	Flag Field	Values
0	ONU is 1G upstream capable	0 - ONU transmitter is capable of 1 Gb/s 1 - ONU transmitter is not capable of 1 Gb/s
1	ONU is 10G upstream capable	0 - ONU transmitter is not capable of 10 Gb/s 1 - ONU transmitter is capable of 10 Gb/s
2-3	reserved	Ignored on reception.
4	1G registration attempt	0 - 1 G registration is attempted 1 - 1 G registration is not attempted
5	10G registration attempt	0 - 10 G registration is not attempted 1 - 10 G registration is attempted
6-7	reserved	Ignored on reception.
8	ONU is answering report mode to OLT	0 - ONU sends report including FEC overhead 1 - ONU sends report not including FEC overhead
9-15	reserved	Ignored on reception.

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