Multiple MCS IEEE 802.3bn EPoC Ad Hoc - 010213

Attendance

- Joe Solomon – Comcast
- Jorge Salinger – Comcast
- Andrea Garavaglia – Qualcomm
- Bill Powell - ALU
- Charaf Hanna – ST Micro
- Duane Remein – Huawei
- Doug Jones - Comcast
- Hal Roberts – Calix
- Leo Montreuil – Broadcom
- Marek Hajduczenia – ZTE
- Matt Schmitt - CableLabs
- Mike Darling – Shaw
- Paul Nikolich – Independent?
- Peter Wolff – Titan Photonics
- Ranaan Ivry – ?
- Rob Howald – Motorola
- Satish Mudugere – Intel
- Curtis Knittle – CableLabs
- Ron Wolff – Aurora
- Steve Shellhammer – Qualcomm
- Thushara Hewavithana – Intel
- Tom Staniec – Cohere
- Saif Rahman - Comcast
- Tim Brophy - Cisco
- Wim De Ketelaere – Excentis
- Jim Farmer - Aurora

Plan for Moving Forward

Have received presentations on the benefits; unless there is a new benefit not yet discussed, we will focus only on the complications of implementing Multiple MCS

Use case on slide 22

Agreed that this use case is valid

Marek: If the FCU does its function correctly, the OLT shouldn't have to worry about the HFC implementation complexity

- Jorge: Yes, but this should also be possible in a "repeating" FCU, so wouldn't be hidden
- Marek: Will be VERY complex for the OLT to keep track of all HFC characterisitcs and will make the OLT much more complex than today
- Duane: This case is a trivial MMP case; the OLT only needs to know rate limitations of a CNU. That should be common knowledge to the OLT – no additional burden to OLT.
    - Jorge: Yes, but there will be different data rates on the same PON
    - Duane: On the DS, this is common, but more complicated on the US – have to have gate messages from the CNUs with all of the rate information. Knowing non-fixed rates (updated in quasi-real time) is not that much more complicated for 4 CNUs as it would be for 1 CNU
    - Steve: Similar to multiple MCS – even if there is the same modulation, may not have the same data rate
        - Independent of MCS – if HFCB had more muted sub-carriers, for example, they would have different data rates
    - Jorge: This case assumes same spectrum allocation for each network, but not necessarily the case. It would be unusual to have a different amount of spectrum dedicated to different subscribers in a service group
    - Jim F: Would be unusual to have different modulation profiles for different customers in a SG, since they likely have the same impairment profiles
    - Duane: Nothing prevents different HFC domains on a single PON
    - Jorge: This is a downstream case only; in the US, might have different MCS for each CNU. This is specific to the DS, given the broadcast nature.
    - Marek: OLT today has the capability to determine the bandwidth to the FCU, but how the FCU manages profiles DS of it is beyond the scope of this discussion
        - Jorge: Doesn't this mean that the FCU has to be bridging? If repeating, the OLT would have to be aware.
        - Marek: For DPoE, the OLT provisions a datarate in the US and DS. Shouldn't be anything different for EPoC.
- Tom: If a segment is properly aligned, but there are other things that impact overall bandwidth (underground cables, line extenders, etc.), a CNU might not have a full 192 MHz channel. In this case, might need to qualify what a CNU can handle and get that back to the FCU/OLT; they will have to determine what can be received by the CNU.
    - Jim F: The OLT has to know how much data the CNU can receive
    - Tom: How do we quantify what the actual capability of each CNU in the DS is and get that to the OLT?
- Saif: This discussion shouldn't focus on capacity limits of service flows, but focus on typical link rate capabilities and how to treat the differences in different FCUs and their sub-tended CNUs.
    - In the PHY, how do we deal with a non-uniform (capacity) of FCUs?
    - This is the physical layer between the FCU and CNU, not OLT and FCU.

Saif: If we agree that might need another profile for each HFC behind a different FCU, why can't we have different modulation profiles behind a single FCU?

- Marek: If the FCU can hide the details from the OLT, it's not an issue (bridger); but if the FCU functions as a repeater, then this is complex.
- Duane: The OLT needs to know the datarate of the SLA of each CNU; in this example, there is a single rate on each HFC PHY. For multiple rates on a single HFC PHY, there will be more complexity at the FCU.
- Saif: If the FCU is a repeater, the OLT will need to do more to manage this?
  - Duane: The problem is at the MMI layer; how do you communicate different rates across that layer? If we can solve this, everything else is possible. Right now there is no way to synch the MAC and PHY layers to have a quasi-dynamic rate. Rates are static and don't change. How does the PHY inform the MAC what rate a channel is operating at. This is not a repeater function; assumes some intelligence in the FCU.
  - Jorge: If the ONUs have a 1 Gbps rate, then the FCUs have to operate at 1 Gbps. The CNUs will operate at different rates and the FCUs will have to know and manage this. The OLT will NOT need to know the CNU rates.
  - Tim: If that is the case, then the FCU can manage and the OLT doesn't have to manage.
  - Duane: Optical rate is fixed…
  - Jorge: Doesn't the OLT need to know how much data to send to an FCU and pad the frame so that the FCU doesn't get overwhelmed?
    - Duane: Paqckets are sent in a rate limited fashion and interleave frames from multiple CNUs as the scheduler decides, without regard to order on the PHY. Just concerned with not sending more data to a CNU than it is allocated.
    - Bill: Think the OLT DBA function needs to know how much data can be absorbed on an HFC link so that it is not overrun.
    - Duane: Shouldn't be concerned with the line rate at a CNU, since the data rate it is provisioned for is going to be less than the line rate. Rate to an LLID is a provisioned rate; typical, but not required.
    - Jim: In the case where I have only one FCU on a PON; if the HFC can only handle 500 Mbps, how do we communicate this, when the OLT assumes 1 Gbps on the PON?
    - Duane: The OLT figures this out currently, but the method is not standardized now. Aggregate data rate on the segment is more important than the rate on an individual CNU.

Jorge to set up a follow up meeting on Friday, January 4 to continue the discussion.