143.2 Summary of major concepts

The following are the major concepts of the MCRS:

a) The MCRS transmission is controlled by a higher layer (e.g., Multipoint MAC Control sublayer defined in Clause 144) via the use of MCRS_CTRL primitives with indications of transmission channels, positions, and lengths.
b) The MCRS establishes a temporary binding of a single MAC instance to one or more xMII instances with all xMIIs operating at the same rate.
c) In the transmit direction, the MCRS converts the MAC serial data stream into the parallel data paths of multiple xMIIs servicing separate PHYs.
d) In the receive direction, the MCRS maps the signal sets provided by the xMIIs to the PLS service primitives of individual MACs.
e) Each direction of data transfer is independent and serviced by data, control, and clock signals.
f) The MCRS generates continuous data or control characters in the transmit path and expects continuous data or control characters in the receive path.

143.2.5.1 LLID data transmission over multiple MCRS channels

The dynamic channel bonding is achieved by interleaving data belonging to a single LLID (i.e., data from a single MAC instance) over multiple envelopes on multiple MCRS channels, as illustrated in Figure 143–7. The unit of interleaving is one EQ. The data from a single MAC instance is divided into EQs. MCRS collects transmission channel index positions, and lengths from MCRS_CTRL primitives and distributes the EQs over the channels. Each EQ is transmitted on the channel that has the earliest transmission availability. If there are multiple such channels, the one with the lowest channel index is selected. The EQs on the same MCRS channel are further formed into one envelope. That means the overlapping envelopes are filled with EQs in the increasing order of MCRS channel index.

Figure 143–7 shows an example of LLID data transmission over multiple MCRS channels. Note that the peak rate is not well achieved in this figure, because the grant allocations are not optimally overlapped. Since LLID data transmission ends when grant allocations are exhausted, the peak rate can be achieved if grant allocations on multiple channels end at the same, or nearly the same, positions.

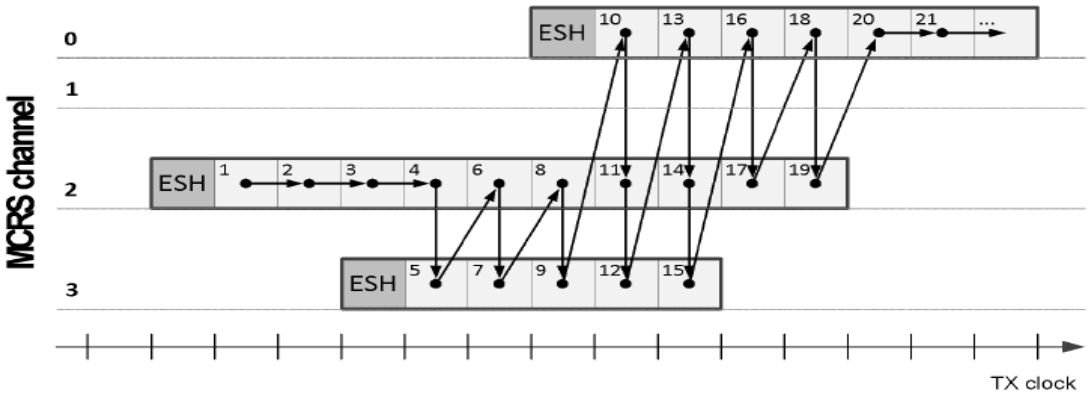

Figure 143–7—Fill order of overlapping envelopes

144.4.3 Granting Process

A key concept pervasive in Multipoint MAC Control is the ability to arbitrate specific transmitters out of a plurality of ONUs. The OLT controls an ONU's transmission by assigning grants. Note that the grant allocations on multiple channels should end at the same, or nearly the same, positions to achieve the peak rate.

The transmitting window of an ONU is indicated in the GATE message where each granted LLID is explicitly identified (*LLID* subfield of the *EnvAlloc[n]* field, see 144.4.4.1) and granted (*EnvLength* subfield of the *EnvAlloc[n]* field, see 144.4.4.1). All granted LLIDs share the same grant start time (*Grant Start Time* field, see 144.4.4.1). An ONU begins transmission when its *LocalTime* variable matches the value indicated in the *Grant Start Time* field in the GATE message. An ONU concludes its transmission with sufficient margin to ensure that the laser is turned off before the grant length interval has elapsed.

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