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FROM: Peter Johansson

TO: T10 SBP-3 working group

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RE: Stream command block ORB

The format of the stream command block, as described in SBP-3 Revision 1a, was developed roughly five years ago and reflected then current thinking. It is, perhaps, in need of some revision to benefit from the experience gained in the intervening years, in particular with respect to AV disks.

The ORB as defined today may be used to construct a "play list" that stitches together discontiguous AV segments for seamless presentation to a viewer—but it does so in a bulky, awkward fashion. A single ORB is required to describe each contiguous segment, so the play list itself is a linked list of ORBs.

What if the play list were represented more compactly, in a single buffer?

The pages that follow contain proposed modifications to the SBP-3 draft to make this possible. Please note that new commands would be created in order to take advantage of this feature. Existing device-dependent commands were designed without knowledge of a play list.

5.1.2.2 Stream command block ORB

A stream command block ORB is a structure that has the format illustrated below.

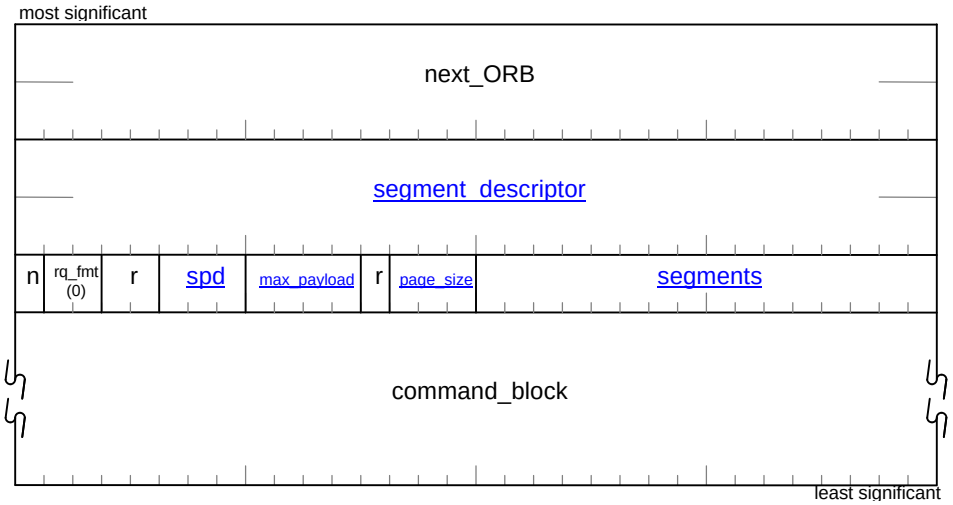

Figure 17 – Stream command block ORB

The *next_ORB* field shall contain a null pointer or the address of a dummy ORB or a stream command block ORB and shall conform to the address pointer format illustrated by Figure 12.

The *segment_descriptor* field shall contain either an immediate segment descriptor or the address of an array of segment descriptors. The format of segment descriptors is specified by Figure 17a. When *segments* is zero, an immediate segment descriptor is present in the ORB. Otherwise, Figure 11 shall specify the format of the *segment_descriptor* field which shall address a contiguous array of segment descriptors.

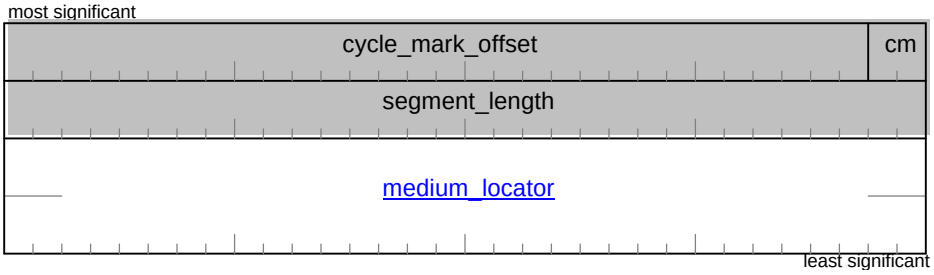

Figure 17a – Segment descriptor

The stream data described by a stream command block ORB consists of one or more segments, each of which is logically contiguous with respect to the device medium. Segments need not be logically contiguous on the device medium with respect to each other. When a stream consists of a single segment, it may be described by immediate data present in the *segment_descriptor* field. An immediate segment descriptor is a truncated portion of a segment descriptor, as shown by the gray shading above. When a segment descriptor array is used, each entry shall be eight bytes long, as illustrated by Figure 17a.

The *cm* field (together with the *cycle_mark_offset* field) specifies the location of the first quadlet of isochronous data (~~stream~~ segment offset) as encoded by the table below.

Value	*cycle_mark_offset*	~~Stream~~ Segment offset
0	Undefined	Zero
1	Undefined	*cycle_mark_offset*
2	Location of first CYCLE MARK	Zero
3	Location of first CYCLE MARK	*cycle_mark_offset*

The ~~stream~~ segment offset derived from the combination of *cm* and *cycle_mark_offset* specifies the location of the first quadlet of the isochronous data as an offset, in quadlets, relative to the starting medium location indicated by the *command_block*. For a block device, the ~~stream~~ segment offset, expressed in bytes, shall be less than the block size of the device.

NOTE – When an immediate segment descriptor is used, the command transported by the stream command block ORB specifies a starting location on the medium and an associated transfer length. Particularly in the case of block devices, the relevant isochronous data may be a subset of the data length and may commence at a nonzero offset relative to the natural block boundaries of the medium—hence the necessity for the additional values, ~~*stream_length*~~ *segment_length* and ~~stream~~ segment offset, to completely characterize the request.

The *cycle_mark_offset* field, when *cm* has a value of two or three, specifies the location of the first CYCLE MARK packet as an offset, in quadlets, relative to the starting medium location indicated by the *command_block*. When *cm* has a value of one, *cycle_mark_offset* specifies the ~~stream~~ segment offset instead. In either case, the value of *cycle_mark_offset*, converted to bytes, shall be less than ~~*stream_length*~~ *segment_length*.

NOTE – The *cycle_mark_offset* field may be useful to reestablish synchronization within the recorded isochronous data if a prior stream command block terminated in error.

The ~~*stream_length*~~ *segment_length* field specifies the length of data, in bytes, that is to be transferred to or from the device medium.

The *medium_locator* field shall specify the location on the device medium for the stream data. The meaning and usage of this field is determined by the command transported by the ORB.

The *notify* bit and *rq_fmt* field are as previously defined for all ORB formats. The *rq_fmt* field shall be zero.

The *spd* field shall specify the maximum speed that the target may use for data transfer transactions addressed to the segment descriptor array, as encoded by **Error! Reference source not found.**.

The largest data transfer length that may be requested by the target in a single Serial Bus read or write transaction addressed to the segment descriptor array is $2^{max\_payload + 2}$ bytes. The *max_payload* field shall specify a maximum data transfer length less than or equal to the length permissible at the data transfer rate specified by *spd*.

The *page_size* field shall specify the underlying page size of the segment descriptor array memory. A *page_size* value of zero indicates that the underlying page size is not specified. Otherwise the page size is $2^{page\_size + 8}$ bytes.

The *segments* field shall either be zero or contain the number of elements in the segment descriptor array addressed by *stream_descriptor*. When the value of the *segments* field is zero, the ORB does not reference a segment descriptor array and the contents of the *spd*, *max_payload* and *page_size* field are unspecified.

The *command_block* field contains information not specified by this standard.