The page table mechanism in SBP-2 was designed and optimized for disk transfers. However, it is overly restrictive for other classes of devices that may want to use SBP-2. Additionally, it is not clear in the current draft the meaning of the page table when the page_table_present bit is one and page_size is zero. I would like to use this combination to indicate that the page table is an unrestricted scatter/gather list.

I propose that support of the unrestricted scatter/gather list be optional and indicated by a new bit in the Logical_Unit_Characteristics entry of the unit directory or logical unit directory in the configuration ROM of the device.

I propose the following changes to the document:

In section 5.1.2.1 add the following paragraph just before the paragraph beginning “If page_table_present is zero, the data_size field…”

> If page_table_present is one and page_size is zero then the page_table represents an unrestricted scatter/gather list with no inherent page size.

In section 5.2:

The data buffer associated with an ORB is specified by the data_descriptor, page_table_present, page_size and data_size fields. The data buffer is a logically contiguous area in system memory. As previously described, when page_table_present is zero, the data buffer is also contiguous within Serial Bus address space. In this case, data_descriptor contains the 64-bit address of the data buffer and data_size specifies its length, in bytes.

In the other case, when page_table_present is equal to one, the data buffer is composed of segments that are discontinuous within Serial Bus address space and it is necessary to use a page table to describe the segments that form the data buffer. The page table is a variable-length array of elements whose format is determined by page_size. When page_size is non-zero the page_table uses the normalized format. When page_size is zero the page_table uses the unrestricted scatter/gather list format. Each element describes one segment that is contiguous within Serial Bus address space. Page table elements shall be octet aligned.

> The presence of a page table is indicated by the value of page_table_present in the ORB. When page_table_present is nonzero, the data_descriptor field in the ORB shall contain the address of the page table and the data_size field shall contain the number of elements in the page table.

> When a page table is used it shall be located in the same node as the data buffer it describes. The spd and max_payload fields of the ORB shall describe data transfer capabilities for both the data buffer and the page table.
5.2.1 Normalized page tables

The page table shall be contiguous within Serial Bus address space and shall be accessible to Serial Bus block read transactions with a data_length less than or equal to 2 \( \text{page_size} \) bytes so long as a block read transaction does not cross Serial Bus address boundaries that occur every 2 \( \text{page_size} \) bytes.

![Figure 1 – Page table element (when page_size equals four)](image)

NOTE – In the figure above, the field widths of segment_base_lo and segment_offset, 20 and 12 bits, respectively, are chosen only for the purposes of illustration. The size of segment_base_lo and segment_offset vary according to page_size. The field width, in bits, of segment_offset shall be \( \text{page_size}+8 \). In the example shown above, the page size is assumed to be 4096 bytes.

The segment_length field shall specify the length, in bytes, of the portion of the data buffer described by the page table element. The value of segment_length shall be less than or equal to \( 2 \text{page_size}+8 \).

The segment_base_hi and segment_base_lo fields together shall specify the base address of the segment within the node’s 48-bit system memory address range.

The segment_offset field shall specify the starting address for data transfer within the segment.

The 64-bit system memory address used to address the data is formed by the concatenation of the 16-bit node_ID field from the data_descriptor field in the ORB, segment_base_hi, segment_base_lo and segment_offset.

In all page table elements, the sum of segment_length and segment_offset shall be less than or equal to \( 2 \text{page_size}+8 \).

In addition to the preceding requirements, the values of segment_length and segment_offset are constrained by their position within the page table. These additional restrictions are summarized below.

<table>
<thead>
<tr>
<th>Element</th>
<th>1</th>
<th>2</th>
<th>( n ) (where ( n \geq 3 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No additional restrictions</td>
<td>segment_length = ( 2 \text{page_size}+8 ) - segment_offset</td>
<td></td>
</tr>
<tr>
<td>1 – ( n-2 )</td>
<td>—</td>
<td>segment_offset = 0</td>
<td>segment_offset = 0</td>
</tr>
<tr>
<td>( n-1 )</td>
<td>—</td>
<td>—</td>
<td>segment_offset = 2 ( \text{page_size}+8 )</td>
</tr>
</tbody>
</table>

The presence of a page table is indicated by the value of page_table_present in the ORB. When page_table_present is nonzero, the data_descriptor field in the ORB shall contain the address of the page table and the data_size field shall contain the number of elements in the page table.

When a page table is used it shall be located in the same node as the data buffer it describes. The spd and max_payload fields of the ORB shall describe data transfer capabilities for both the data buffer and
The page table shall be contiguous within Serial Bus address space and shall be accessible to Serial Bus block read transactions with a `data_length` less than or equal to `page_size` + 8 bytes so long as a block read transaction does not cross Serial Bus address boundaries that occur every `2^{page_size}` bytes.

### 5.2.2 Unrestricted scatter/gather lists

The page table shall be contiguous within Serial Bus address space and shall be accessible to Serial Bus block read transactions with a `data_length` less than or equal to `data_size`*8 bytes.

<table>
<thead>
<tr>
<th>most significant</th>
<th>segment_length</th>
<th>segment_base_hi</th>
</tr>
</thead>
<tbody>
<tr>
<td>segment_base_lo</td>
<td></td>
<td>least significant</td>
</tr>
</tbody>
</table>

**Figure 32 – Page table element (when `page_size` equals zero)**

The `segment_length` field shall specify the length, in bytes, of the portion of the data buffer described by the page table element. A `segment_length` value of zero shall not be used.

The `segment_base_hi` and `segment_base_lo` fields together shall specify the base address of the segment within the node’s 48-bit system memory address range.

The 64-bit system memory address used to address the data is formed by the concatenation of the 16-bit `node_ID` field from the `data_descriptor` field in the ORB, `segment_base_hi` and `segment_base_lo`. 