

To: X3T9.2 Membership

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Subject: 16-byte Multimedia Commands

1. OUTBOUND I/O PROCESS command

The OUTBOUND I/O PROCESS command (table 1) establishes a task that transfers data from the initiator to the target.

Table 1 - OUTBOUND I/O PROCESS command

Byte	Description
0	Operation Code
1	Control Field
2	Reserved
3	Reserved
4	I/O process data origin address (msb)
5	I/O process data origin address
6	I/O process data origin address
7	I/O process data origin address (lsb)
8	I/O process data receive address (msb)
9	I/O process data receive address
10	I/O process data receive address
11	I/O process data receive address (lsb)
12	I/O process transfer length (msb)
13	I/O process transfer length
14	I/O process transfer length
15	I/O process transfer length (lsb)

The operation code for the OUTBOUND I/O PROCESS command is xxh.

The I/O process data origin address is the address of the data in host to be transferred.

The I/O process data receive address is the address where the data is to be written in the target.

The I/O process transfer length is the length in bytes of the data to be transferred.

2. INBOUND I/O PROCESS command

The INBOUND I/O PROCESS command (table 2) establishes a task that transfers data from the target to the initiator.

Table 2 - INBOUND I/O PROCESS command

Byte	Description
0	Operation Code
1	Control Field
2	Reserved
3	Reserved
4	I/O process data origin address (msb)
5	I/O process data origin address
6	I/O process data origin address
7	I/O process data origin address (lsb)
8	I/O process data receive address (msb)
9	I/O process data receive address
10	I/O process data receive address
11	I/O process data receive address (lsb)
12	I/O process transfer length (msb)
13	I/O process transfer length
14	I/O process transfer length
15	I/O process transfer length (lsb)

The operation code for the INBOUND I/O PROCESS command is xxh.

The I/O process data origin address is the address of the data in host to be transferred.

The I/O process data receive address is the address where the data is to be written in the target.

The I/O process transfer length is the length in bytes of the data to be transferred.

3. STREAM CONTROL command

The STREAM CONTROL command (table 3) establishes parameters that control the isochronous data transfer.

Table 3 - STREAM CONTROL command

Byte	Description
0	Operation Code
1	Control Field
2	Reserved
3	Reserved
4	Reserved
5	Synch Period
6	Synch period
7	Synch Period
8	Seconds high count (msb)
9	Seconds high count
10	Seconds high count
11	Seconds high count (lsb)
12	Seconds count/cycle count (msb)
13	Seconds count/cycle count (lsb)
14	Channel number
15	Error handling/action/offset

The operation code for the STREAM CONTROL command is xxh.

The STREAM CONTROL command requests the target to change the state (on or off) or characteristics of an isochronous stream.

The contents of the STREAM CONTROL command determines the requested action. The requested action can be effective immediately, on a particular cycle number or on some other stream event, as specified by settings of fields.

When the target is a talker and is told to pause, the target waits for the specified stream event, then transmits zero length isoch data packets. When the target is a listener, a pause instructs the target to temporarily stop recording a stream of isoch data while maintaining context for that data transfer.

The data receive function tells the target to either begin talking or listening, or continue talking or listening at the place where it was paused. The pause function does not affect the state of the stream of data; upon resuming, the target continues where it left off.

The identifier field contains the stream identifier of the isoch stream to which this data receive/stop or pause request applies.

The synch period field determines the periodicity of the synchronization packet. A synchronization packet is one in which the sy field in the isoch packet header is set to 10b. A talker generates this field and the listener examines this field to detect data receive of stream events, stream synchronization packets and end of stream events. If a listener detects an undefined value in this field, the listener raises an error condition.

The seconds high count is a 25-bit field which is valid only if the stream event field contains a value of either cycle number or data receive of stream after cycle number. When valid, the seconds high count field contains a value to be compared against the seconds high count field of the Bus_Time register. A cycle number match has occurred on the isochronous cycle on which these two fields are equal, and the values in the seconds Count/cycle Count fields are equal to the seconds count and cycle count fields of the cycle data receive packet.

The channel number field is only used for the data receive action. This field contains the 8-bit number of the isoch channel that the target is to use while sending or receiving isoch data.

The format of the Error Handling/Action/Offset field is diagrammed in the following table and described in table 4.

Table 4 - Error handling/action/offset field format

Bit	Definition
28 to 31	Error reporting
24 to 27	Continue mode
20 to 23	Stream event
16 to 19	Action
0 to 15	Byte offset

The error reporting field determines the error reporting strategy for isoch data transferred on this stream according to the following (these error reporting strategies are defined elsewhere in this document):

- 0 Stop on any error
- 1 Log error and continue
- 2 Ignore all errors
- 3-15 reserved

The continue mode field determines how missing cycles of isoch data are to be treated, assuming the target is programmed to not stop on errors. The value in this field is interpreted as follows:

- 0 Concatenate all data regardless of missing cycles of data
- 1 Skip ahead when there are gaps in the data
- 2 Skip ahead and fill with a fixed data pattern
- 3-15 reserved

The stream event field informs the target that the requested action is to take place on a certain event, according to the following:

- 0 ASAP - i.e., on the next possible isoch cycle
- 1 cycle Number - Perform the requested action on a specific isoch cycle number, or later if the specified cycle has already occurred. The seconds high count, seconds count and cycle count fields specify the isoch cycle on which the action is to take affect.
- 2 data receive of stream - Perform the action on receipt of either a data receive of stream or synchronization packet (for the data receive action) or an end of stream packet (for the stop or pause actions). Note that this stream event only applies when the target is acting as a listener.
- 3 data receive of stream after cycle number - Perform the action on the first synchronization packet following the isoch cycle specified by the values in the seconds high count, seconds count and cycle count fields. If the specified isoch cycle has already occurred, perform the action on the next synchronization packet. Note that this stream event only applies when the target is acting as a listener.

The action field contains a code which informs the target the action that it is to perform, according to the following:

- 0 Stop sending or receiving isoch data and enter the stopped state. If the target is acting as a talker, the target sends an end of stream packet on the isoch cycle on which this action takes affect. The target does not send out zero length isoch packets while in the stopped state.
- 1 Pause sending or receiving isoch data and enter the paused state. If the target is acting as a talker, the target shall continuously send zero length isoch packets while in the paused state. If the target is acting as a talker or a listener, the target shall maintain the state of the isoch data transfer and be able to continue from that point if subsequently told to data receive.

2 Start sending or receiving isoch data using isoch channel number contained in the channel number field.

The byte offset field is only used for the stop and pause actions on the ASAP or isoch cycle number stream event. This field contains the number of bytes that the target is to source or sink on the isoch cycle on which the stop or pause actions take affect.

When the target begins sending isoch data, it sets the sy field in the header of the first isoch packet to 10b (data receive of stream packet). Thereafter, the target sets the sy field to 10b on every <synch period> number of cycles (synchronization packets). On the last packet in an isoch stream, the talker sets the value in the sy field to 01b (end of stream packet). For all other isoch packets not mentioned, the target sets the sy field to 00b.

For example, if the synch period field is set to 2, the target will set the sy field in the header of every other isoch packet to 10b. If the synch period field is set to zero, the target will set the sy field to 00b for all isoch packets except for the data receive of stream and end of stream packets.

The target shall always set the reserved field in the isoch packet header to 00b.

When the target is acting as a listener, if the target receives an isoch packet that has an illegal value in the sy field, or an isoch packet in which the reserved field in the isoch header is not zero, the target shall treat this as an error. Error handling is discussed in a later section of this appendix.