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Subject: UAS Clause 6 (Usage)

1 Related documents

UASr1, USB Attached SCSI revision 1
USB-2, Universal Serial Bus Revision 2.0

2 Introduction

This proposal defines the Usage clause for UAS. The Usage clause describes the communication sequences between the UAS initiator port and the UAS target port.

3 Proposed additions to UAS

The following text adds to clause 3 and replaces clause 6.3 of UAS.

3.6 Sequence figure notation

A Sequence Figure describes sequences of communication between a requestor and a responder. Figure 1 is an example Sequence Figure. Arrows that start at the requestor and end at the responder represent communication from the requestor to the responder. Arrows that start at the responder and end at the requestor represent communication from the responder to the requestor.

Each arrow has a label. The label describes the communication between the requestor and the responder.

The sequence figures start at the top and progress in time toward the bottom.

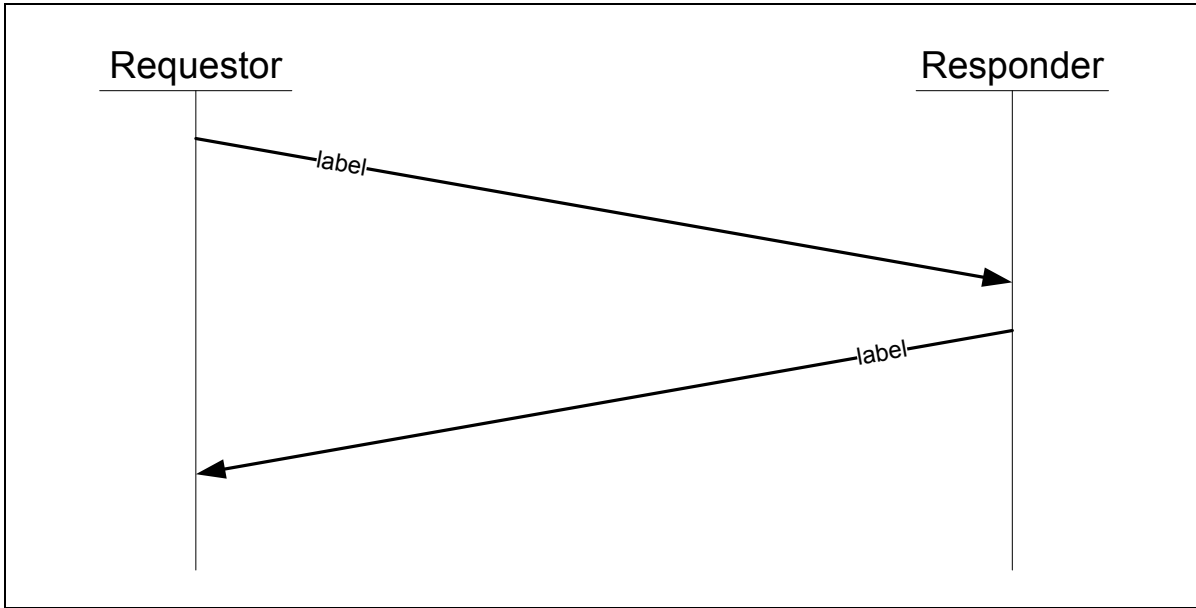


Figure 1 — Sequence figure notation

6.3 Information Unit Sequences

6.3.1 Overview

The Sequence Figures in this subclause describe communication between an UAS initiator port and a UAS target port. Figure 2 is an example UAS Sequence Figure. In figure 2, arrows that start at the UAS initiator port and end at the UAS target port represent communication from the UAS initiator port to the UAS target port and arrows that start at the UAS target port and end at the UAS initiator port represent communication from the UAS target port to the UAS initiator port. Each arrow has up to 3 elements:

- a) pipe name is the name of a USB pipe as described in clause 4xxxx;
- b) IU is an optional parameter which indicates the Information Unit (See 6.2xxx) that is transferred on the pipe; and
- c) TAG_x is an optional parameter that provides information regarding a field in an IU.

Only the command pipe (see xxxx) and the status pipe (see xxxx) use the IU and TAG_x parameters. The data-in (see xxxx) and data-out (see xxxx) transfer data associated with commands.

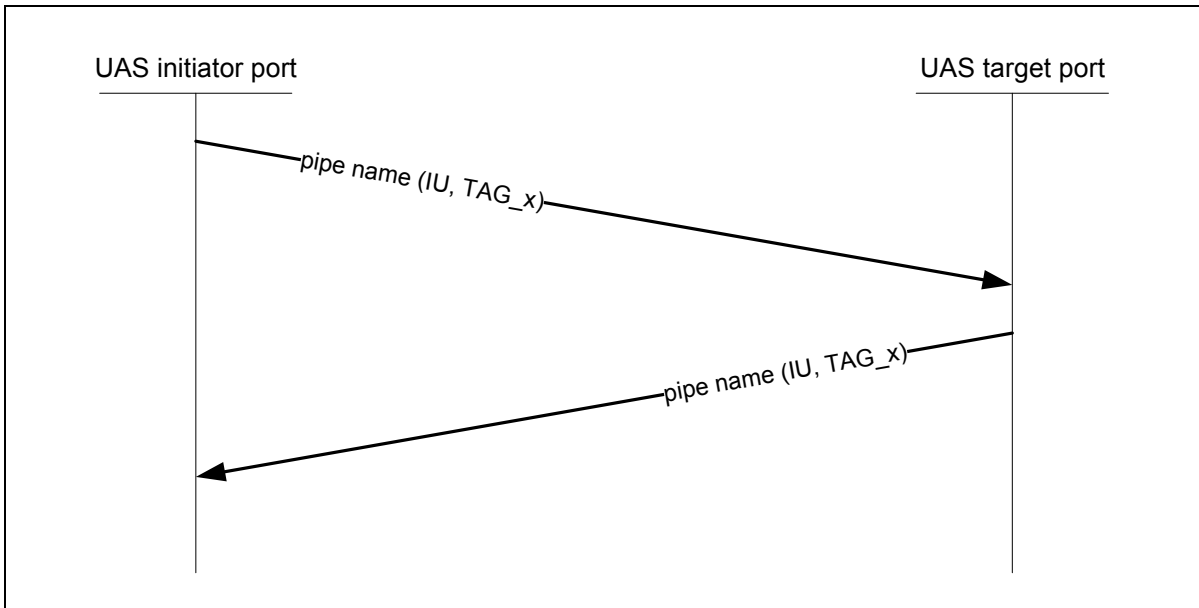


Figure 2 — UAS sequence figure notation

6.3.2 Non-data command sequence

Figure 3 describes the sequence of communication between the UAS initiator port and UAS target port for a command that does not require data transfer.

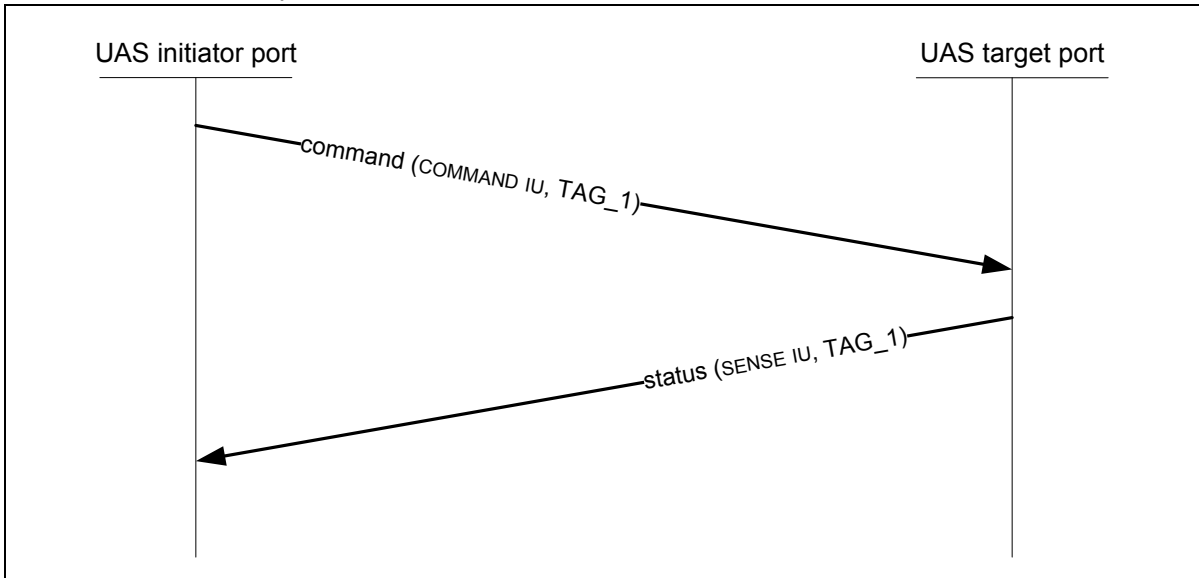


Figure 3 — Non-data Transfer

6.3.3 Data-out command sequence

Figure 4 describes the sequence of communication between the UAS initiator port and UAS target port for a command that requires data transfer from the UAS initiator port to the UAS target port.

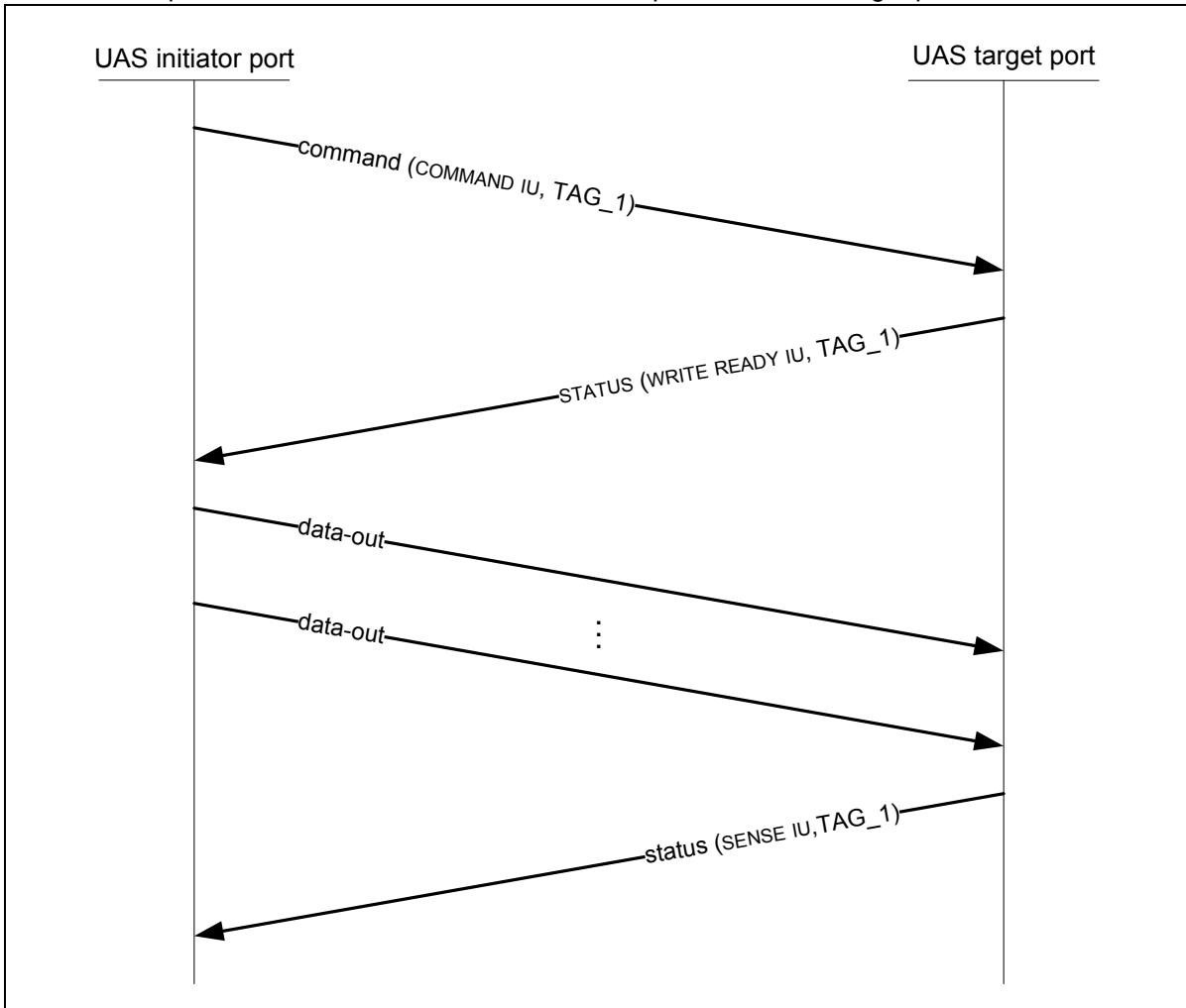


Figure 4 — Write Data Transfer

6.3.4 Data-in command sequence

Figure 5 describes the sequence of communication between the UAS initiator port and UAS target port for a command that requires data transfer from the UAS target port to the UAS initiator port. The UAS target port shall not transmit the SENSE IU before the USB initiator port has acknowledged that all of the data has been transferred (See USB-2).

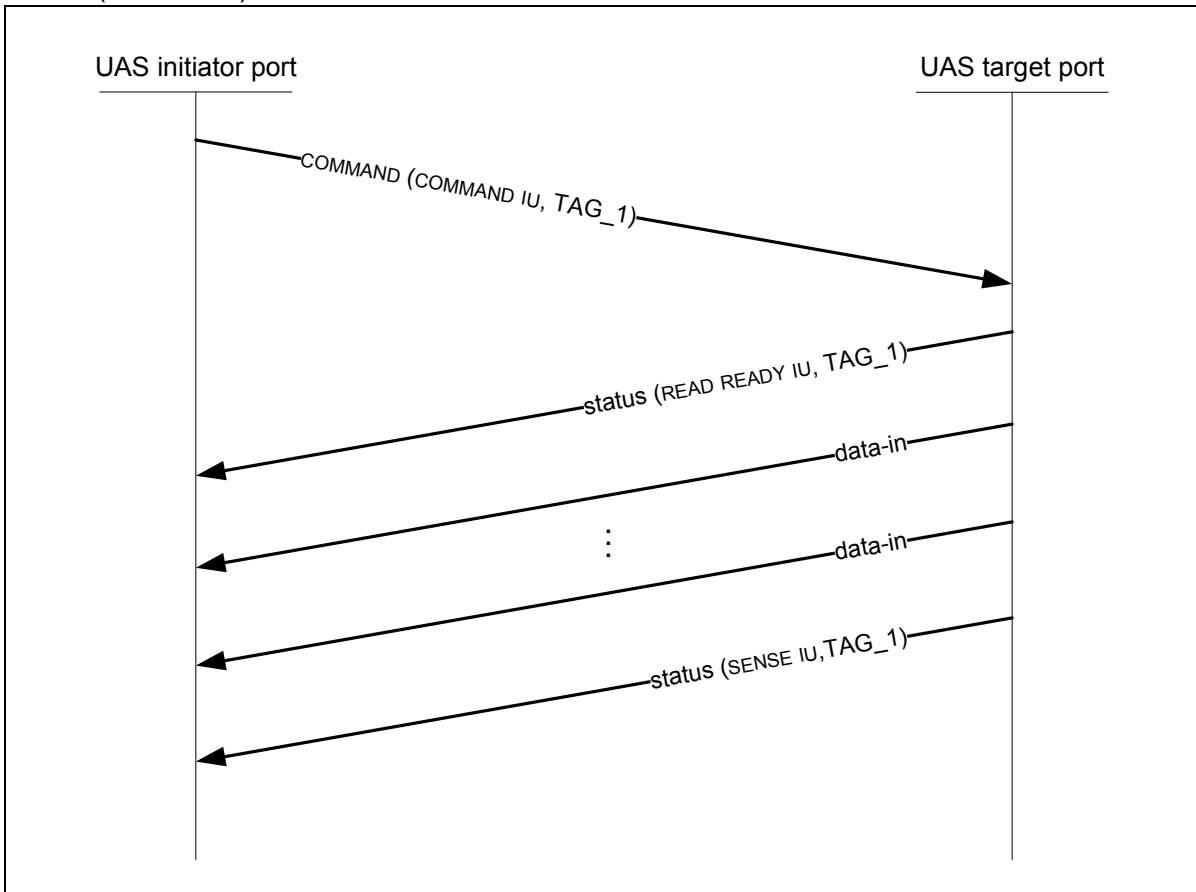


Figure 5 — Read Data Transfer

6.3.5 Task Management command sequence

Figure 6 describes the sequence of communication between the UAS initiator port and UAS target port for a task management command that is received by the UAS target port and then subsequently aborted by the UAS initiator port. In this example, there is no SENSE IU returned by the device because the TASK MANAGEMENT IU, with TAG_1, successfully aborted the outstanding command.

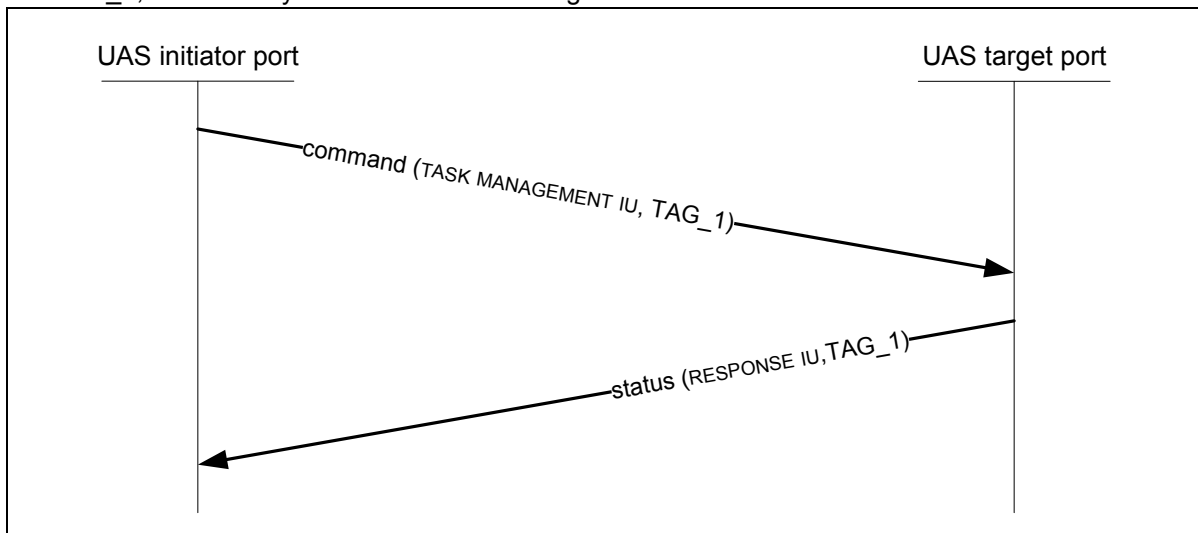


Figure 6 — Task Management

6.3.6 Bi-directional command sequence

Figure 7 describes the sequence of communication between the UAS initiator port and UAS target port for a command that requires data transfer both directions between the UAS target port and the UAS initiator port. Once the READ READY IU and WRITE READY IU are received by the UAS initiator port, both data-in and data-out transfer occur asynchronously. The UAS target port may send the READ READY IU and wait for the data-in transfer to complete and then send the WRITE READY IU and then wait for data-out transfer to complete; or vice versa. Although figure 7 shows that the SENSE IU is transferred when the last data-in transfer has completed, the UAS initiator port may process the SENSE IU before the data-in transfer is complete.

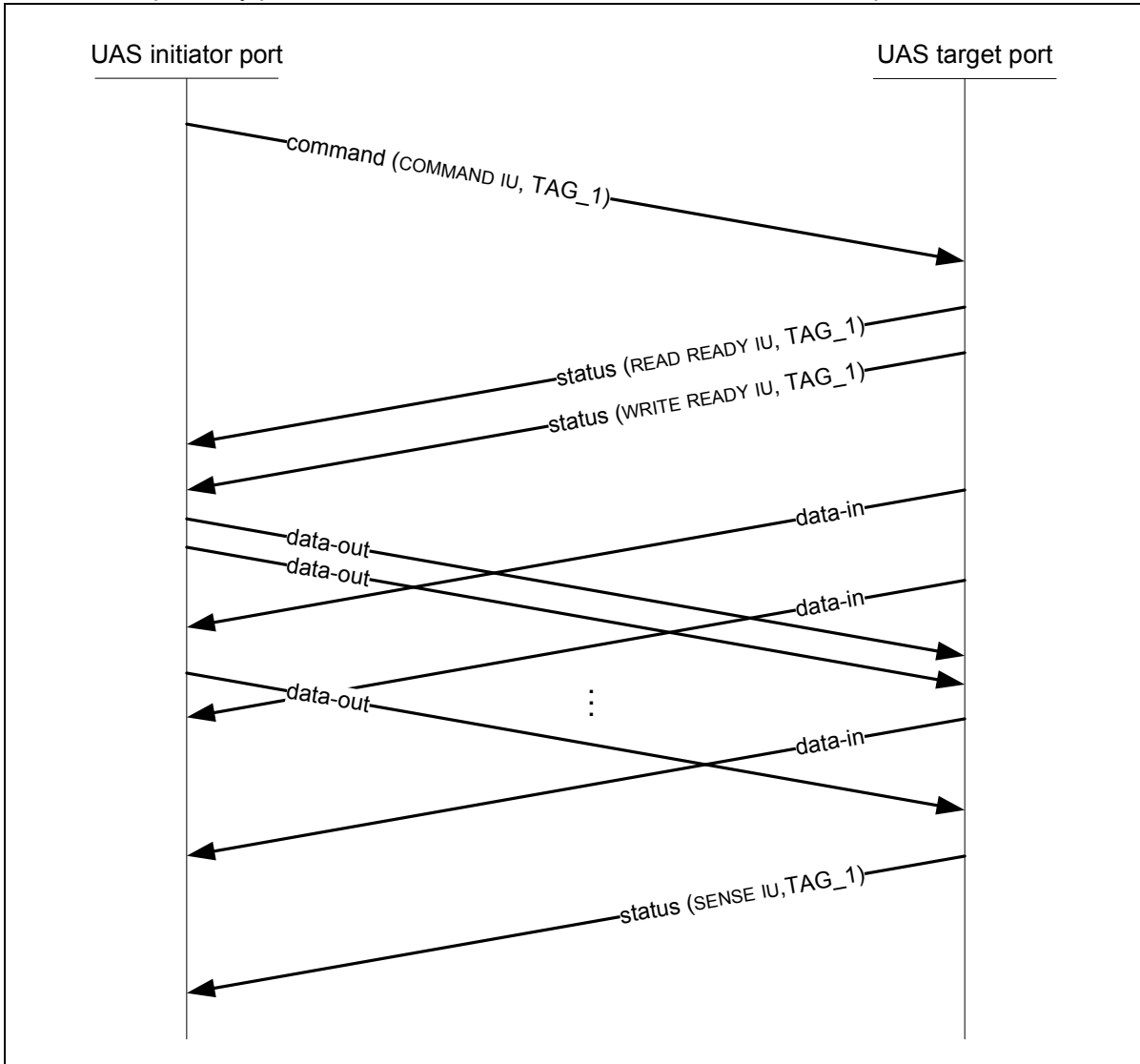


Figure 7 — Bi-directional Data Transfer

NOTE 1 - The order of the data-in and data-out phases of a bidirectional command may be influenced by both the definition of the bidirectional command and the capabilities of the USB target.

6.3.7 Multiple command example

Figure 8 describes the sequence of communication between the UAS initiator port and UAS target port for several commands using the simple queuing model (see SAM-4) as follows:

- 1) the UAS initiator port transfers a read command with an INITIATOR PORT TRANSFER TAG of TAG_1;
- 2) the UAS initiator port transfers a read command with an INITIATOR PORT TRANSFER TAG of TAG_2;
- 3) the UAS initiator port transfers a write command with an INITIATOR PORT TRANSFER TAG of TAG_3
- 4) the UAS initiator port transfers a write command with an INITIATOR PORT TRANSFER TAG of TAG_4;
- 5) the UAS target port requests to transfer the read data for INITIATOR PORT TRANSFER TAG of TAG_2;
- 6) the UAS target port requests to transfer the write data for INITIATOR PORT TRANSFER TAG of TAG_4;
- 7) data transfer begins for both TAG_2 and TAG_4
- 8) the UAS initiator port transfers a task management request (using the INITIATOR PORT TRANSFER TAG of TAG_5) to abort the command with INITIATOR PORT TRANSFER TAG of TAG_3;
- 9) the UAS target port reports that the command with INITIATOR PORT TRANSFER TAG TAG_3 was successfully aborted;
- 10) the UAS initiator port transfers a write command with an INITIATOR PORT TRANSFER TAG of TAG_5;
- 11) the UAS target port reports command completion for INITIATOR PORT TRANSFER TAG TAG_2;
- 12) the UAS target port requests to transfer the read data for INITIATOR PORT TRANSFER TAG of TAG_1;
- 13) the UAS target port begins transferring data for INITIATOR PORT TRANSFER TAG TAG_1;
- 14) the UAS target port reports command completion for INITIATOR PORT TRANSFER TAG TAG_4;
- 15) the UAS initiator port transfers a write command with an INITIATOR PORT TRANSFER TAG of TAG_6;
- 16) the UAS target port requests the write data for INITIATOR PORT TRANSFER TAG of TAG_6;
- 17) the UAS initiator port begins transferring data for INITIATOR PORT TRANSFER TAG TAG_6;
- 18) the UAS initiator port transfers a command which does not require data transfer with an INITIATOR PORT TRANSFER TAG of TAG_3;
- 19) the UAS target port reports command completion for INITIATOR PORT TRANSFER TAG TAG_3;
- 20) the UAS target port reports command completion for INITIATOR PORT TRANSFER TAG TAG_6;
- 21) the UAS target port reports command completion for INITIATOR PORT TRANSFER TAG TAG_1;
- 22) the UAS target port requests the write data for INITIATOR PORT TRANSFER TAG of TAG_5;
- 23) the UAS initiator port begins transferring data for INITIATOR PORT TRANSFER TAG TAG_5;
- 24) the UAS target port reports command completion for INITIATOR PORT TRANSFER TAG TAG_5; and
- 25) the UAS target port is idle.

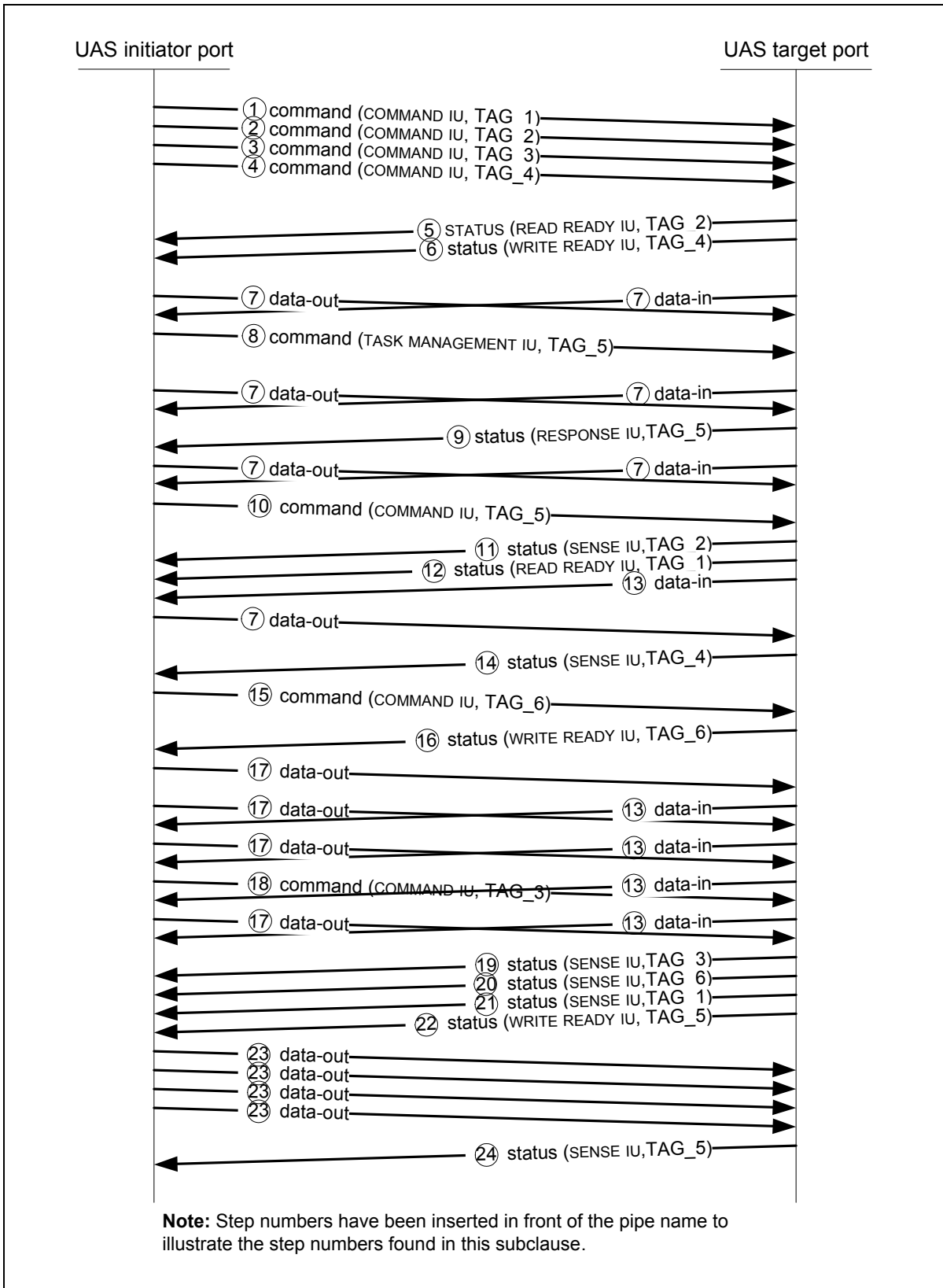


Figure 8 — Multiple Command Example