

**Ladder Diagrams for Error  
Recovery For FCP -2 Rev 04  
Out-Of-Order Delivery- Annex D**

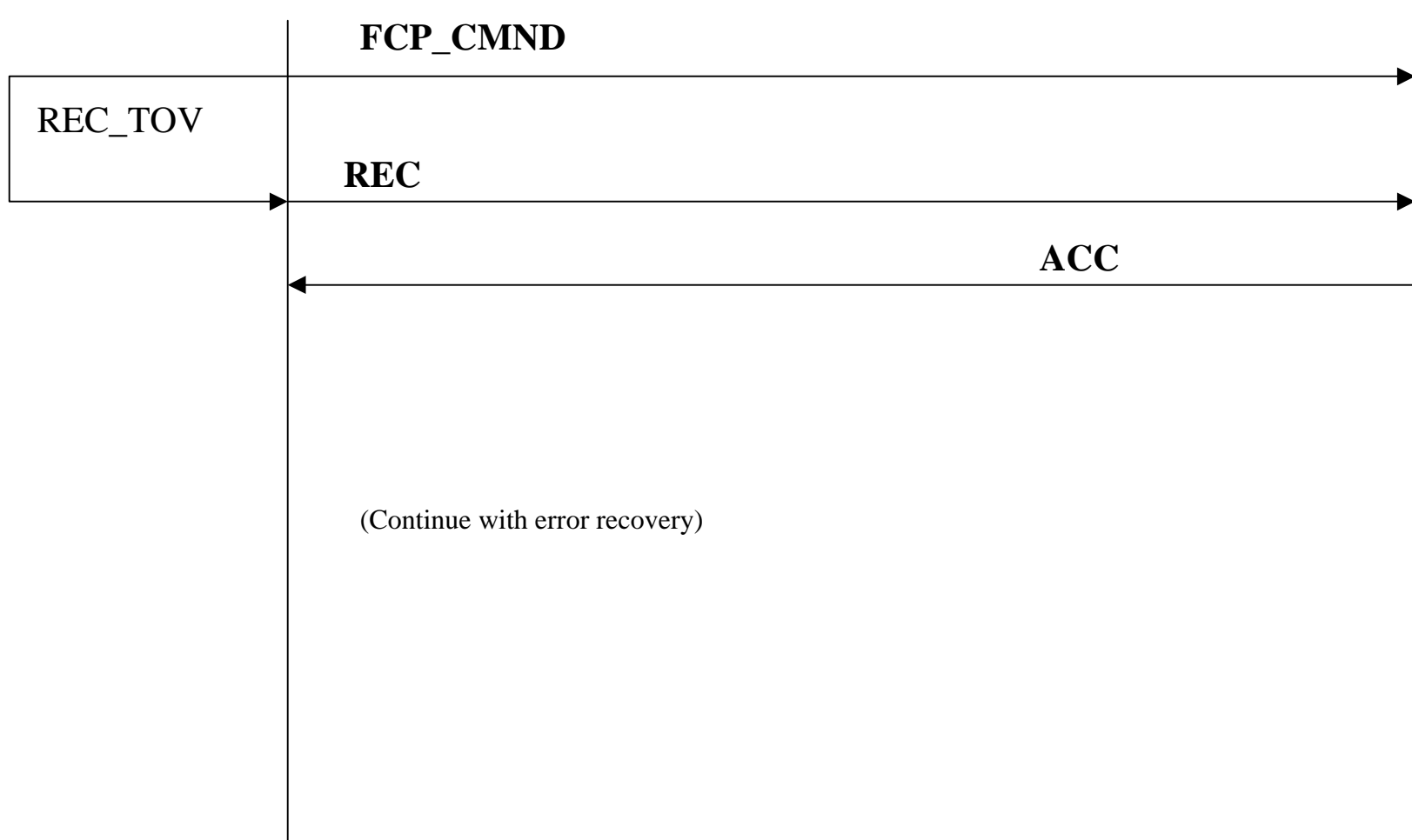
**Carl Zeitler**

**Compaq Computer Corporation**

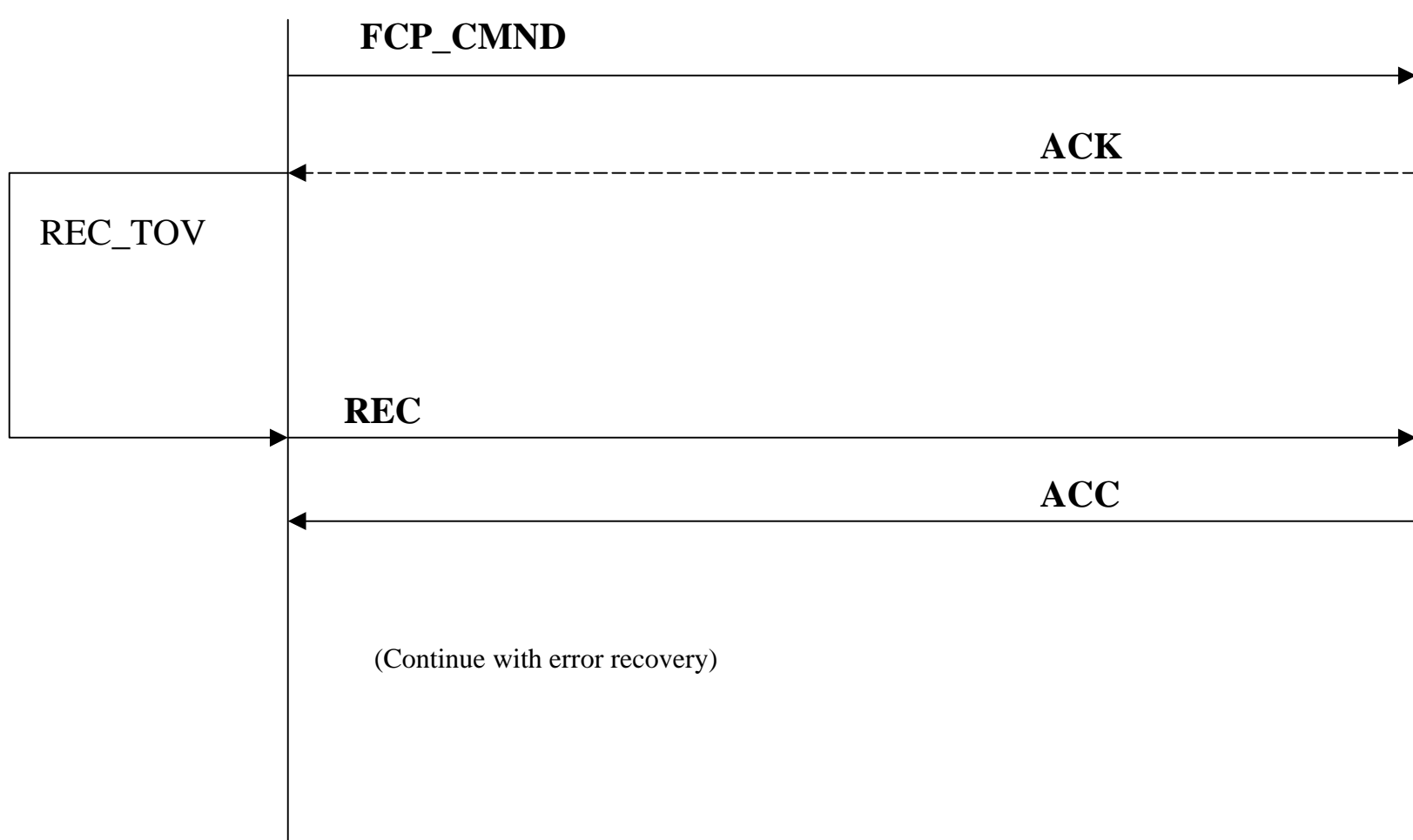
**January 28, 2000**

**T10/00-137**

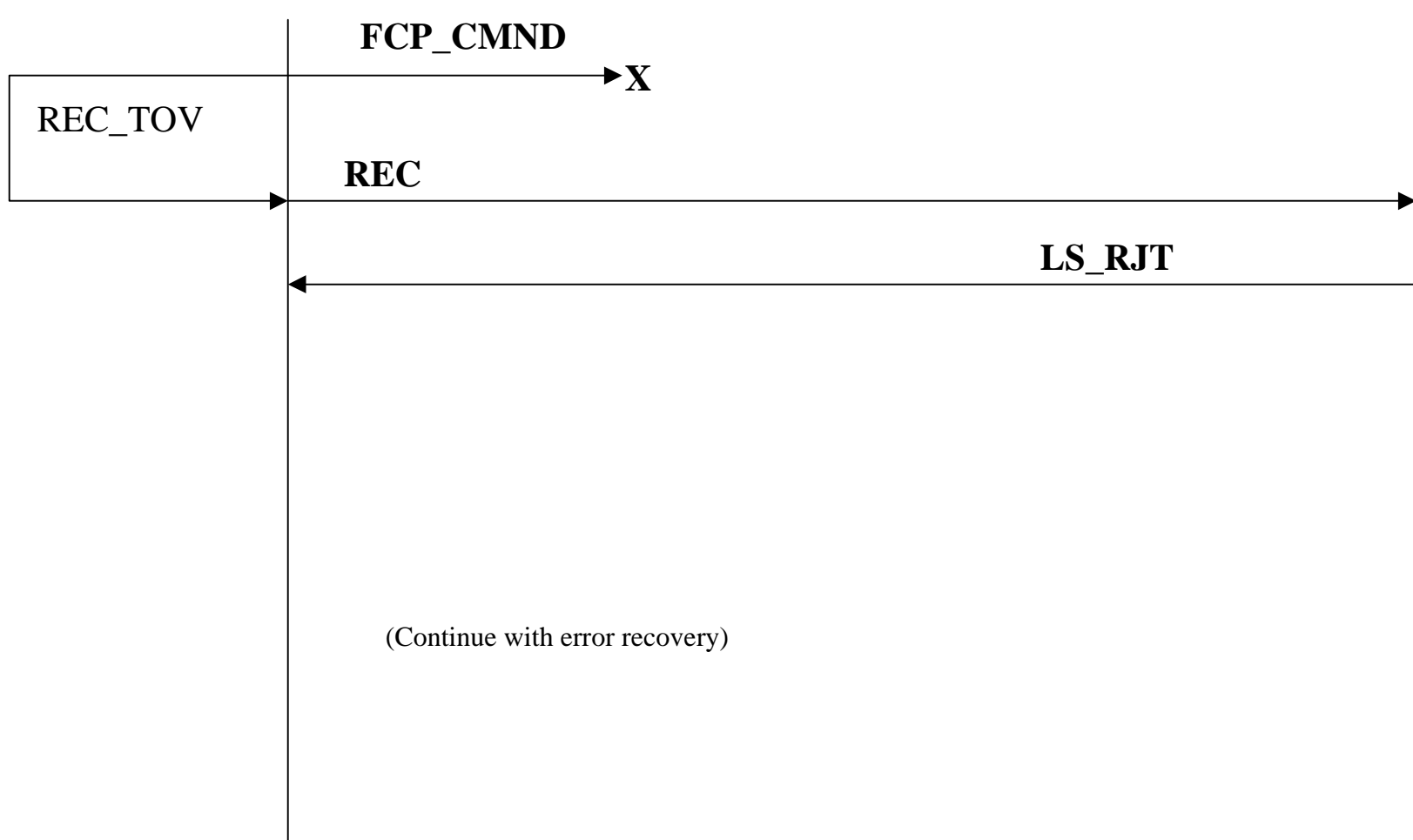
# D.1 Class 3 Error Detection



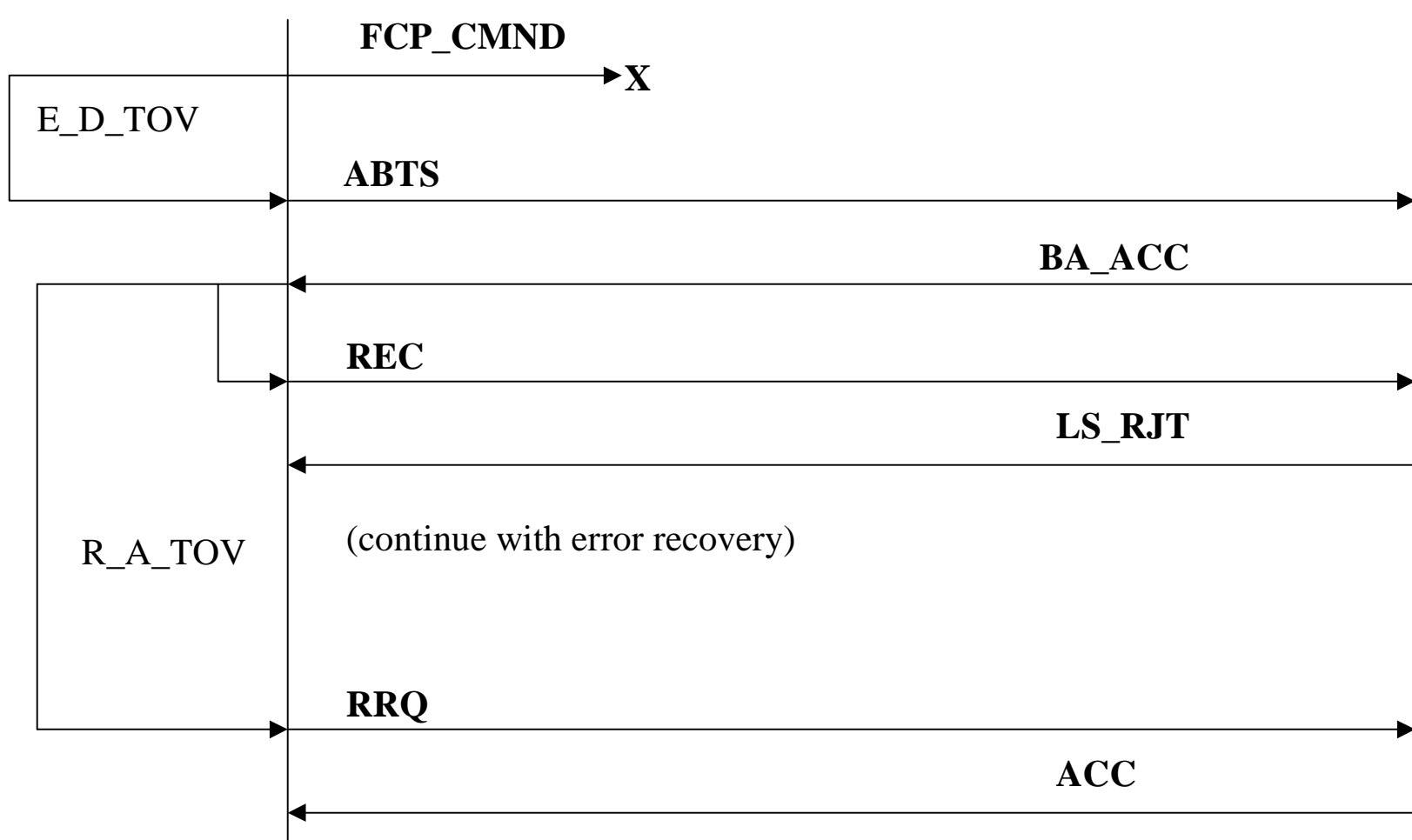
# D.1 Class 2 Error Detection



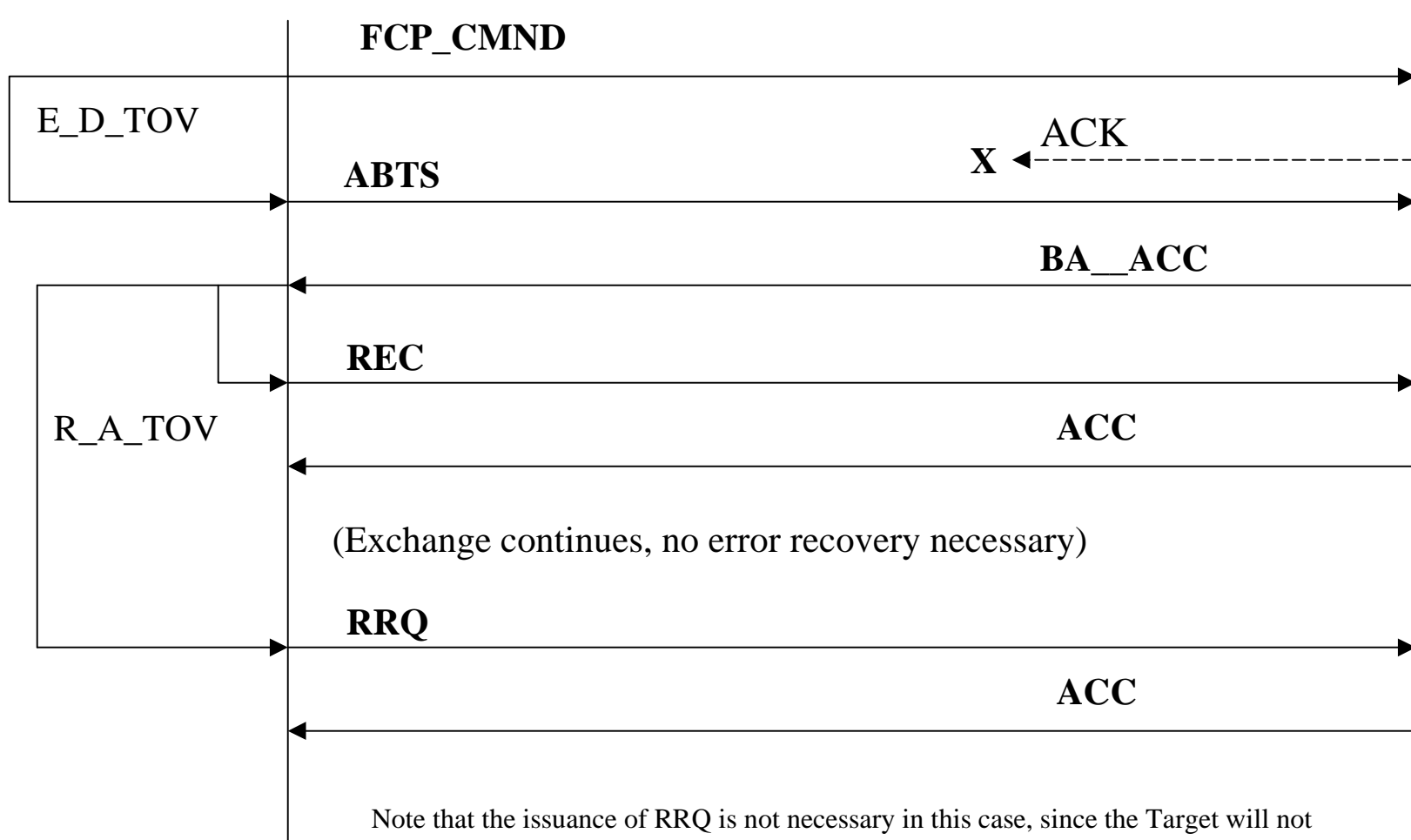
# D.2 Class 3 FCP\_CMD Lost



# D.2 Class 2 FCP\_CMD Lost

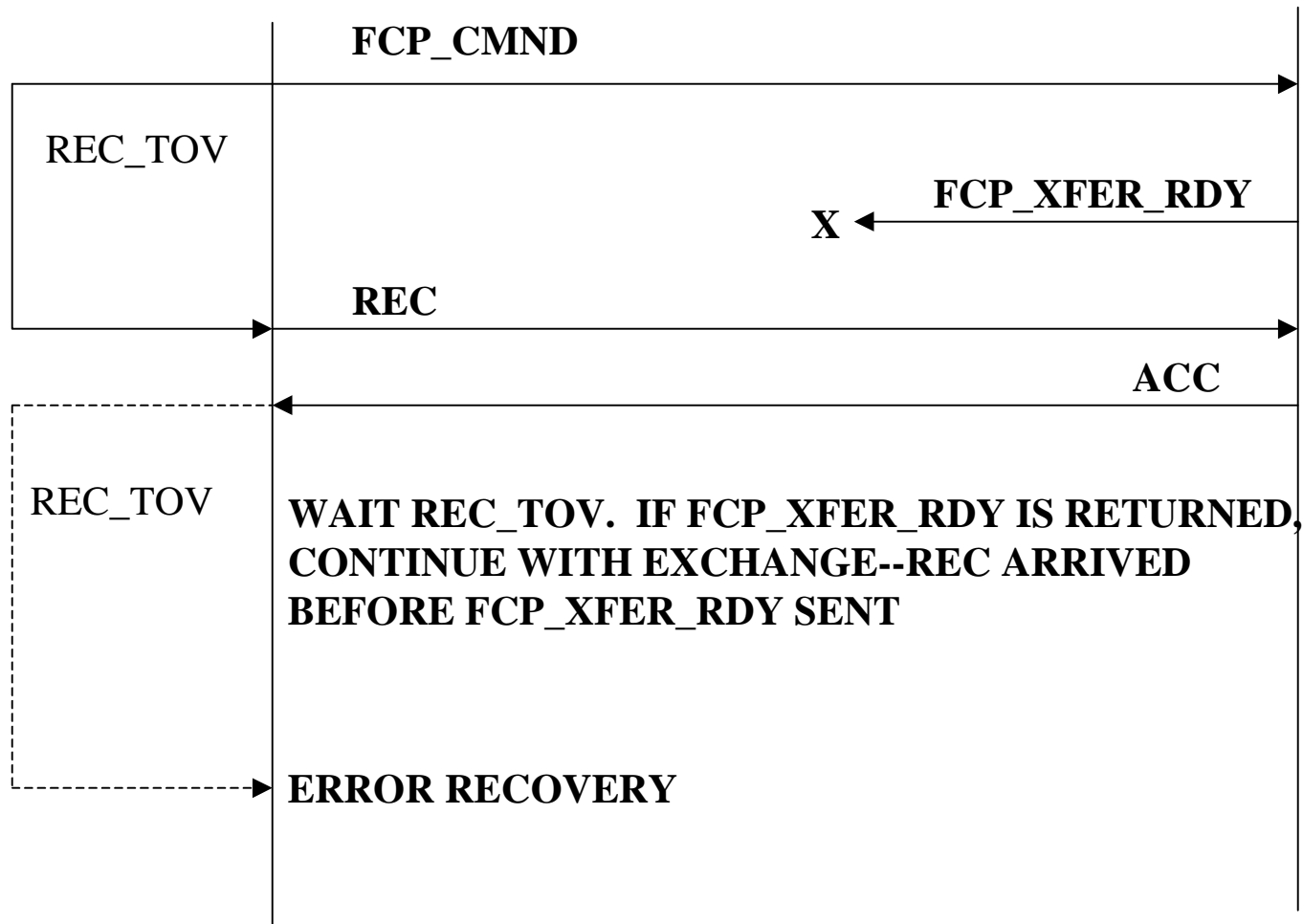


# D.2.1 Class 2 Lost ACK on FCP\_CMND

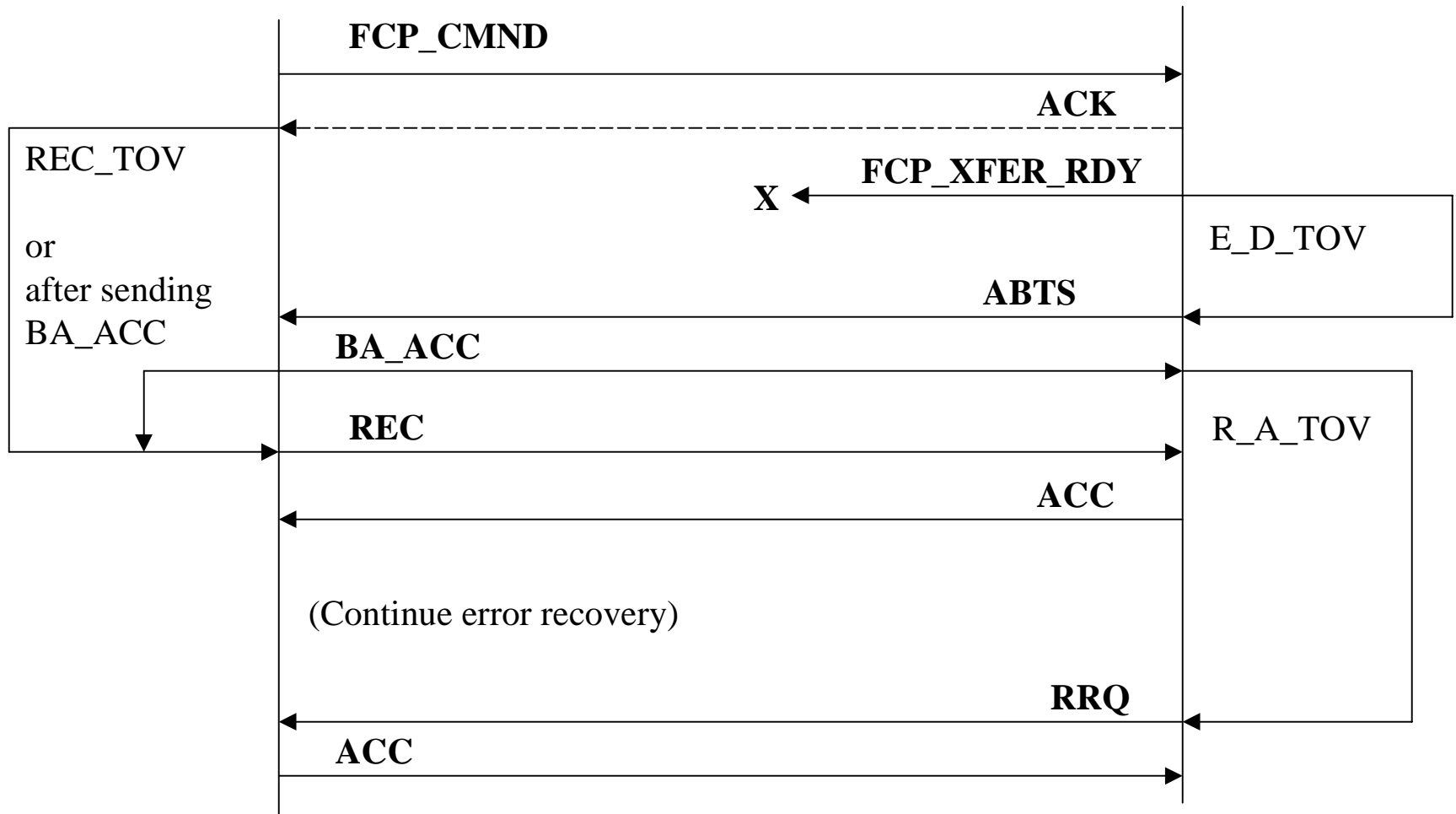


Note that the issuance of RRQ is not necessary in this case, since the Target will not have established a Recovery Qualifier. However, the Initiator cannot reclaim the resources associated with its Recovery Qualifier until the ACK is received (out of order) or the R\_A\_TOV time-out expires.

# D.3 Class 3 FCP\_XFER\_RDY Lost



# D.3 Class 2 FCP\_XFER\_RDY Lost

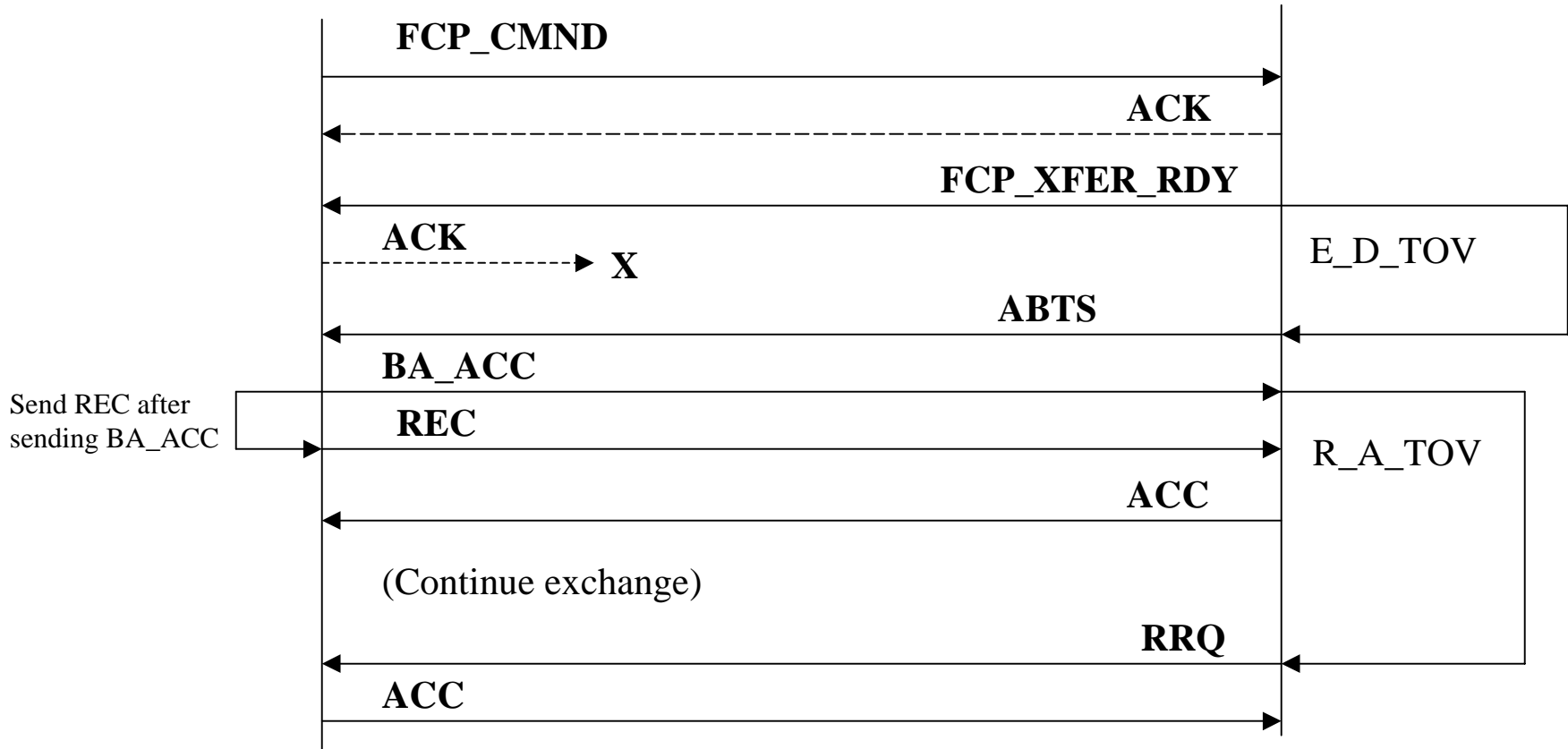


## Error Recovery Addition

A new SEQ\_ID must be used in the retransmission of FCP\_XFER\_RDY. For Class 2, the SEQ\_CNT value used must be one greater than the value used in the ABTS frame.



# D.4 Class 2 FCP\_XFER\_RDY Rcvd, ACK Lost



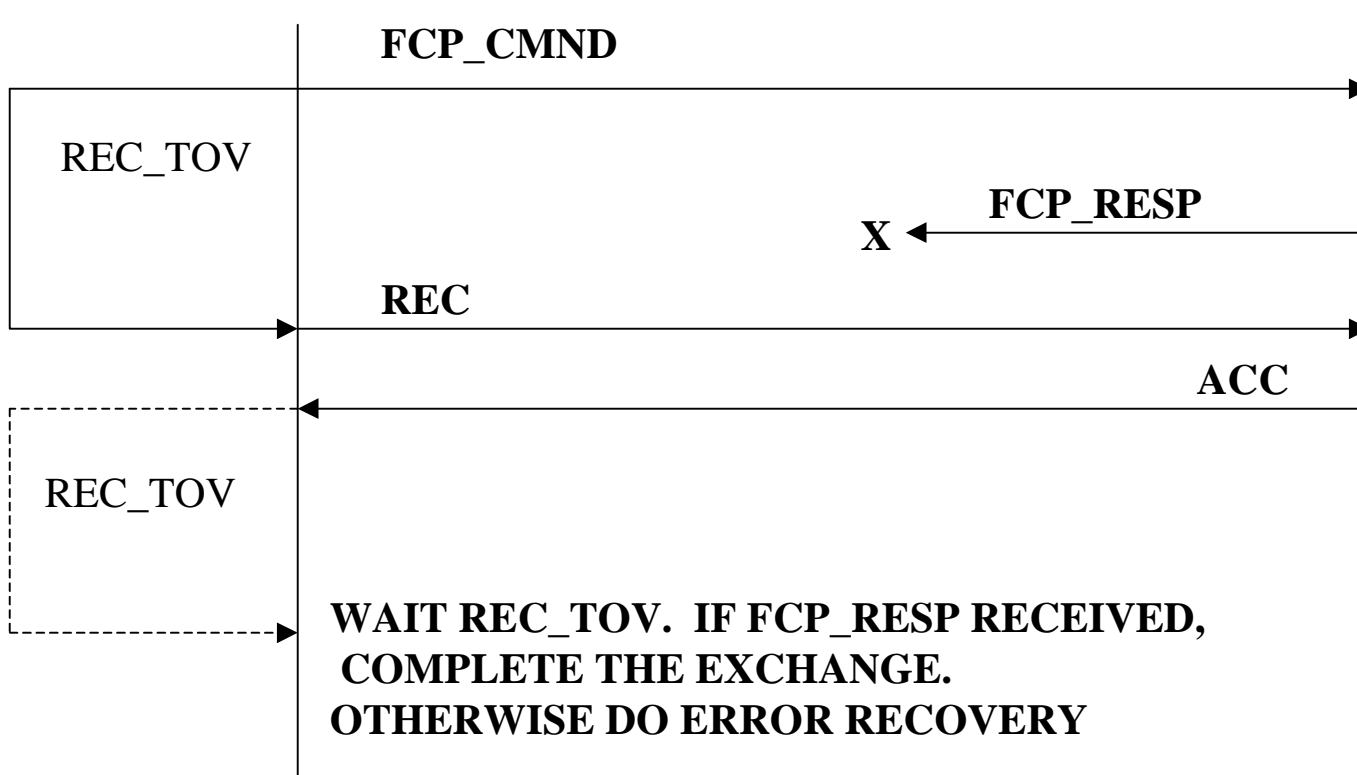
## Error Recovery

None:

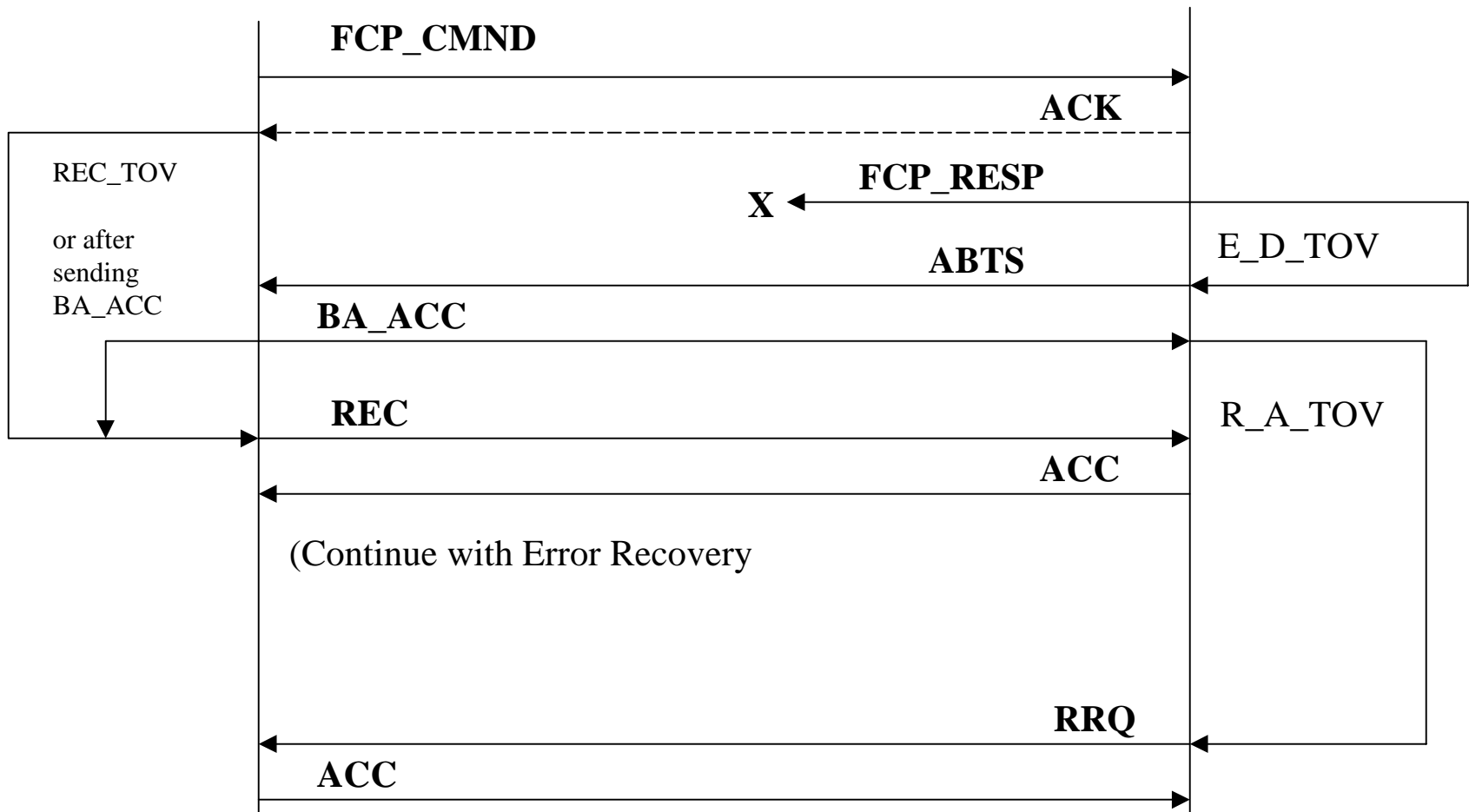
The ACCs returned for the REC indicates that the Initiator holds Sequence Initiative and the Exchange is open. No error recovery is required.

Note: The Target may elect not to issue the RRQ since no Recovery Qualifier was established by the Initiator in this case. It must still let R\_A\_TOV expire before reclaiming the resources associated with its Recovery Qualifier.

# D.5 Class 3 FCP\_RESP Lost, No FCP\_CONF Req.



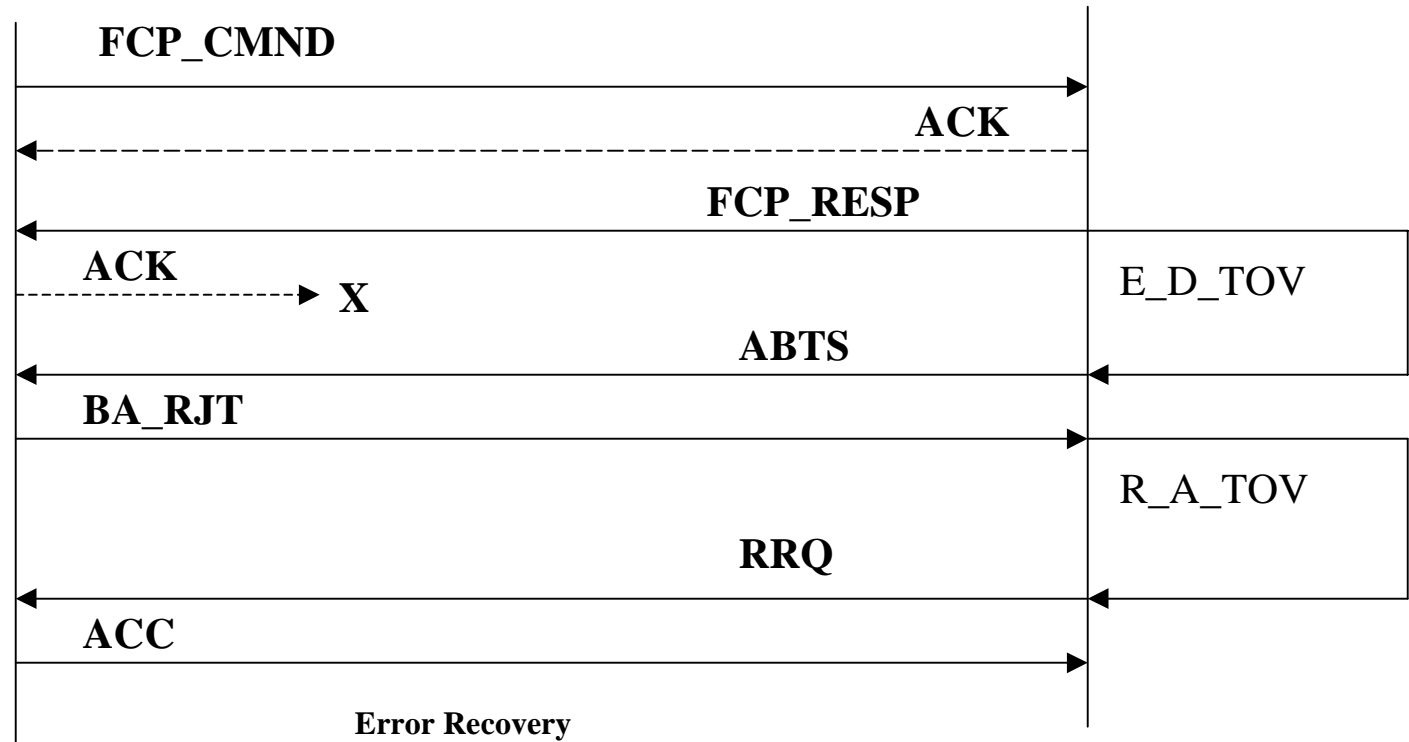
# D.5 Class 2 FCP\_RESP Lost, No FCP\_CONF Req.



## Error Recovery Addition

A new SEQ\_ID must be used in the retransmission of FCP\_RESP. For Class 2, the SEQ\_CNT value used must be one greater than the value used in the ABTS frame.

# D.6 Class 2 FCP\_RESP Rcvd, ACK Lost



None:

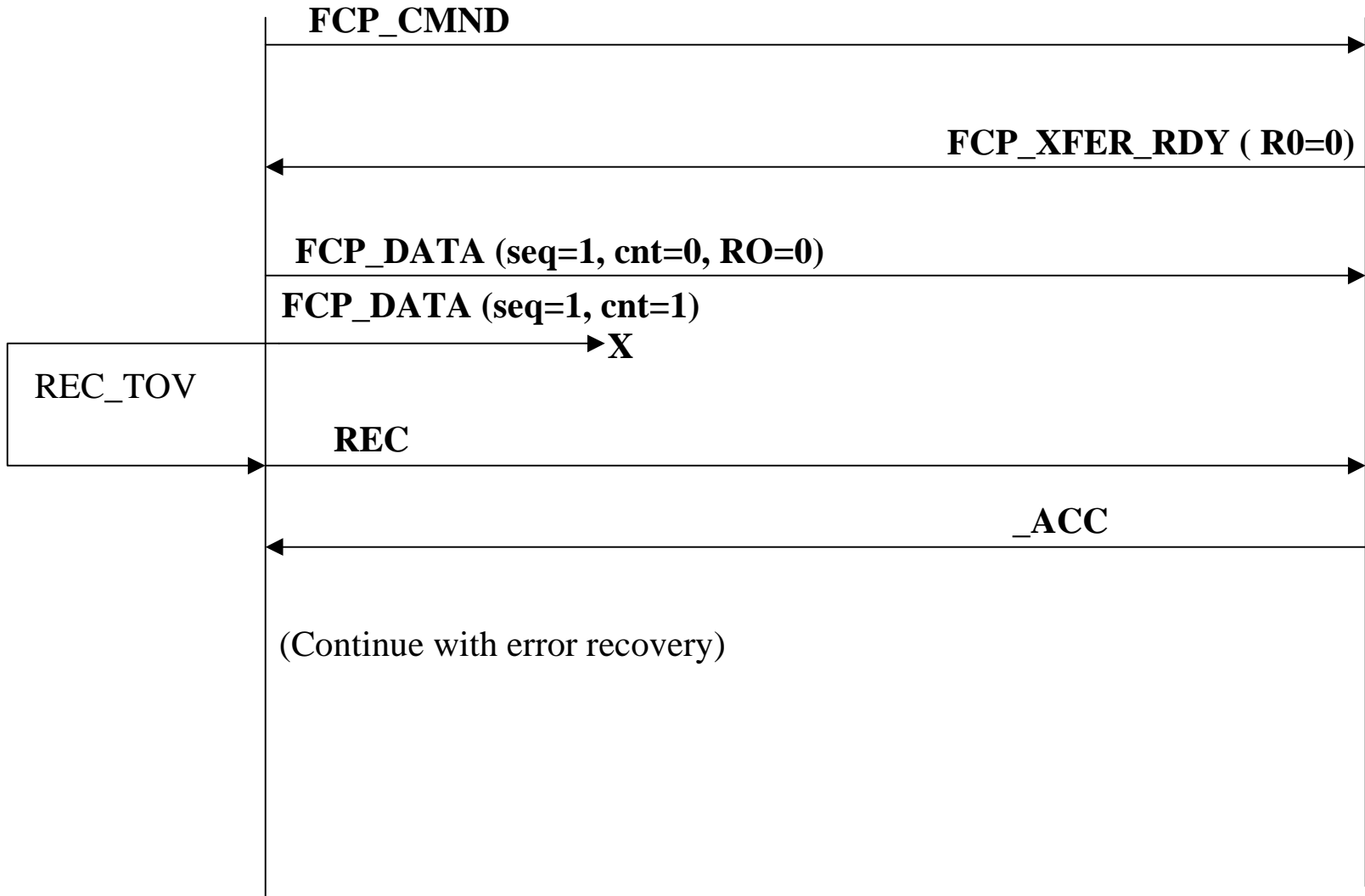
The BA\_RJT for the ABTS indicates the Exchange is unknown and therefore complete.

No error recovery is required.

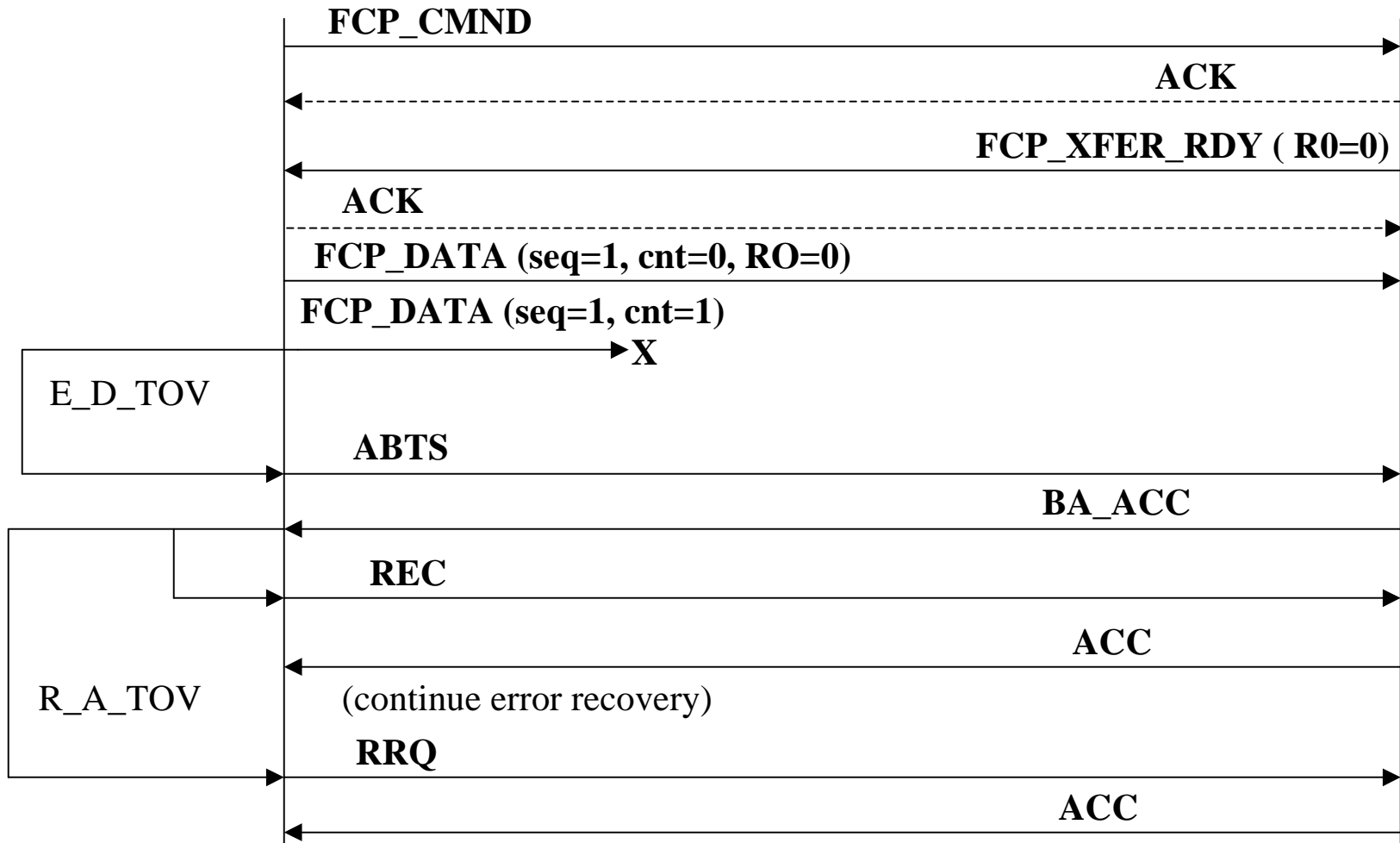
The Target must establish a Recovery Qualifier. The associated resources cannot be reused for a period of R\_A\_TOV or until the ACK to FCP\_RESP is delivered (out of order).

Note: The Target may elect not to issue the RRQ as no Recovery Qualifier was established by the initiator.

# D.7 Class 3 Lost Write Data, Last Frame of Seq.



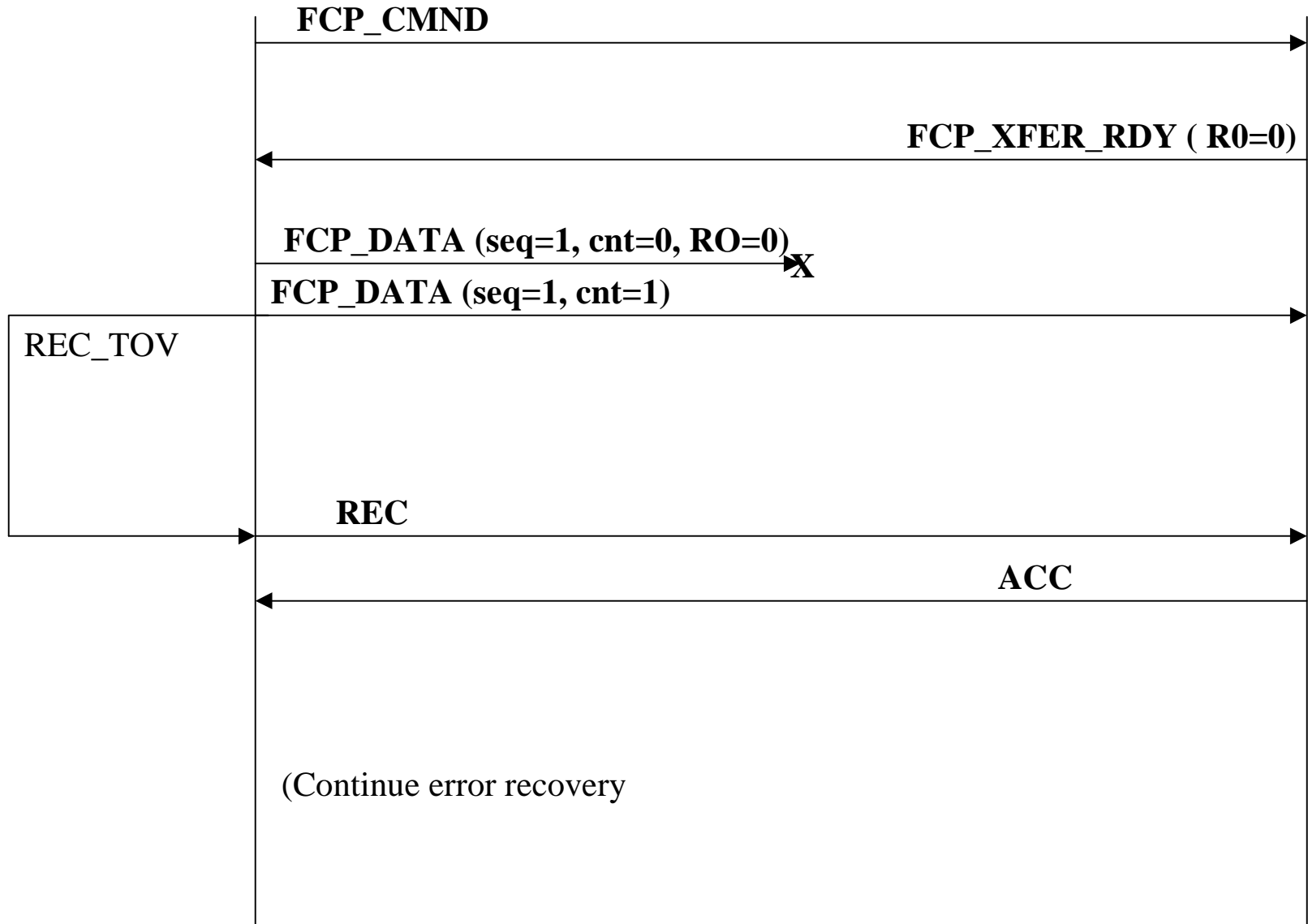
# D.7 Class 2 Lost Write Data, Last Frame of Seq.



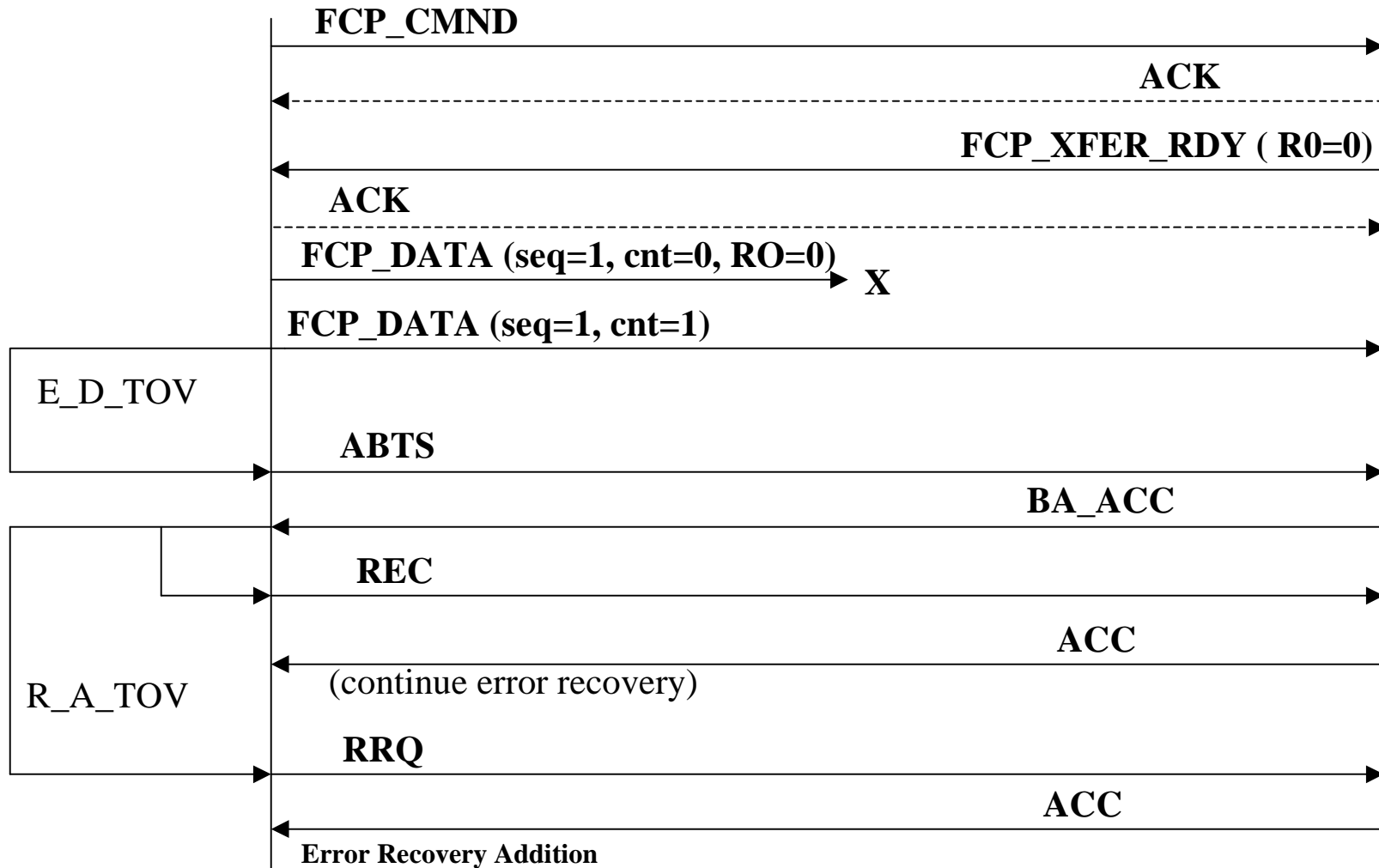
## Error Recovery Addition

New Sequence Ids shall be used for the retransmission of FCP\_XFER\_RDY and FCP\_DATA. For Class 2, the starting Sequence count value used with the retransmission of FCP\_DATA frames shall be one greater than the value used in ABTS.

# D.8 C1 3, Lost Write Data, Not Last Fr. of Seq.



# D.8 Class 2 Lost Write Data, Not Last Frame of Seq.



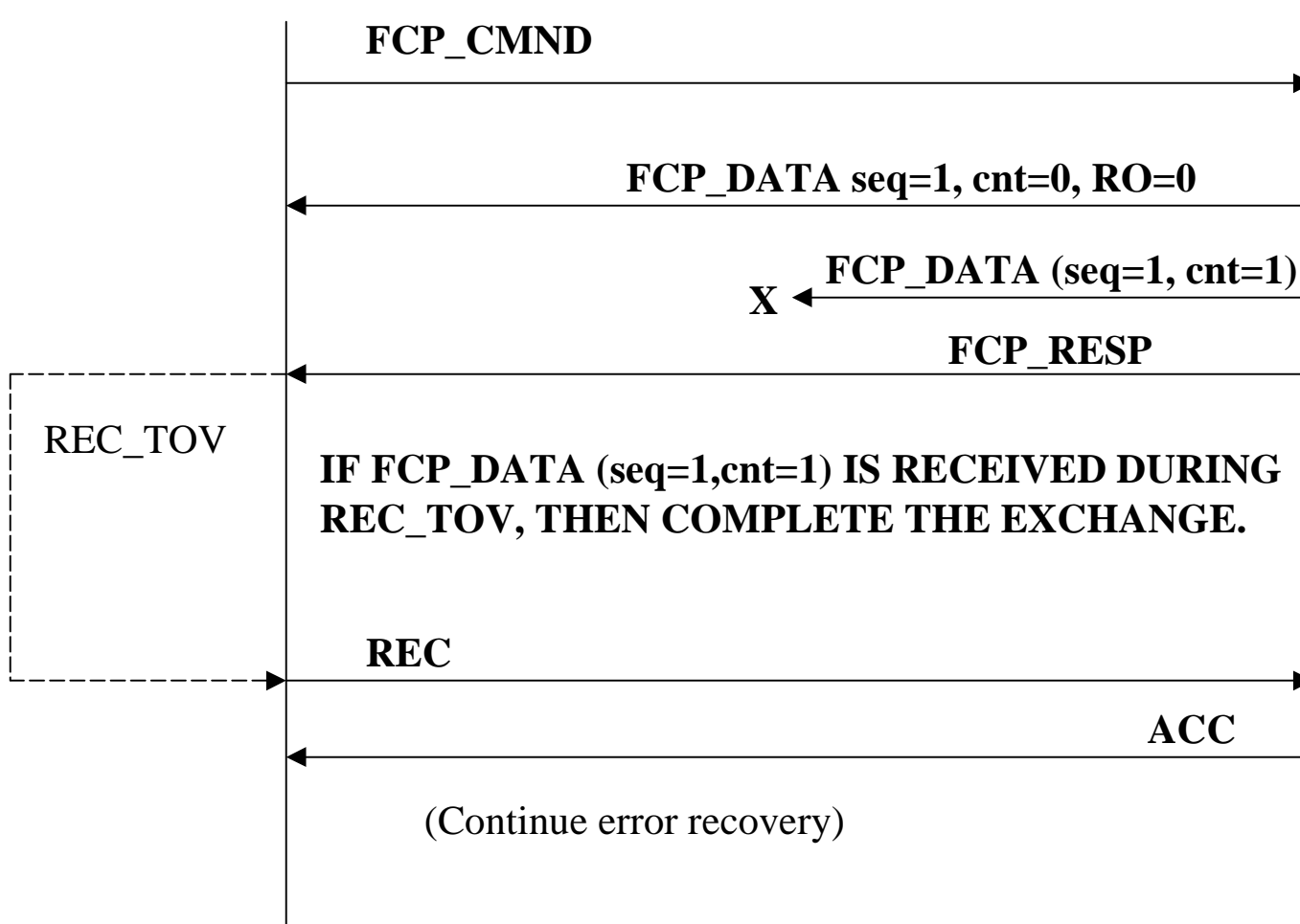
## Error Recovery Addition

New Sequence IDs shall be used for retransmission of FCP\_XFER\_RDY and FCP\_DATA.

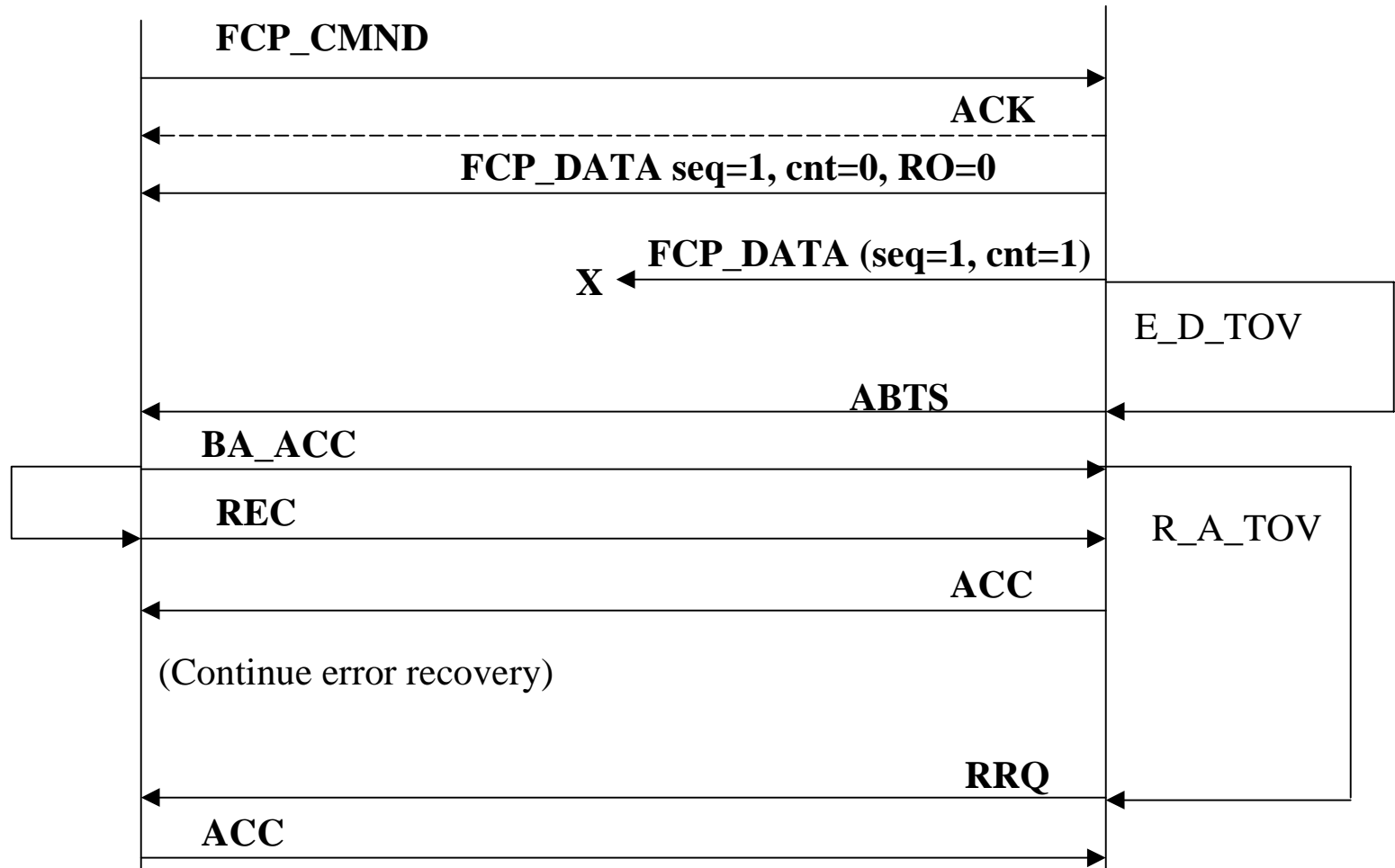
For Class 2, the Sequence count value used with the retransmission of FCP\_DATA shall be one greater than the value used in ABTS.



# D.9 Class 3 Lost Read Data, Last Frame of Seq.



# D.9 Class 2 Lost Read Data, Last Frame of Seq.

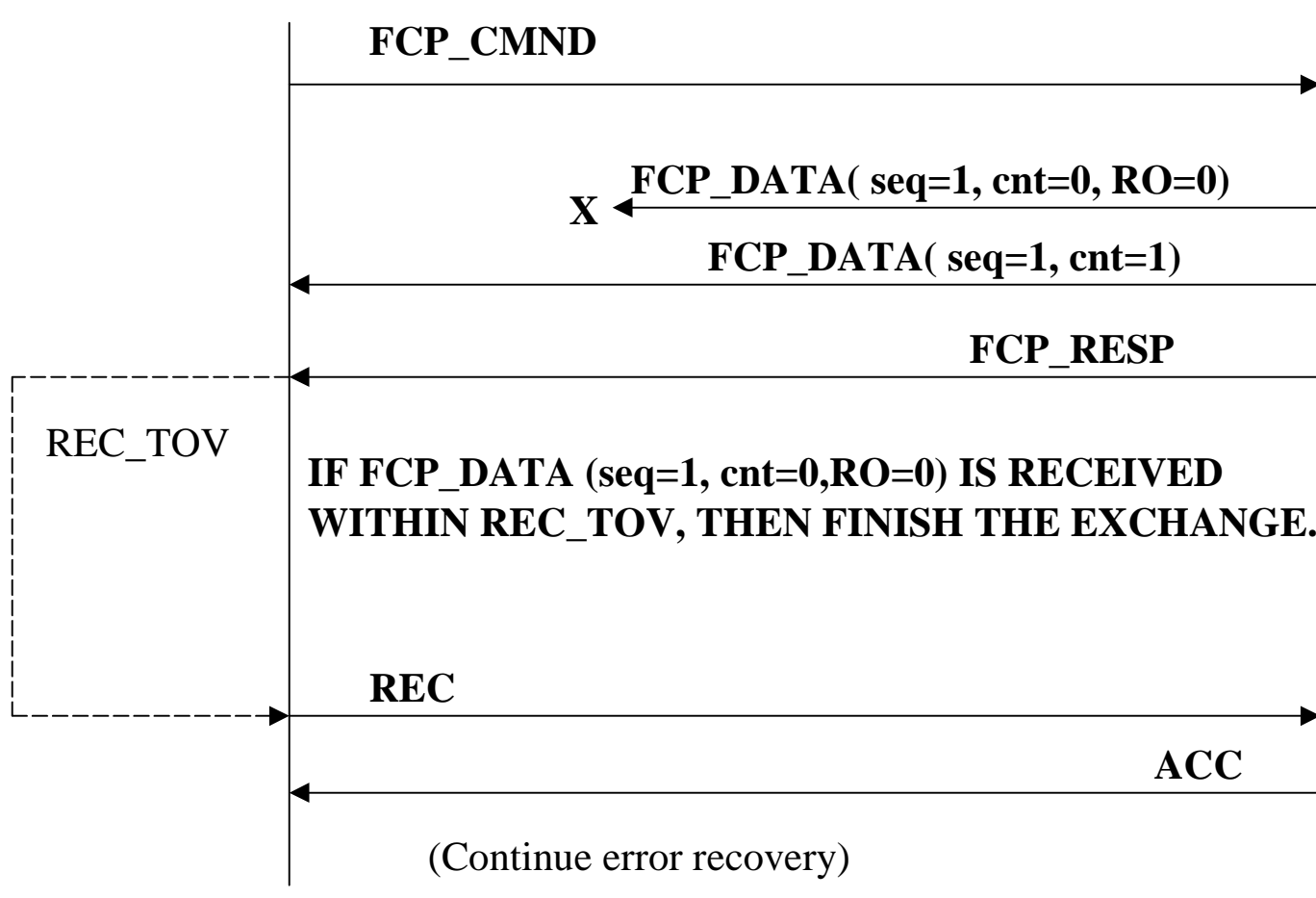


## Error Recovery Addition

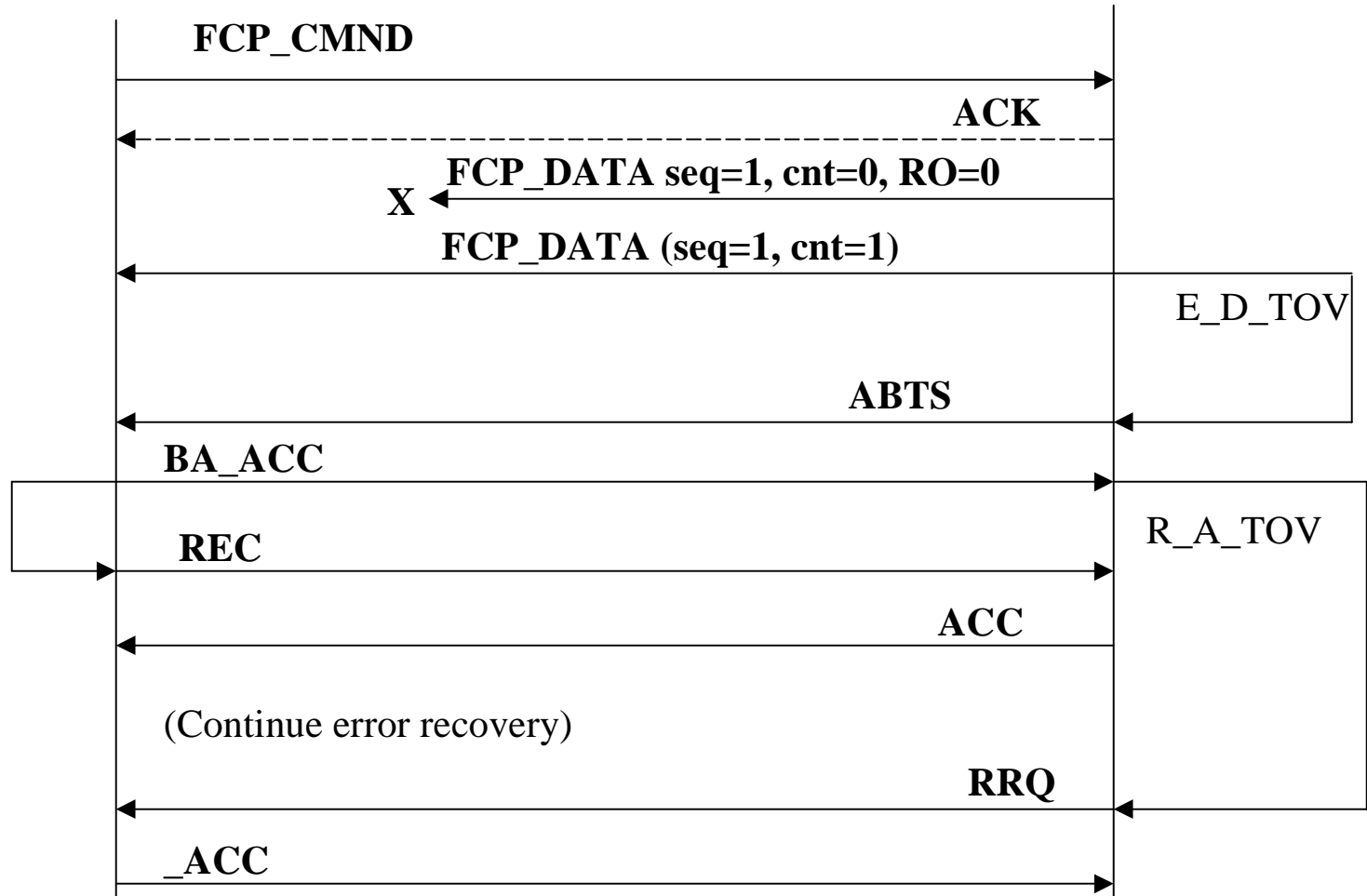
New Sequence IDs shall be used for retransmission of FCP\_XFER\_RDY and FCP\_DATA.

For Class 2, the Sequence count value used with the retransmission of FCP\_DATA shall be one greater than the value used in ABTS.

# D.10 Class 3 Lost Read Data, Not Last Frame of Seq



# D.10 Class 2 Lost Read Data, Not Last Frame of Seq

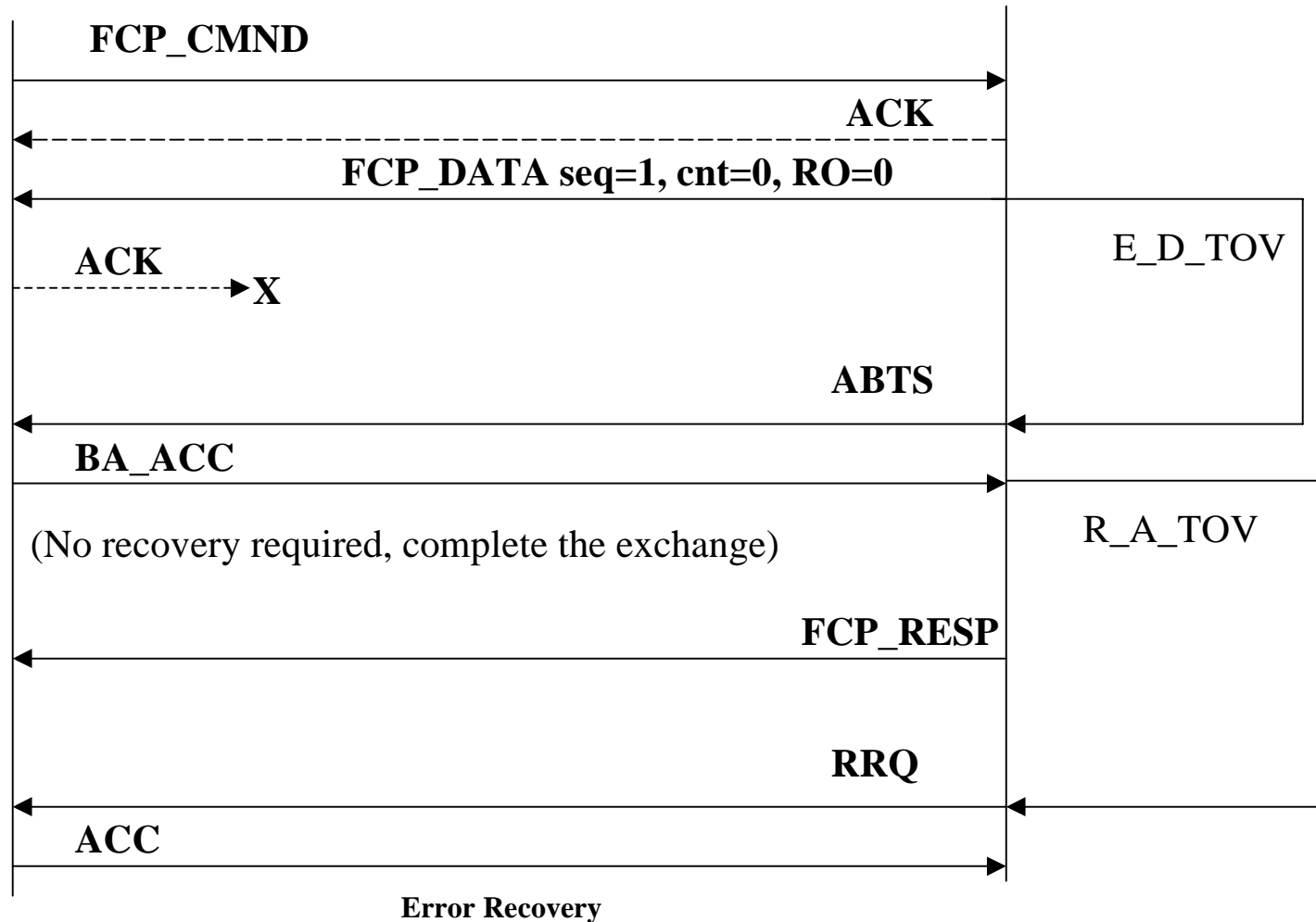


## Error Recovery Addition

New Sequence IDs shall be used for retransmission of FCP\_XFER\_RDY and FCP\_DATA.

For Class 2, the Sequence count value used with the retransmission of FCP\_DATA shall be one greater than the value used in ABTS.

# D.11 Class 2 ACK Lost on Read.



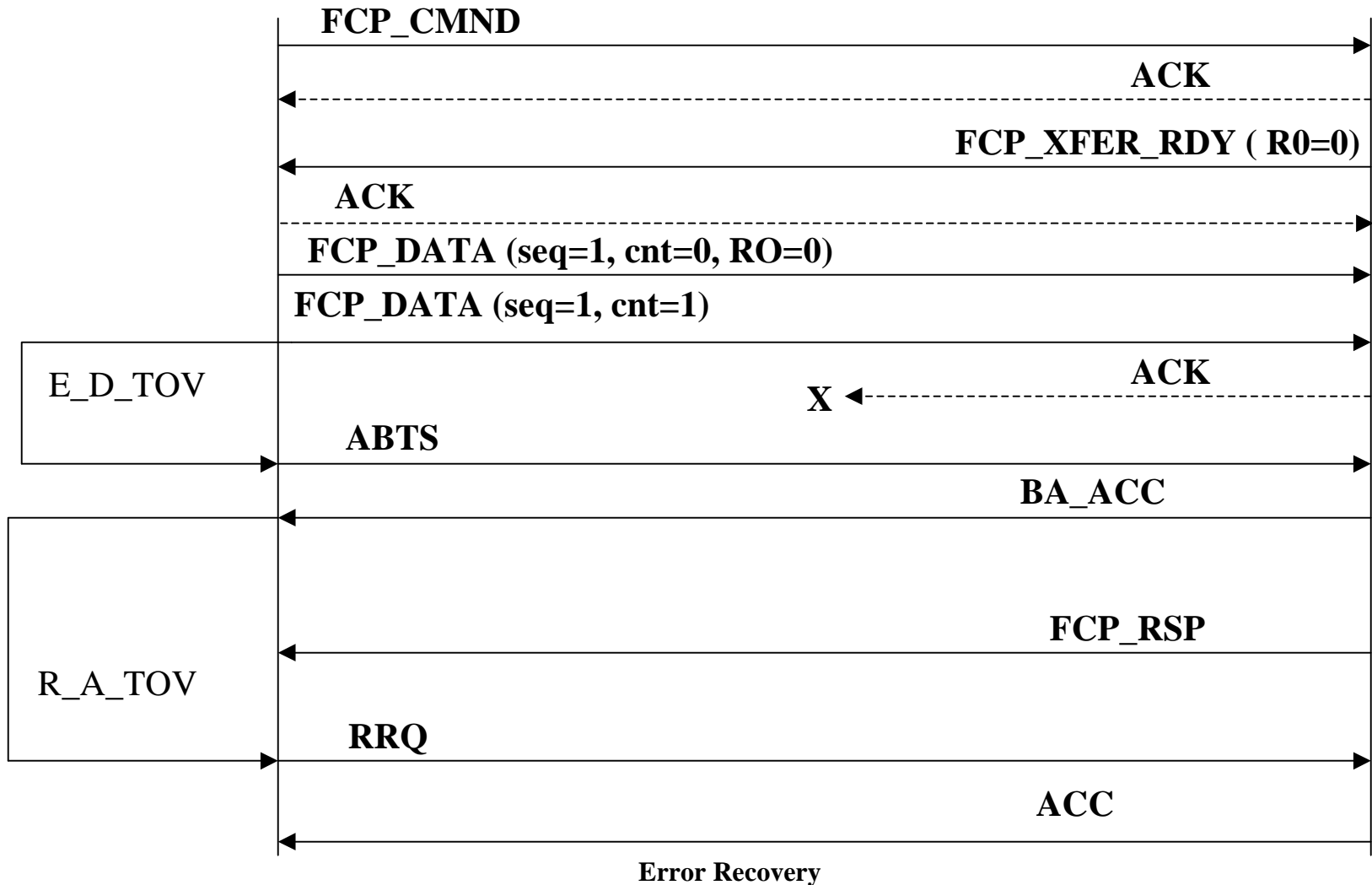
None:

The initiator has received the FCP\_DATA frame or sequence. No error recovery is required.

Note: The BA\_ACC indicates the FCP\_DATA sequence was received, the Target continues the Exchange.

Note: The Target must establish its Recovery Qualifier. The resources associated with the Recovery Qualifier can be reclaimed on receipt of the ACK(out of order) or after R\_A\_TOV. The issuance of RRQ is optional as no Recovery Qualifier was established by the Initiator in this case.

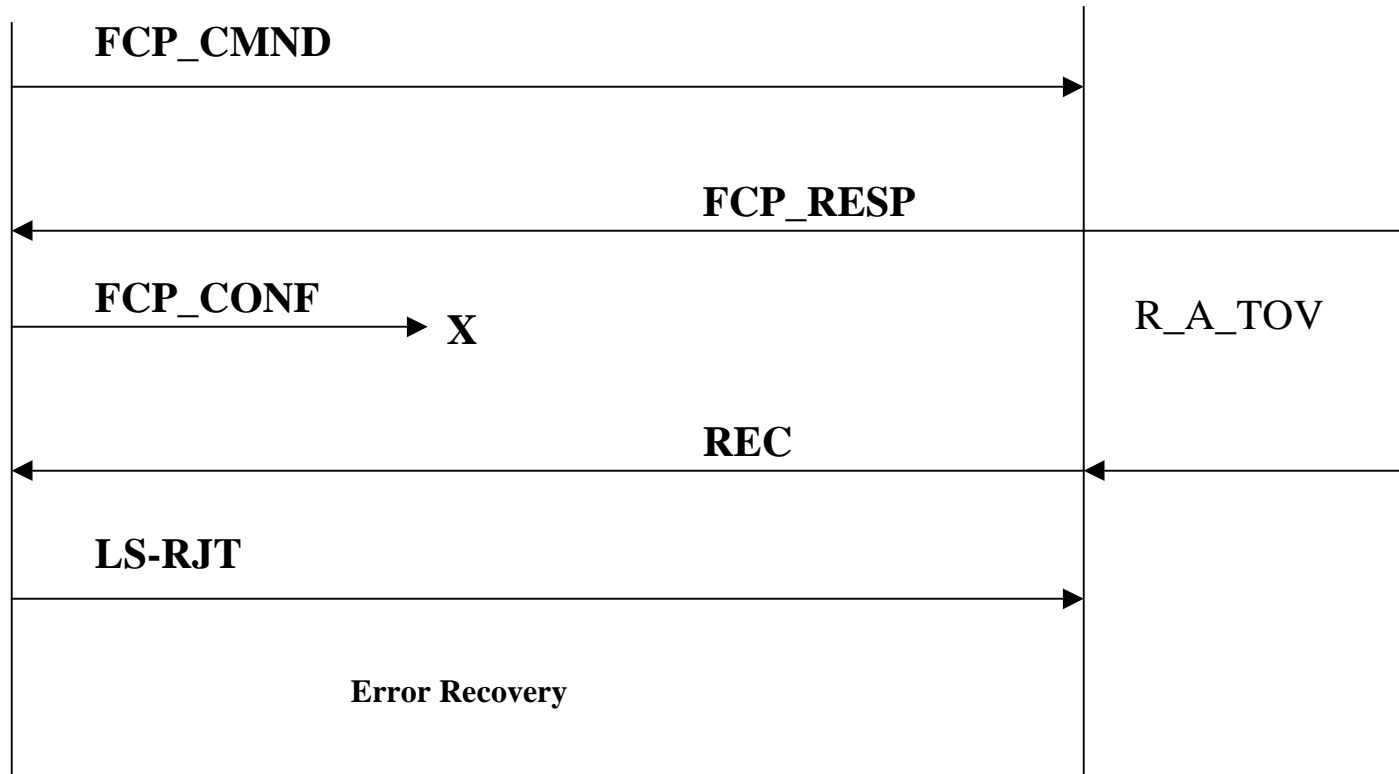
# D.12 Class 2 ACK Lost on Write



None: The Target received the FCP\_DATA sequence. No error recovery is required.

Note: The BA\_ACC indicates the data sequence was received, the Target and Initiator continue the Exchange. The Initiator must establish its Recovery Qualifier. The resources associated with the Recovery Qualifier can be reclaimed on receipt of the ACK (out of order) or after R\_A\_TOV. The issuance of the RRQ is optional as no Recovery Qualifier was established by the Target. FCP\_RESP can be received at any time after FCP\_DATA(seq1, cnt1 has been sent, but prior to the expiration of R\_A\_TOV.

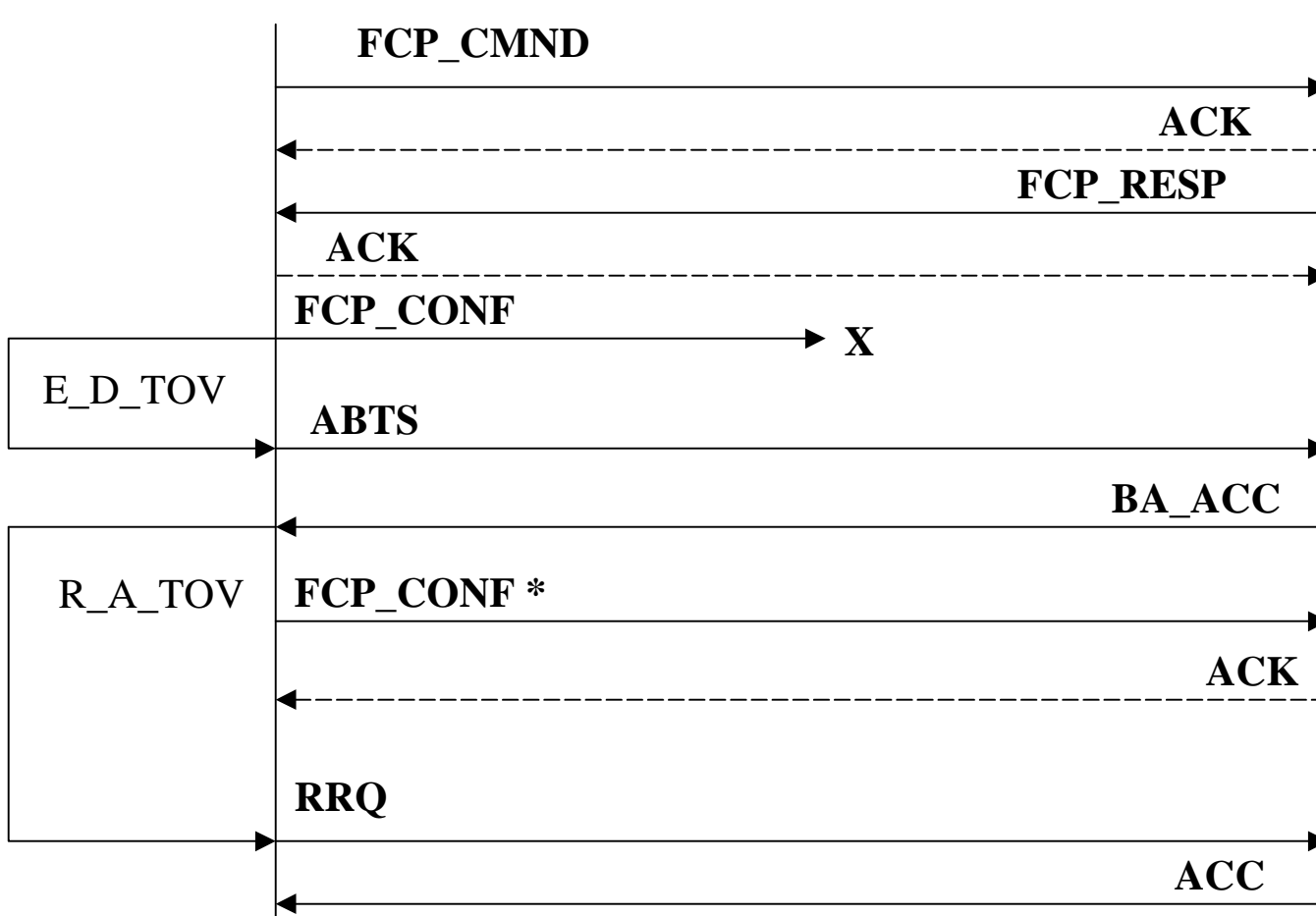
# D.? Class 3 FCP\_CONF Lost



None.

LS-RJT indicates that the Initiator received FCP\_RESP and sent FCP\_CONF. Note that if FCP\_CONF is received after LS\_RJT, it is discarded as there is no context for it.

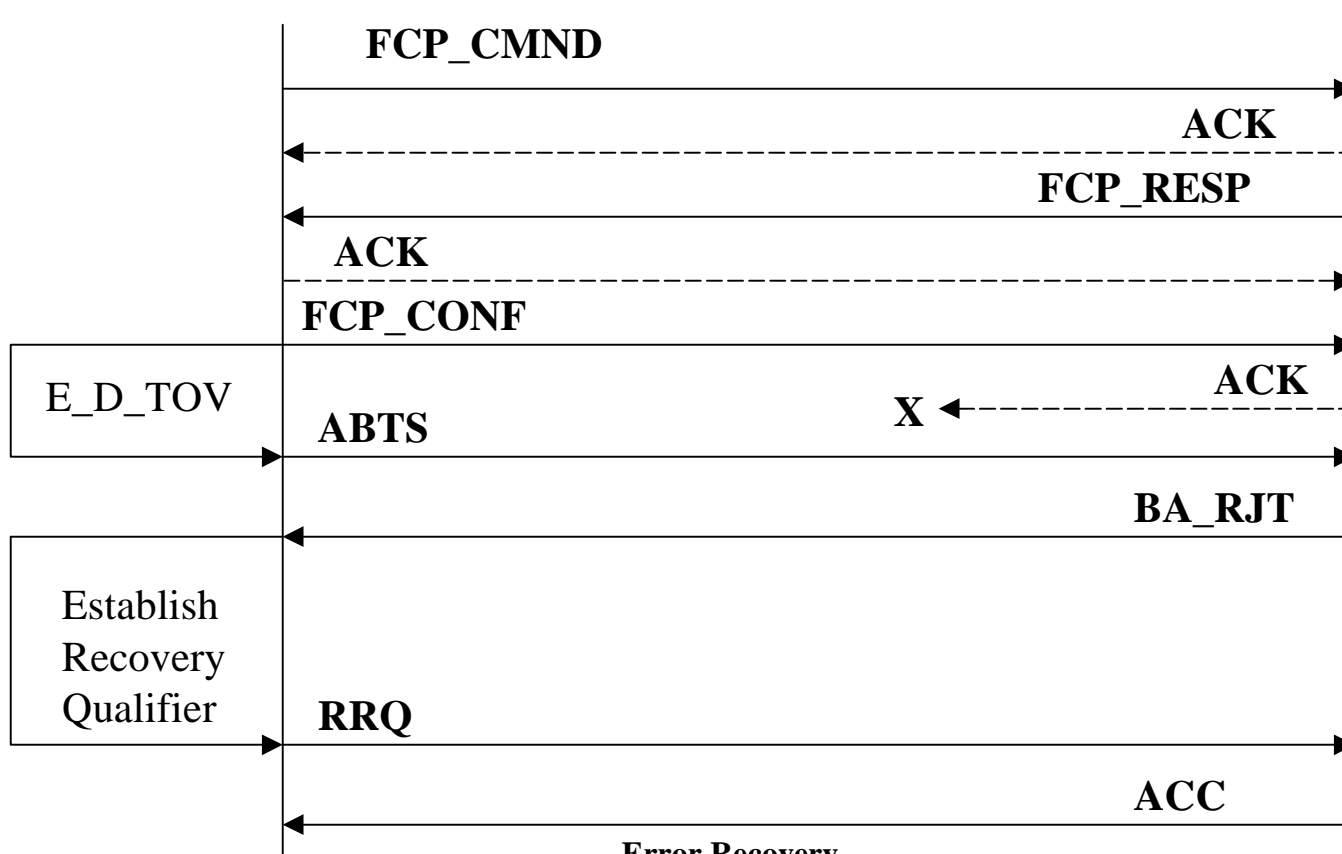
# D.?? Class 2 FCP\_CONF Lost



\* Second FCP\_CONF must be sent with a different SEQ\_ID. The SEQ\_CNT value used in the retransmission of FCP\_CONF must be one greater than the value used in the ABTS frame.



# D.??? Class 2 ACK Lost on FCP\_CONF

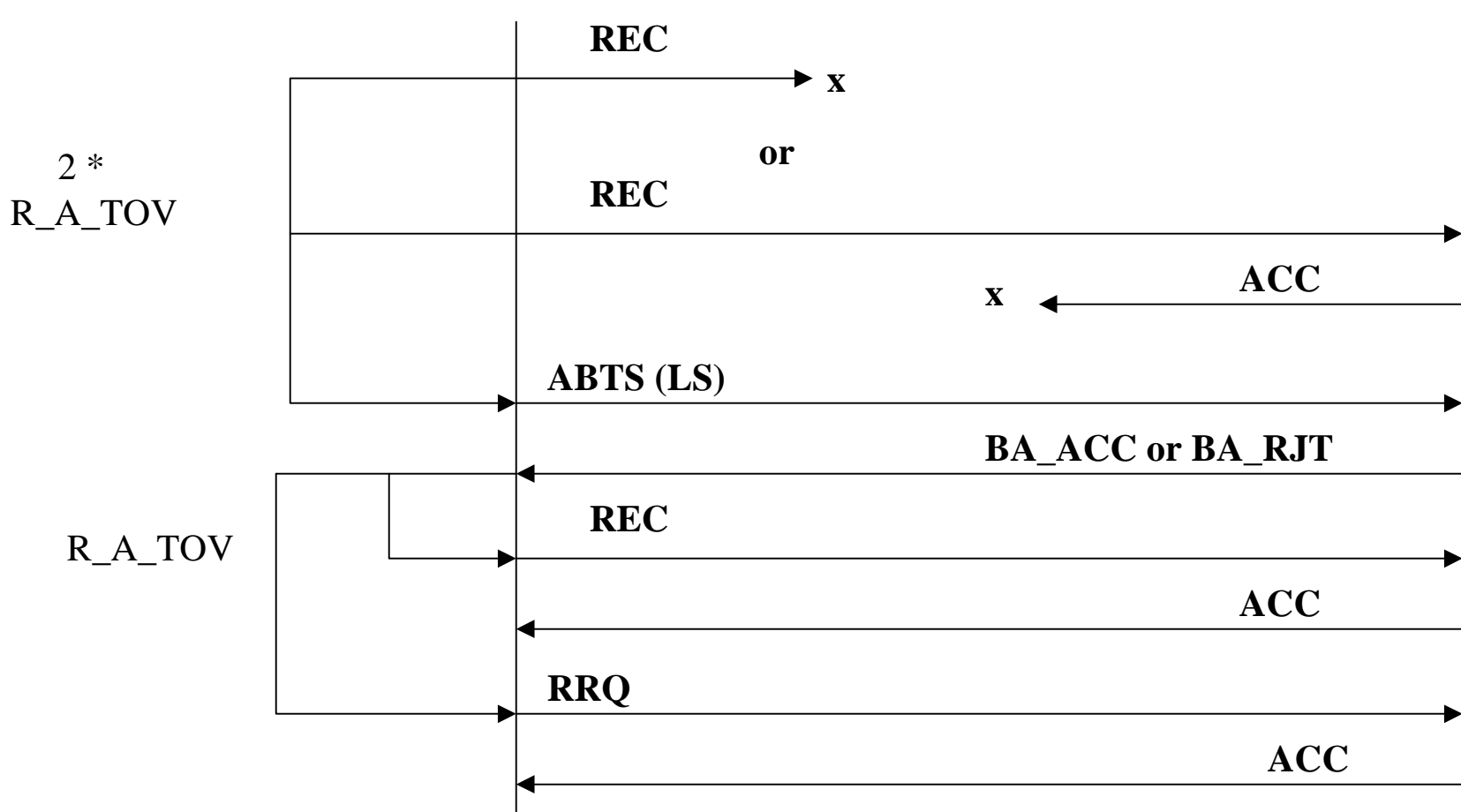


**Error Recovery**

None:

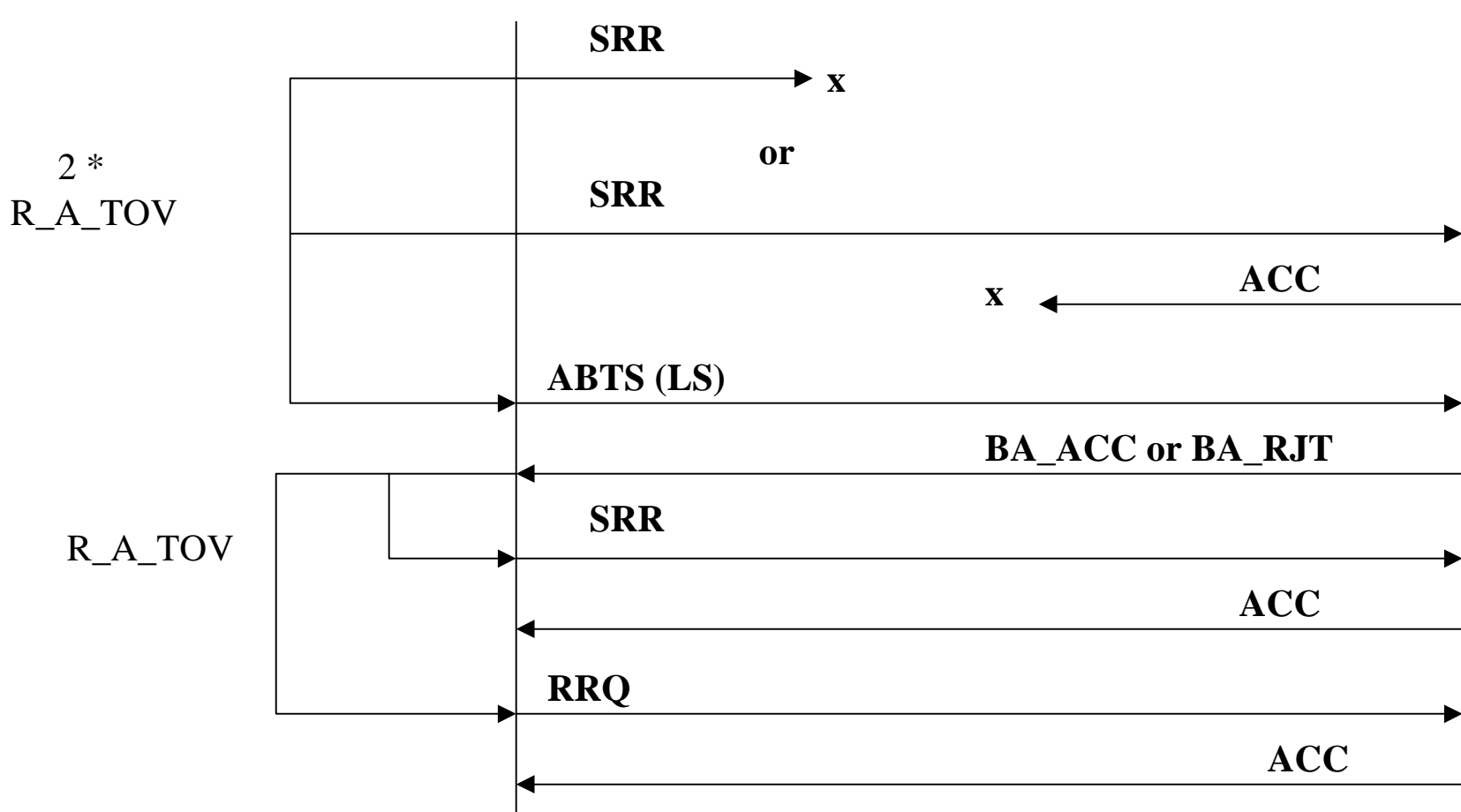
The Initiator must establish a Recovery Qualifier on receipt of the BA\_RJT. The resources associated with the Recovery Qualifier can be retired on the receipt of the ACK (out of order) or when REC\_TOV Time-out has expired. Note that the issuance of RRQ is optional as no Recovery Qualifier was established by the Target.

# D.13 REC or REC Response Lost



Change E\_D\_TOV in the text to  $2 * R\_A\_Tov$  to agree with the text in 12.6.2

# D.14 SRR or SRR Response Lost



Change E\_D\_TOV in the text to  $2 * R\_A\_Tov$  to agree with the text in 12.6.3