To: INCITS T10 Committee
From: Susan Gray, Quantum
Date: January 2004
Document Number: T10/04-056r1
Subject: ADT Link service error recovery

1 Revision History

Revision 1:
Incorporate input from February 9, 2004 teleconference.

Revision 0:
Initial proposal

2 Discussion

The current error recovery section does not address error recovery of link service frames. The following table summarizes the intended recovery procedures for each frame type and port state. "Corrupted" errors become retryable errors and are not listed in the table. Symbol framing errors don't relate to frames and always have the same recovery procedure and therefore are not listed in the table.

Legend: retryable (sender detected error)   protocol – should never happen
                      resource limitation   recoverable (only possible for non-link service frames)

                none: no error recovery method is currently defined
                impossible: can't happen
                illegal: not valid to send the frame type in the corresponding state

Transmitter error recovery

Frame State	Port Login	Port Logout	NOP	Pause	Initiate Recovery	Other frame types
P0 Initial	Illegal (port login is always sent from p1 login)	None None None Impossible	None None None Impossible	Illegal	Illegal	Illegal
P1 Login	Initiate new login exchange – transition to P1 None None Impossible	None None None Impossible	None None None Impossible	Illegal	Illegal	Illegal
P2 Logged-in / TS Active	Illegal	None None None Impossible	None None None Impossible	None None None Impossible	N/A None None Impossible	Resend – transition to T1 None None Resend Transition to T1
P2 Logged-in / TS Paused	Illegal	Illegal	Illegal	Illegal	Illegal	Illegal
P4 Logged Out	Illegal	Illegal	Illegal	Illegal	Illegal	Illegal
T1 Initiate Recovery	Illegal	None None None	None None None	None None None	Resend Resend Resend	Illegal

Frame State	Port Login	Port Logout	NOP	Pause	Initiate Recovery	Other frame types
		Impossible	Impossible	Impossible	Impossible	
T2 Retry Initiate Recovery	Illegal	None	None	None	Abort open exchanges & initiate Login exchange with default params (AOE = 1)	Illegal
		None	None	None	"	
		None	None	None	"	
		Impossible	Impossible	Impossible	Impossible	

Receiver error recovery

Frame State	Port Login	Port Logout	NOP	Pause	Initiate Recovery	Other frame types
P0 Initial	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0
P1 Login	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0
P2 Logged-in / T0 Active	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 1 Transition to R1
P2 Logged-in / T1 Paused	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 1 Transition to R1
P4 Logged Out	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 1 Transition to R1
R1 Pending Recovery	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 1
R2 Recovering	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 0	Nak w/ PR 0 Nak w/ PR 0 Nak w/ PR 1

ADT Revision 10 currently includes the following error recovery subclauses:

4.7 link layer error recovery

4.7.1 Error detection
4.7.1.1 Error detection overview
4.7.1.2 Error detection by the frame sender
4.7.1.3 Error detection by the frame receiver

4.7.2 Error recovery for non link service frames
4.7.2.1 (place holder for Port Login recovery)
4.7.2.2 Retryable error
4.7.2.3 Corrupted frame
4.7.2.4 Protocol error
4.7.2.5 Resource limitation
4.7.2.6 Recoverable error
4.7.2.7 Error recovery for symbol framing errors

3 Proposed changes

4.7.2 Error recovery ~~for non link service frames~~

4.7.2.1 Error recovery for Login IUs

If an error is detected in a Port Login IU, the port shall restart the negotiation process. This is accomplished by transitioning to N1:Negotiating and initiating a new login exchange using default operating parameters.

4.7.2.7 Error recovery for symbol framing errors

After detecting four or more symbol framing errors without the receipt of a frame, a port shall abort all exchanges, set the operating parameters of the interface to default settings, transition to P1:Login and initiate a Port Login exchange with the AOE bit set to one.