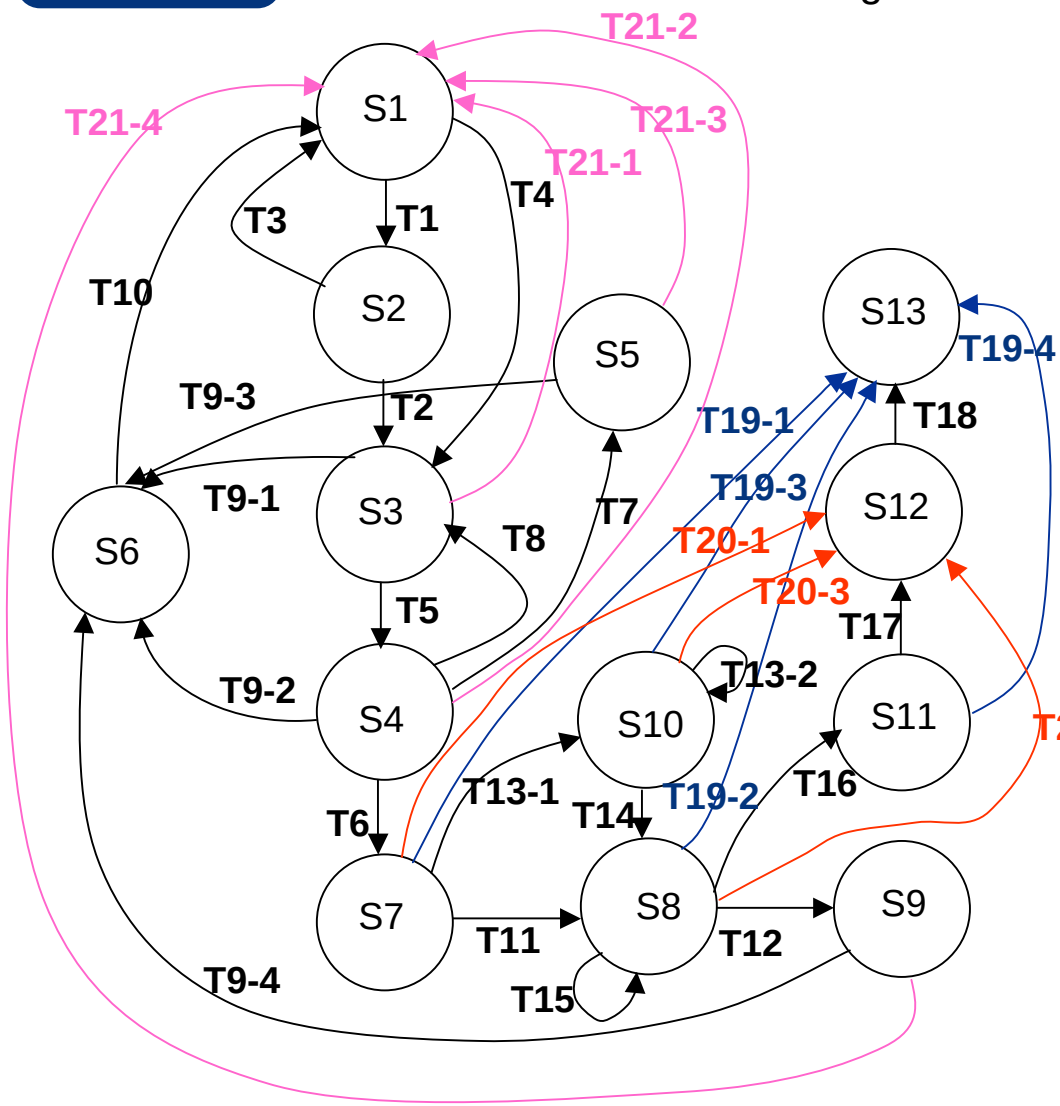
iscsi state diagrams

iSCSI connection state transitions

standard connection state diagram



Symbolic Names for States

- S1: FREE
- S2: XPT_WAIT (illegal for target)
- S3: XPT_UP
- S4: LOGIN_SENT (initiator)/LOGIN_RCVD (target)
- S5: FAILED
- S6: EXITING
- S7: LOGGED_IN (full-feature phase)
- S8: LOGO_SENT (initiator)/LOGO_RCVD(target)
- S9: LOGGED_OUT
- S10: ASYNC_MSG_SENT (target)/ ASYNC_MSG_RCVD(initiator)
- S11:LOGO_FAILED
- S12: XPT_CLEANUP
- S13: BUSY

- **Note**: Transitions happening due to the same event and arriving into the same resultant state (from different starting states) share the same transition number, but are given different suffixes.

iscsi state diagrams

iSCSI connection state transitions (contd.)

state transition table

T O

F R O M

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13
S1	-	T1	T4	-	-	-	-	-	-	-	-	-	-
S2	T3	-	T2	-	-	-	-	-	-	-	-	-	-
S3	T21-1	-	-	T5	-	T9-1	-	-	-	-	-	-	-
S4	T21-2	-	T8	-	T7	T9-2	T6	-	-	-	-	-	-
S5	T21-3	-	-	-	-	T9-3	-	-	-	-	-	-	-
S6	T10	-	-	-	-	-	-	-	-	-	-	-	-
S7	-	-	-	-	-	-	-	T11	-	T13-1	-	T20-1	T19-1
S8	-	-	-	-	-	-	-	T15	T12	-	T16	T20-2	T19-2
S9	T21-4	-	-	-	-	T9-4	-	-	-	-	-	-	-
S10	-	-	-	-	-	-	-	T14	-	T13-2	-	T20-3	T19-3
S11	-	-	-	-	-	-	-	-	-	-	-	T17	T19-4
S12	-	-	-	-	-	-	-	-	-	-	-	-	T18
S13	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: **“-”** stands for “undefined”.

iscsi state diagrams

iSCSI connection state transitions (contd.)

State transitions

- T1: Transport connect request was made (ex: TCP SYN sent). (initiator only)
- T2: Transport connection established. (initiator only)
- T3: Transport connection request timed out, or failed. (initiator only)
- T4: Transport connection established (target only).
- T5: iSCSI login was sent by the initiator (or was received for a target).
- T6: A login success was received/sent
- T7: A login redirection/initiator error/target error was received. (initiator only)
- T8: A login redirection/initiator error/target error was sent. (target only)
- T9-1, T9-2, T9-3, T9-4: Transport disconnect request was sent/indication received (ex: TCP FIN received/sent).
- T10: Both sides closed the transport connection.
- T11: Logout was sent by the initiator (or was received for a target).
- T12: Logout Response (success) was received by the initiator (or sent by the target)
- T13-1, T13-2: Async PDU with iSCSI event 2 received by the initiator (or sent by the target)
- T14: Logout was sent by the initiator (or was received for a target)
- T15: Async PDU with iSCSI event 2 received (initiator only)
- T16: Logout Response (failure) was received by the initiator (or sent by the target)
- T17: Transport disconnect request was sent/indication received (ex: TCP FIN received/sent).
- T18: Both sides closed the transport connection.

iscsi state diagrams

iSCSI connection state transitions (contd.)

State transitions (contd.)

•T19-1, T19-2, T19-3, T19-4: Transport connection deemed non-responsive by either end; or transport RESET received by either; or Async PDU with iSCSI event 3 (for this CID), or event 4 received by the initiator.

•T20-1, T20-2, T20-3: Unexpected transport disconnect indication received by either side.

•T21-1, T21-2, T21-3, T21-4: Transport connection deemed non-responsive by either end; or transport RESET received by either.

iscsi state diagrams

iSCSI connection state transitions (contd.)

Whenever a connection state machine (say, CSM-R) enters the BUSY state (S13), it must go through the state transitions additionally described in the connection recovery state diagram either using a connection in the LOGGED_IN state with an explicit logout (let us call it CSM-E), or on a new transport connection in the FREE state with an implicit logout (let us call it CSM-I) This recovery state diagram hence is applicable only to the instance of the connection in recovery, i.e. CSM-R. In the case of an implicit logout for example, CSM-R reaches RECOVERY_DONE at the time CSM-I reaches LOGGED_IN. In the case of an explicit logout, CSM-R reaches RECOVERY_DONE when CSM-E receives a successful logout response while continuing to be in the LOGGED_IN state.

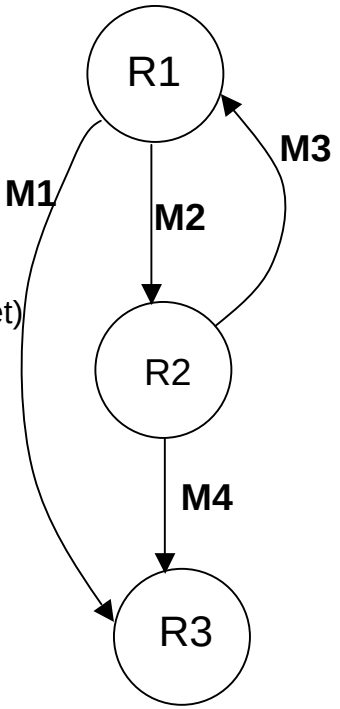
Symbolic names for states in the connection recovery state diagram :

- R1: BUSY (Same as S13)
- R2: IN_RECOVERY
- R3: RECOVERY_DONE (Same as S1)

State transitions in the connection recovery state diagram

- M1: Connection state timeout happened on either side.
- M2: An implicit /explicit logout was sent by the initiator (or received by the target)
  - In CSM-I case, a recovery login was sent by the initiator (or received by the target) in state S1.
  - In CSM-E case, a logout was sent by the initiator (or received by the target) in state S7.
- M3: Logout failure detected
  - CSM-I failed to reach S7, instead arrived into S1.
  - CSM-E either moved out of S7, or Logout timed out and/or aborted, or Logout Response (failure) received by the initiator (or sent by the target).
- M4: Successful implicit/explicit logout was performed.
  - CSM-I reached state S7.
  - CSM-E stayed in S7, and received Logout Response (success) by the initiator (or sent by the target).

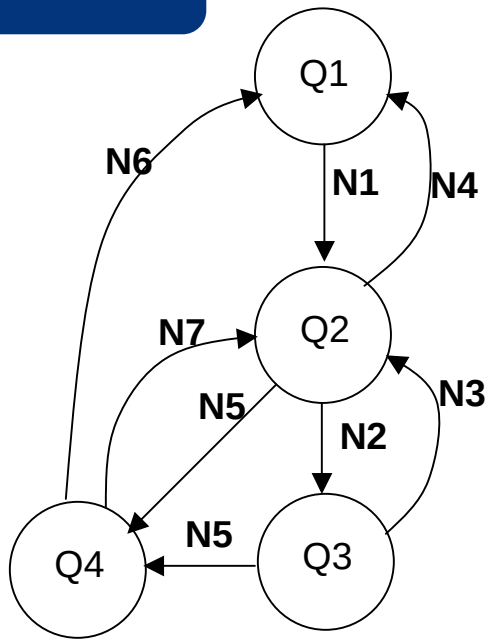
connection recovery state diagram



iscsi state diagrams

iSCSI session state transitions

session state diagram



Symbolic Names for States

- Q1: FREE
- Q2: ACTIVE
- Q3: LOGGED_IN
- Q4: FAILED

If any one connection participating in a session is LOGGED_IN, the session state is LOGGED_IN. Else, it is ACTIVE. The first connection becoming LOGGED_IN and the last connection becoming not LOGGED_IN toggles the session state.

State transitions

•N1: At least one transport connection was established for the session.

•N2: At least one transport connection reached the LOGGED_IN state .

•N3: Last LOGGED_IN connection had ceased to be LOGGED_IN.

•N4: Last participating transport connection was dropped.

•N5: Session failure (all connections reported BUSY, or recovery failed)

•N6: Session state timeout happened on either side.

•N7: Session recovery attempt with an implicit logout (I.e. login).