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To: T10 Technical Committee
From: Bill Galloway
Subj: SAS Credit Not Ready

A new primitive is needed to allow the recipient of frames to say that it does not have anymore credit and will not have any credit anytime soon.

Actions:

Rename RRDY(1) in primitive tables to CREDIT_BLOCKED.

Update state diagrams with new parameters.

Add following paragraph:

7.1.4.x CREDIT_BLOCKED
CREDIT_BLOCKED indicates that no more credit is going to be sent during this connection.

Replace following paragraphs:

7   Link layer

7.14 SSP link layer

7.14.7 SSP link layer state machines

7.14.7.1   Overview
The SSP link layer contains several state machines that run in parallel to control the flow of dwords on the link during an SSP connection. The SSP link state machines are as follows:

   a)   SAS Phy Receiver (SSP_R state machine);

   b)   SAS Phy Transmitter (SSP_T state machine);

   c)   Transmit Interlocked Frame Monitor (SSP_TIM state machine);

   d)   Transmit Frame Credit Monitor (SSP_TCM state machine);

   e)   DONE Control (SSP_D state machine);

   f)   Transmit Frame Control (SSP_TF state machine);

   g)   Receive Frame Control (SSP_RF state machine);

   h)   Receive Frame Credit Monitor (SSP_RCM state machine);

   i)   Receive Interlocked Frame Monitor (SSP_RIM state machine);

j)   Transmit Credit Control (SSP_TC state machine); and

k)   Transmit ACK/NAK Control (SSP_TAN state machine).

All the SSP state machines shall begin after receiving an Enable Disable SSP parameter with an argument of Enable from the SL state machine (see **Error! Reference source not found.**).

All the SSP state machines shall stop after:

a)   receiving an Enable Disable SSP parameter with an argument of Disable from the SL state machine;

b)   receiving a Request Close parameter from the SSP_D1:DONE_Wait state indicating that the connection shall be closed;

c)   receiving a Request Break parameter from the SSP_D1:DONE_Wait state indicating that a BREAK primitive sequence shall be transmitted; or

If a state machine consists of multiple states the initial state is as indicated in state machine description in this subclause.

The SSP_R state machine's function is to receive primitives and frames and indicate to other SSP state machines the receipt of those dwords. The SSP_R state machine contains the SSP_R1:Receive state (see 7.14.7.2).

The SSP_T state machine's function is to transmit primitives and frames and indicate to other state machines the transmission of those dwords. The SSP_T state machine contains the SSP_T1:Transmit state (see 7.14.7.3).

The SSP_TIM state machine's function is to ensure that ACKs or NAKs are received for each transmitted frame before the ACK/NAK timeout. The SSP_TIM state machine contains the SSP_TIM1:Tx_Interlock_Monitor state (see 7.14.7.4).

The SSP_TCM state machine's function is to ensure that credit is available from the originator before a frame is transmitted. The SSP_TCM state machine contains the SSP_TCM1:Tx_credit_monitor state (see 7.14.7.5).

The SSP_D state machine's function is to ensure a DONE has been received and transmitted before the SL state machine disables the SSP state machines. The SSP_D state machine contains the SSP_D1:Done_Wait state (see 7.14.7.6).

The SSP_TF state machine's function it to control when the SSP_T state machine transmits an SOF, frame dwords, EOF, and a DONE. The SSP_TF state machine contains the following states:

a)   Initial state: SSP_TF1:Connected_Idle state (see 7.14.7.7);

b)   SSP_TF2:Tx_Wait state (see 7.14.7.8);

c)   SSP_TF3:Indicate_Frame_Tx state (see 7.14.7.9); and

d)   SSP_TF4:Indicate_DONE_Tx state (see 7.14.7.10).

The SSP_RF state machine's function is to receive frames and to indicate the successful or unsuccessful receipt of those frames. The SSP_RF state machine contains the SSP_RF1:Rcv_Frame state (see 7.14.7.11).

The SSP_RCM state machine's function is to ensure that there was credit given to the originator for every frame that is received. The SSP_RCM state machine contains the SSP_RCM1:Rcv_Credit_Monitor state (see 7.14.7.12).

The SSP_RIM state machine's function is to indicate to the SSP_RF1:Rcv_Frame state when the number of ACKs and NAKs transmitted equal the number of the EOFs received. The SSP_RIM state machine contains the SSP_RIM1:Rcv_Interlock_Monitor state (see 7.14.7.13).

The SSP_TC state machine's function it to control when the SSP_T state machine transmits an RRDY or CREDIT_BLOCKED. The SSP_TC state machine contains the following states:

    a)   Initial state: SSP_TC1:Tx_Credit_Idle state (see 7.14.7.14); and

    b)   SSP_TC2:Indicate_Credit_Tx state (see 7.14.7.15).

The SSP_TAN state machine's function is to control when the SSP_T state machine transmits an ACK or NAK. The SSP_TAN state machine contains the following states:

    a)   Initial state: SSP_TAN1:Tx_ACK/NAK_Idle state (see 7.14.7.16); and

    b)   SSP_TAN2:Indicate_ACK/NAK_Tx state (see 7.14.7.17).
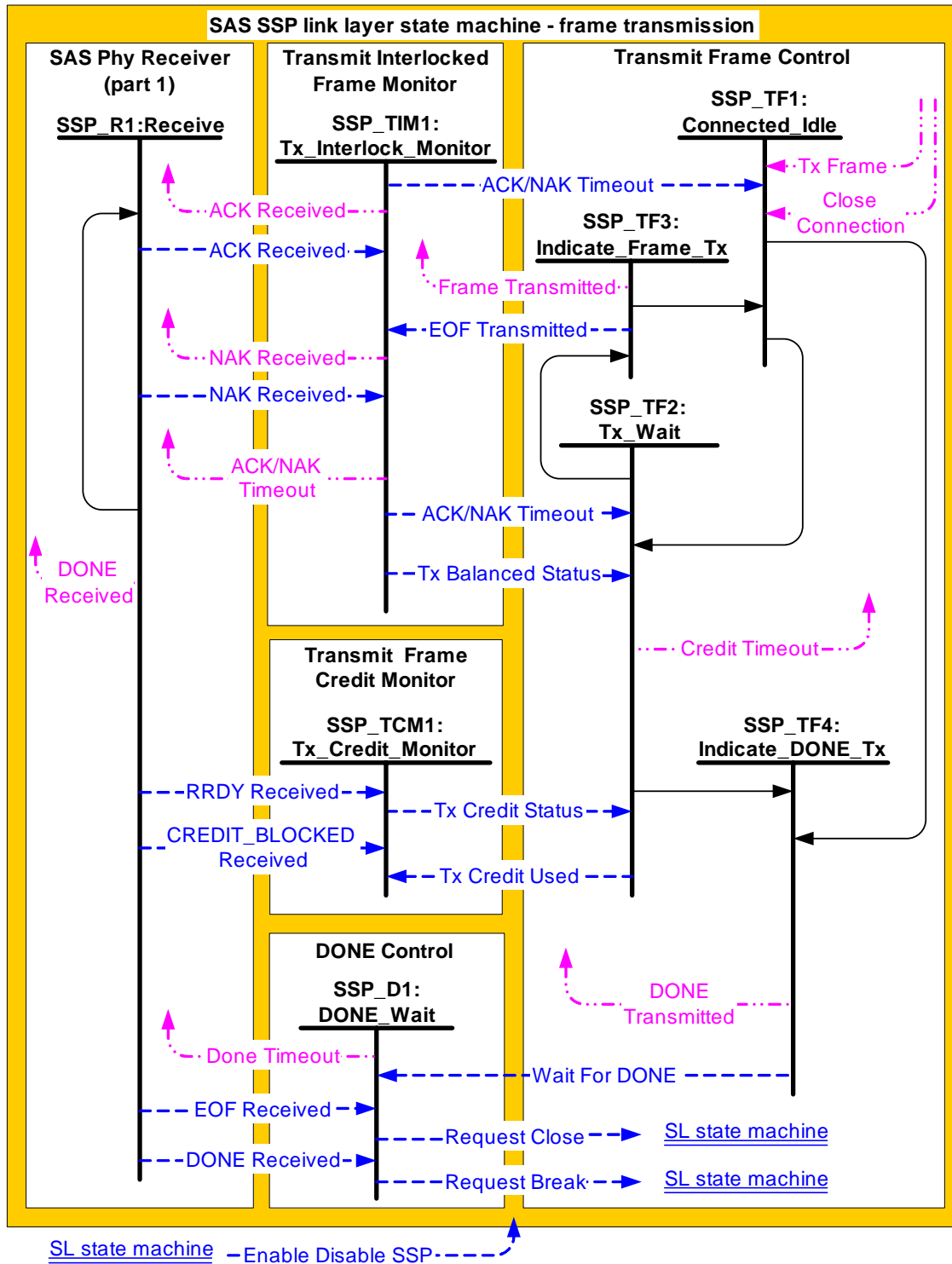
Figure 1 shows the states related to frame transmission.

Figure 1. SSP link layer state machines (part 1 - frame transmission)

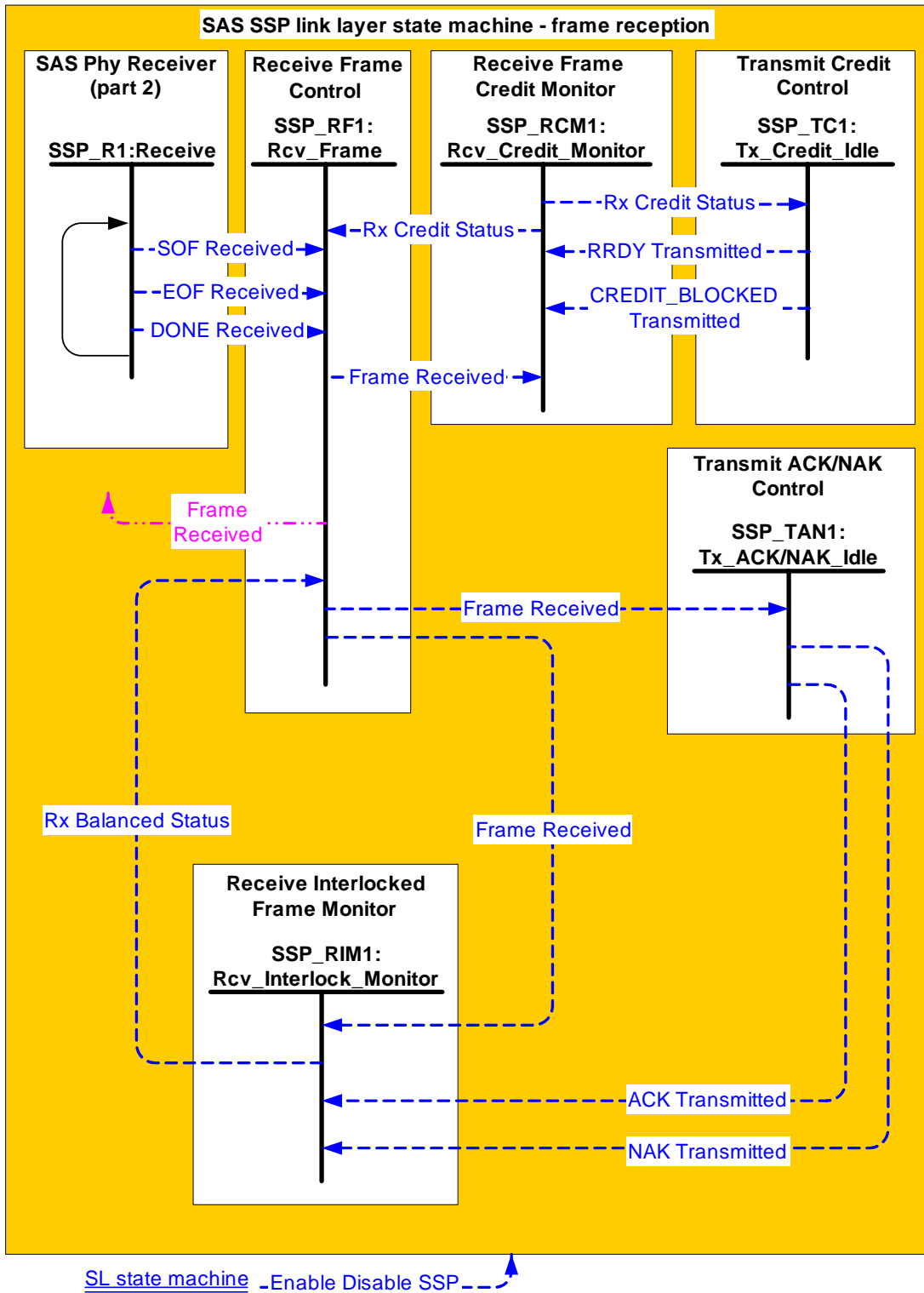Figure 2 shows the states related to frame reception.

Figure 2. SSP link layer state machines (part 2 - frame reception)

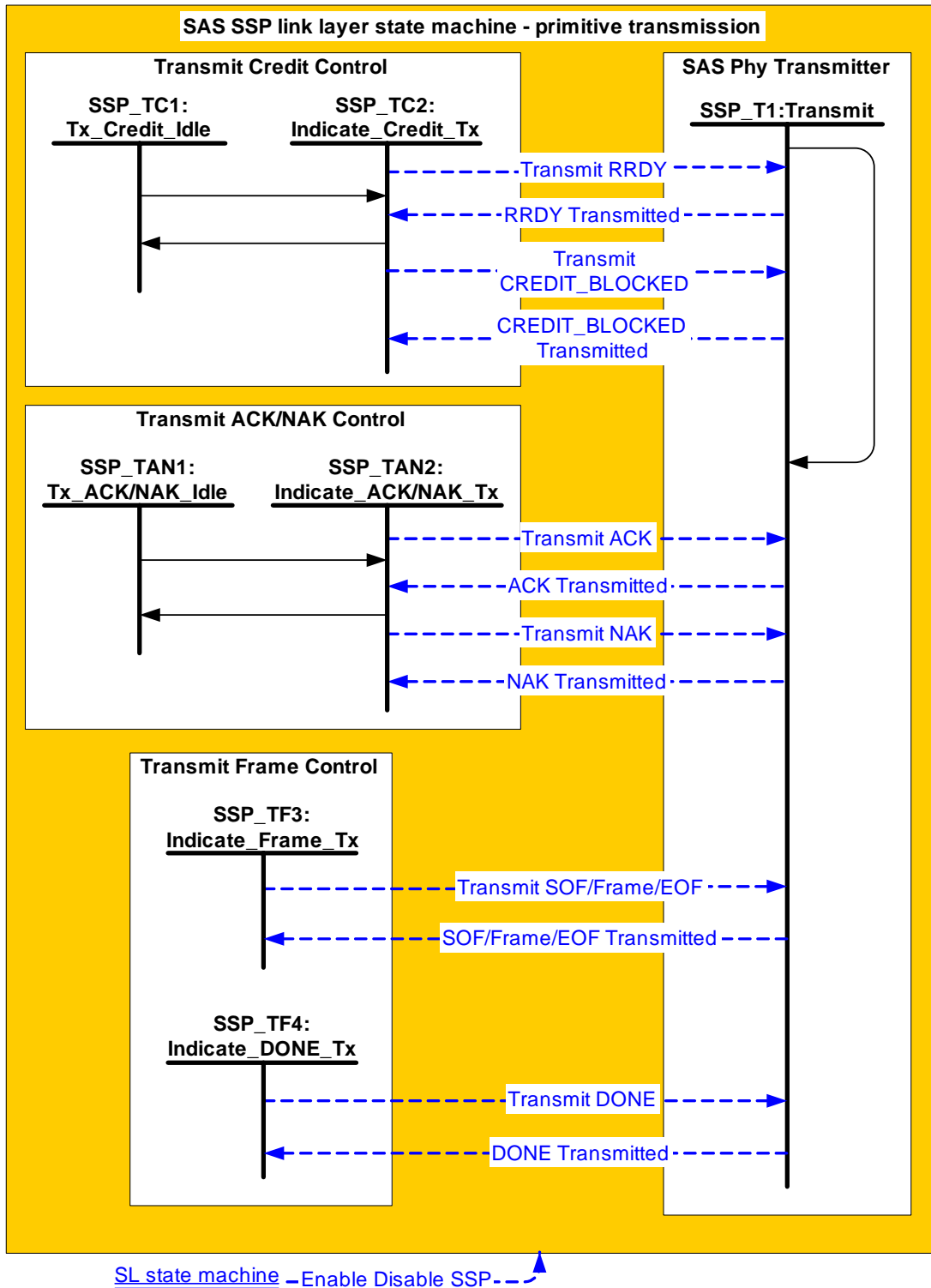Figure 3 shows the states related to primitive transmission.

Figure 3. SSP link layer state machines (part 3 - primitive transmission)

7.14.7.2   SSP_R1:Receive state

7.14.7.2.1   SSP_R1:Receive state description

This state receives frames and primitives.

As a result of receiving an ACK or a NAK this state shall send an ACK Received parameter or a NAK Received parameter to SSP_TIM1:Tx_Interlock_Monitor state.

As a result of receiving a RRDY or a CREDIT_BLOCKED this state shall send an RRDY Received parameter or a CREDIT_BLOCKED Received parameter to SSP_TCM1:Tx_Credit_Monitor state.

As a result of receiving a DONE(CLOSE CONNECTION) this state shall send a Done Received parameter to the following states:

   a) SSP_D1:DONE_Wait state; and

   b) SSP_RF1:Frame_Rcv state.

As a result of receiving a DONE(CREDIT TIMEOUT) this state shall send a Done Received parameter to the following states:

   c) SSP_D1:DONE_Wait state; and

   d) SSP_RF1:Frame_Rcv state.

As a result of receiving a DONE(ACK/NAK TIMEOUT) this state shall send a Done Received parameter to the following states:

   a) SSP_D1:DONE_Wait state; and

   b) SSP_RF1:Frame_Rcv state.

This state shall also send a Done Received confirmation with ACK/NAK Timeout argument to the port layer. This confirmatoin is a warning to the port layer that the transmitter is going to close the connection within 1 ms.

As a result of receiving a SOF this state shall send a SOF Received parameter to the SSP_RF1:Frame_Rcv state.

As a result of receiving an EOF this state shall send an EOF Received parameter to the following states:

   c) SSP_D1:DONE_Wait state; and

   d) SSP_RF1:Frame_Rcv state.

7.14.7.2.2   Transition SSP_R1:Receive to SSP_R1:Receive

The SSP_R1:Receive to SSP_R1:Receive transition shall occur:

   a) every time a data dword associated with a frame is received;

   b) every time an ACK or a NAK is received;

   c) every time a RRDY or a CREDIT_BLOCKED is received;

   d) every time a DONE is received;

   e) every time a SOF is received; and

   f) every time an EOF is received.

7.14.7.3   SSP_T1:Transmit state

7.14.7.3.1   SSP_T1:Transmit state description

This state transmits frames and primitives.

On a request to transmit, this state shall transmit the indicated dword. If there are multiple requests to transmit primitives, the following priority should be followed when selecting the primitives:

1) ALIGN;
2) ACK or NAK;
3) RRDY;
4) CREDIT_BLOCKED;
5) DONE; then
6) SOF/frame/EOF.

In the absence of any transmit requests this state shall transmit idle dwords and ALIGNs as necessary.

When the Transmit ACK parameter is sent by the SSP_TAN2:Indicate_ACK/NAK_Tx state, this state shall transmit an ACK and shall send the ACK Transmitted parameter to the SSP_TAN2:Indicate_ACK/NAK_Tx state.

When the Transmit NAK parameter is sent by the SSP_TAN2:Indicate_ACK/NAK_Tx state, this state shall transmit a NAK and shall send the NAK Transmitted parameter to the SSP_TAN2:Indicate_ACK/NAK_Tx state.

When the Transmit RRDY parameter is sent by the SSP_TC2:Indicate_Credit_Tx state, this state shall transmit a RRDY and shall send the RRDY Transmitted parameter to the SSP_TC2:Indicate_Credit_Tx state.

When the Transmit CREDIT_BLOCKED parameter is sent by the SSP_TC2:Indicate_Credit_Tx state, this state shall transmit a CREDIT_BLOCKED and shall send the CREDIT_BLOCKED Transmitted parameter to the SSP_TC2:Indicate_Credit_Tx state.

When the Transmit DONE parameter is sent by the SSP_TF4:Indicate_DONE_Tx state, this state shall transmit a DONE and shall send the DONE Transmitted parameter to the SSP_TF4:Indicate_DONE_Tx state.

When the Transmit SOF/frame/EOF parameter is sent by the SSP_TF3:Indicate_Frame_Tx state, this state shall transmit an SOF, the data dwords of the frame, and an EOF. If during the transmission of a frame an indication that a primitive is to be transmitted occurs, this state may transmit the indicated primitive by inserting the primitive between the frames' dwords. This state shall send a SOF/frame/EOF Transmitted parameter to the SSP_TF3:Indicate_Frame_Tx state each time an EOF is transmitted.

7.14.7.3.2   Transition SSP_T1:Transmit to SSP_T1:Transmit

The SSP_T1:Transmit to SSP_T1:Transmit transition shall occur:

a) every time an ALIGN is transmitted;

b) every time an ACK or a NAK is transmitted;

c) every time an RRDY is transmitted;

d) every time an CREDIT_BLOCKED is transmitted;

e) every time a DONE is transmitted; and

f) every time an SOF, frame dword, or EOF is transmitted;

g) every time an idle is transmitted.

7.14.7.4 SSP_TIM1:Tx_Interlock_Monitor state

This state monitors the number of frames transmitted and monitors the number of ACKs and NAKs received. This state ensures that an ACK or NAK is received for each frame transmitted and indicates a timeout if they are not.

When the number of frames transmitted equals the number of ACKs and NAKs received then this state is balanced and shall send the Tx Balanced Status parameter with the Balanced argument to the SSP_TF2:Tx_Wait state. When the number of frames transmitted does not equal the number of ACKs and NAKs received then this state is not balanced and shall send the Tx Balanced Status parameter with the Not Balanced argument to the SSP_TF2:Tx_Wait state.

The EOF Transmitted parameter received from the SSP_TF3:Indicate_Frame_Tx state shall be used by this state to count the number of frames transmitted.

If this state is not balanced, the ACK Received parameter from the SSP_R1:Receive state shall be used by this state to count the number of ACKs and NAKs received and shall be used to send an ACK Received confirmation to the port layer.

If this state is not balanced, the NAK Received parameter from the SSP_R1:Receive state shall be used by this state to count the number of ACKs and NAKs received and shall be used to send a NAK Received confirmation to the port layer.

If this state is balanced, the ACK Received parameter and NAK Received parameter from the SSP_R1:Receive state shall be ignored.

When this state is balanced the ACK/NAK timeout timer shall be disabled.

Each time this state becomes not balanced, the ACK/NAK timeout timer shall be initialized to 1 ms and shall start timing. The timer shall be re-initialize to 1 ms each time an ACK or NAK is counted. If the timer expires, this state shall send the ACK/NAK Timeout confirmation to the port layer and to the following states:

a) SSP_TF1:Connected_Idle; and

b) SSP_TF2:Tx_Wait state.

When the SL state machine sends the Enable Disable SSP parameter with an argument of Enable, the number of frames transmitted shall be set equal to the number of ACKs and NAKs received.

7.14.7.5 SSP_TCM1:Tx_credit_monitor state

This state shall keep track of the number of transmit frame credits received versus the number of transmit frame credits used. This state adds transmit frame credit for each RRDY Received parameter indication from the SSP_R1:Receive state and subtracts transmit frame credit for each Credit Used parameter indication from the SSP_TF2:Tx_Wait state. This state shall remember the CREDIT_BLOCKED Received parameter indication from the SSP_R1:Receive state.

When transmit frame credit is available, this state shall send the Tx Credit Status parameter with the Credit Available argument to the SSP_TF2:Tx_Wait state.

When transmit frame credit is not available and credit is not blocked, this state shall send the Tx Credit Status parameter with the Credit Not Available argument to the SSP_TF2:Tx_Wait state.

When transmit frame credit is not available and credit is blocked, this state shall send the Tx Credit Status parameter with the Credit Blocked argument to the SSP_TF2:Tx_Wait state.

When the SL state machine sends the Enable Disable SSP parameter with an argument of Enable, transmit frame credit shall be set to not available and credit shall not be blocked.

7.14.7.6   SSP_D1:DONE_Wait state

7.14.7.6.1   DONE_Wait state description

This state ensures that a DONE is received and transmitted before the connection is closed. The DONE may be transmitted and received in any order.

If the DONE Received parameter has been received from the SSP_R1:Receive state when the Wait For DONE Parameter is received from the SSP_TF4:Indicate_DONE_Tx state, this state shall send the Request Close parameter to the SL state machine (see **Error! Reference source not found.**) to indicate that a CLOSE shall be transmitted.

If the DONE Received parameter has not been received from the SSP_R1:Receive state when the Wait For DONE Parameter is received from the SSP_TF4:Indicate_DONE_Tx state, this state shall initialize the DONE timeout timer to 1 ms. If the Wait For DONE parameter was received with the Close Connection argument or the Credit Timeout argument, the DONE timeout timer shall be re-initialized to 1 ms each time the EOF Received parameter is received from the SSP_R1:Receive state.

If the DONE Received parameter is received from the SSP_R1:Receive state before the DONE timeout timer expires, this state shall send the Request Close parameter to the SL state machine.

If the DONE Received parameter is not received from the SSP_R1:Receive state before the DONE timeout timer expires, this state shall:

   a) send a DONE Timeout confirmation to the port layer; and

   b) send a Request Break parameter to the SL state machine indicating that a BREAK shall be transmitted.

7.14.7.7   SSP_TF1:Connected_idle state

7.14.7.7.1   SSP_TF1:Connected_idle state overview

This state waits for a request from the port layer to transmit a frame or to close the connection.

7.14.7.7.2   Transition SSP_TF1:Connected_Idle to SSP_TF2:Tx_Wait

This transition shall occur when the Tx Frame request is received from the port layer indicating that a frame be transmitted or a Close Connection request is received from the port layer indicating the connection to be closed.

The Balanced or Not Balanced arguments to the Tx Frame request are sent to the SSP_TF2:Tx_Wait state.

7.14.7.7.3   Transition SSP_TF1:Connected_Idle to SSP_TF4:Indicate_Done_Tx

This transition shall occur when the ACK/NAK Timeout parameter is sent by the SSP_TIM1:Tx_Interlock_Monitor state requesting the connection to be closed. This transition shall indicate ACK/NAK Timeout.

7.14.7.8   SSP_TF2:Tx_Wait state

7.14.7.8.1   SSP_TF2:Tx_Wait state overview

This state monitors the Tx Balanced Status parameter from the SSP_TIM1:Tx_Interlock_Monitor state and the Tx Credit Status from the SSP_TCM1:Tx_Credit_Monitor state to ensure that frames are transmitted and connections are closed at the proper time.

If the SSP_TF1:Connected_Idle state indicated that a frame is to be transmitted and the Tx Credit Status parameter has an argument of Not Available, this state shall initialize the Credit timeout timer to 1 ms. The Credit timeout timer shall be disabled if the Tx Credit Status parameter has an argument other than Not Available.

7.14.7.8.2   Transition SSP_TF2:Tx_Wait to SSP_TF3:Indicate_Frame_Tx

If the SSP_TF1:Connected_Idle state indicated that the frame is to be transmitted Balanced, this transition shall occur if the Tx Balanced Status parameter has an argument of Balanced and the Tx Credit Status parameter has an argument of Credit Available.

If the SSP_TF1:Connected_Idle state indicated that the frame is to be transmitted Not Balanced, this transition shall occur if the Tx Credit Status parameter has an argument of Credit Available.

This transition shall send a Credit Used parameter to the SSP_TCM1:Tx_Credit_Monitor state.

7.14.7.8.3   Transition SSP_TF2:Tx_Wait to SSP_TF5:Indicate_Done_Tx

This transition shall always occur if an ACK/NAK Timeout parameter is received from the SSP_TIM1:Tx_Interlock_Monitor state. This transition shall indicate ACK/NAK Timeout.

If the SSP_TF1:Connected_Idle state indicated that the connection is to be closed, this transition shall occur if the Tx Balanced Status parameter has an argument of Balanced. This transition shall indicate Connection Closed.

If the SSP_TF1:Connected_Idle state indicated that a frame is to be transmitted, this transition shall occur if the Tx Credit Status parameter has an argument of Blocked. This transition shall indicate Credit Timeout.

If the SSP_TF1:Connected_Idle state indicated that a frame is to be transmitted, this transition shall occur if the Credit timeout timer expires before the Tx Credit Status parameter has an argument of Available. This transition shall indicate Credit Timeout.

7.14.7.9   SSP_TF3:Indicate_Frame_Tx state

7.14.7.9.1   SSP_TF3:Indicate_Frame_Tx state description

This state requests a frame transmission by indicating a Transmit SOF/frame/EOF parameter to the SSP_T1:Transmit state. Each time a Transmit SOF/frame/EOF parameter is indicated to the SSP_T1:Transmit state, one SOF/frame/EOF is transmitted.

7.14.7.9.2   Transition SSP_TF3:Indicate_Frame_Tx to
SSP_TF1:Connected_idle

This transition shall occur after:

  a) an SOF/frame/EOF Transmitted parameter has been received from the SSP_T1:Transmit state indicating that the frame has been transmitted; and

  b) an EOF Transmitted parameter has been sent to the SSP_TIM1:Tx_Interlock_Monitor state indicating that a frame has been transmitted.

7.14.7.10   SSP_TF4:Indicate_Done_Tx state

This state requests a DONE be transmitted by sending a Transmit DONE parameter to the SSP_T1:Transmit state with one of the following arguments:

    a) Close Connection if the transition into this state indicated a port layer has requested the connection be closed;

    b) ACK/NAK Timeout if the transition into this state indicated an ACK/NAK timeout occurred; or

    c) Credit Timeout if the transition into this state indicated a credit timeout timeout occurred.

After a DONE transmitted parameter is received from the SSP_T1:Transmit state this state shall:

    a) send the DONE parameter to the SSP_D1:DONE_wait state to indicate that no more frames are going to be transmitted during the current connection with a argument of Close Connection, ACK/NAK Timeout, or Credit Timeout; and

    b) send the DONE Transmitted confirmation to the port layer indicating that a DONE was transmitted.

7.14.7.11   SSP_RF1:Rcv_Frame state

This state checks the frame to determine if the frame should be accepted or discarded by the link, to determine if an ACK or NAK should be transmitted, and indicates the Received Frame parameter.

The frame (i.e., all the dwords between an SOF and EOF) shall be discarded if any of the following conditions are true:

    a) the number of bytes between the SOF and EOF is less than 28;

    b) the number of bytes after the SOF is greater than 1 052 bytes;

    c) the Rx Credit Status parameter from the SSP_RCM1:Rcv_Credit_Monitor state has an argument of Credit Exhausted;

    d) the SSP_R1:Receive state sent a DONE Received parameter.

If consecutive SOF Received parameters are sent by the SSP_R1:Receive state without an intervening EOF Received parameter (i.e., SOF, data dwords, SOF, data dwords, and EOF instead of SOF, data dwords, EOF, SOF, data dwords, and EOF) then this state shall discard all dwords between the SOFs

If the frame is discarded then no further action is taken by this state. If the frame is not discarded then this state shall:

    a) send the Frame Received parameter to the SSP_RCM1:Rcv_Credit_Monitor state;

    b) send the Frame Received parameter to the SSP_RIM1:Rcv_Interlock_Monitor state;

If the frame CRC is good and the frame contained no invalid dwords, this state shall:

    a) send the Frame Received parameter to the SSP_TAN1:Tx_ACK/NAK_Idle state with an argument of Successful;

    b) send the Frame Received confirmation to the port layer with an argument of ACK/NAK Balanced or ACK/NAK Not Balanced as determined by the Rx Balanced Status parameter from the SSP_RIM1:Rcv_Interlock_Monitor state;

If the frame CRC is bad or the frame contained invalid dwords, this state shall send the Frame Received parameter to the SSP_TAN1:Tx_ACK/NAK_Idle state with an argument of Unsuccessful.

7.14.7.12   SSP_RCM1:Rcv_Credit_Monitor state

This state monitors the receiver's resources and keeps track of the number of RRDYs transmitted versus the number of frames received.

Anytime resources are released or become available this state shall send the Rx Credit Status parameter with an Available argument to the SSP_TC1:Tx_Credit_Idle state. This state shall only send the Rx Credit Status parameter with an Available argument to the SSP_TC1:Tx_Credit_Idle state after frame receive resources become available. The specifications for when or how resources become available is outside the scope of this standard.

This state may send the Rx Credit Status parameter with a Blocked argument to the SSP_TC1:Tx_Credit_Idle state to indicate that no more credit is going to be sent during this connection. After sending the Rx Credit Status parameter with a Blocked argument to the SSP_TC1:Tx_Credit_Idle state, this state shall not send the Rx Credit Status parameter with an Available argument to the SSP_TC1:Tx_Credit_Idle state for the duration of the current connection. The Rx Credit Status parameter with a Blocked argument should be sent to the SSP_TC1:Tx_Credit_Idle state when no further credit is going to become available within a Credit Timeout (i.e. less than one millisecond).

This state shall only indicate through the Rx Credit Status parameter the amount of resources available to handle received frames (e.g., if this state has resources for 5 frames the maximum number of Rx Credit Status requests with the Available argument outstanding is 5).

This state shall use the RRDY Transmitted parameter from the SSP_TC1:Tx_Credit_Idle state to keep track of the number of RRDYs transmitted. This state shall use the Frame Received parameter from the SSP_RF1:Rcv_Frame state to keep a track of the number of frames received.

Anytime the number of RRDYs exceeds the number of frames receivedthis state shall send a Rx Credit Status parameter with an Credit Extended argument to the SSP_RF1:Rcv_Frame state to indicate that credit has been given to the transmitter.

Anytime the number of RRDYs is equal to the number of frames receivedthis state shall send a Rx Credit Status parameter with an Credit Exhausted argument to the SSP_RF1:Rcv_Frame state to indicate that no credit has been given to the transmitter.

When the SL state machine sends the Enable Disable SSP parameter with an argument of Enable, there is no frame receiver resource credit for the current connection.

7.14.7.13   SSP_RIM1:Rcv_Interlock_Monitor state

This state monitors the number of frames received versus the number of ACKs and NAKs transmitted.

This state shall use the ACK Transmitted parameter and the NAK Transmitted parameter from the SSP_TAN1:Tx_ACK/NAK_idle state to keep track of the number of ACKs and NAKs transmitted. This state shall use the Received Frame parameter from the SSP_RF1:Rcv_Frame state to keep a track of the number of frames received.

Anytime the sum of the ACKs and NAKs transmitted equals the number of frames received this state shall send the Rx Balanced Status parameter with an argument of Balanced to the SSP_RF1:Rcv_Frame state to indicate that the number of frames transmitted is equal to the number of frames received.

Anytime the sum of the ACKs and NAKs transmitted does not equal the number of frames received this state shall send the Rx Balanced Status parameter with an argument of Not

Balanced to the SSP_RF1:Rcv_Frame state to indicate that the number of frames transmitted is not equal to the number of frames received.

When the SL state machine sends the Enable Disable SSP parameter with an argument of Enable, the sum of the ACKs and NAKs transmitted shall be set equal to the number of frames received.

7.14.7.14   SSP_TC1:Tx_Credit_Idle state

7.14.7.14.1   Tx_Credit_Idle state description

This state waits for a Rx Credit Status parameter indication from the SSP_RCM1:Rcv_Credit_Monitor state.

When this state is transitioned into from the SSP_TC2:Indicate_Credit_Tx state with an indication that a RRDY was transmitted it shall indicate the RRDY Transmitted parameter to the SSP_RCM1:Rcv_Credit_Monitor.

When this state is transitioned into from the SSP_TC2:Indicate_Credit_Tx state with an indication that a CREDIT_BLOCKED was transmitted it shall indicate the CREDIT_BLOCKED Transmitted parameter to the SSP_RCM1:Rcv_Credit_Monitor.

7.14.7.14.2   Transition SSP_TC1:Tx_Credit_Idle to SSP_TC2:Indicate_Credit_Tx

This transition shall occur if the SSP_RCM1:Rcv_Credit_Monitor state indicates the Rx Credit Status parameter with the Available argument. This transition shall indicate Transmit RRDY.

This transition shall occur if the SSP_RCM1:Rcv_Credit_Monitor state indicates the Rx Credit Status parameter with the Blocked argument. This transition shall indicate Transmit CREDIT_BLOCKED.

7.14.7.15   SSP_TC2:Indicate_Credit_Tx state

7.14.7.15.1   Indicate_Credit_Tx state description

When the transition to this state indicated Transmit RRDY, this state requests a single RRDY be transmitted by sending a Transmit RRDY parameter to the SSP_T1:Transmit state.

When the transition to this state indicated Transmit CREDIT_BLOCKED, this state requests a single CREDIT_BLOCKED be transmitted by sending a Transmit CREDIT_BLOCKED parameter to the SSP_T1:Transmit state.

7.14.7.15.2   Transition SSP_TC2:Indicate_Credit_Tx to SSP_TC1:Tx_Credit_Idle

This transition shall occur after receiving an RRDY Transmitted parameter or the CREDIT_BLOCKED Transmitted parameter from the SSP_T1:Transmit state.

7.14.7.16   SSP_TAN1:Tx_ACK/NAK_Idle state

7.14.7.16.1   Tx_ACK/NAK_Idle state description

This state waits for a Frame Received parameter from the SSP_RF1:Rcv_Frame state.

When this state is transitioned into from the SSP_TAN2:Indicate_ACK/NAK_Tx state with an indication that an ACK was transmitted it shall send the ACK Transmitted parameter to the SSP_RIM1:Rcv_Interlock_Monitor state.

When this state is transitioned into from the SSP_TAN2:Indicate_ACK/NAK_Tx state with an indication that an NAK was transmitted it shall send the NAK Transmitted parameter to the SSP_RIM1:Rcv_Interlock_Monitor state.

7.14.7.16.2   Transition SSP_TAN1:Tx_ACK/NAK_Idle to SSP_TAN2:Indicate_ACK/NAK_Tx

This transition shall occur if the SSP_RF1:Rcv_Frame state indicates the Frame Received parameter.

If the Frame Received parameter has an argument of Successful, this transition shall indicate Transmit ACK. If the Frame Received parameter has an argument of Unsuccessful, this transition shall indicate Transmit NAK.

If multiple requests for transmitting ACKs and or NAKs occur, then the order in which the ACK and NAK transmissions are requested shall be the same order as the indications for transmitting the ACKs and NAKs were received.

7.14.7.17   SSP_TAN2:Indicate_ACK/NAK_Tx state

7.14.7.17.1   Indicate_ACK/NAK_Tx state description

When the transition to this state indicated Transmit ACK, this state requests a single ACK be transmitted by sending a Transmit ACK parameter to the SSP_T1:Transmit state.

When the transition to this state indicated Transmit NAK, this state requests a single NAK be transmitted by sending a Transmit NAK parameter to the SSP_T1:Transmit state.

7.14.7.17.2   Transition SSP_TAN2:Indicate_ACK/NAK_tx to SSP_TAN1:Tx_ACK/NAK_idle

This transition shall occur after receiving an ACK Transmitted parameter or the NAK Transmitted parameter from the SSP_T1:Transmit state.