

Stream Control Transmission Protocol (SCTP Session Setup, Release and IP Address Reconfiguration)

SCTP Network		EventStudio System Designer 2.5
SCTP Endpoint A	SCTP Endpoint B	
IP Address A	IP Address B 1	IP Address B 2

This sequence diagram was generated with EventStudio System Designer 2.5 (<http://www.EventHelix.com/EventStudio>). The diagram is based on an Ethereal capture obtained from: <http://wiki.ethereal.com/SampleCaptures>.

Stream Control Transmission Protocol (SCTP) is a relatively new transport layer in the IP Protocol Stack. SCTP belongs to the SIGTRAN protocol family and has been used as the transport layer for carrying telecom signaling over IP.

SCTP provides a reliable transport service that operates at message level (unlike TCP that provides a byte stream interface with no message boundaries).

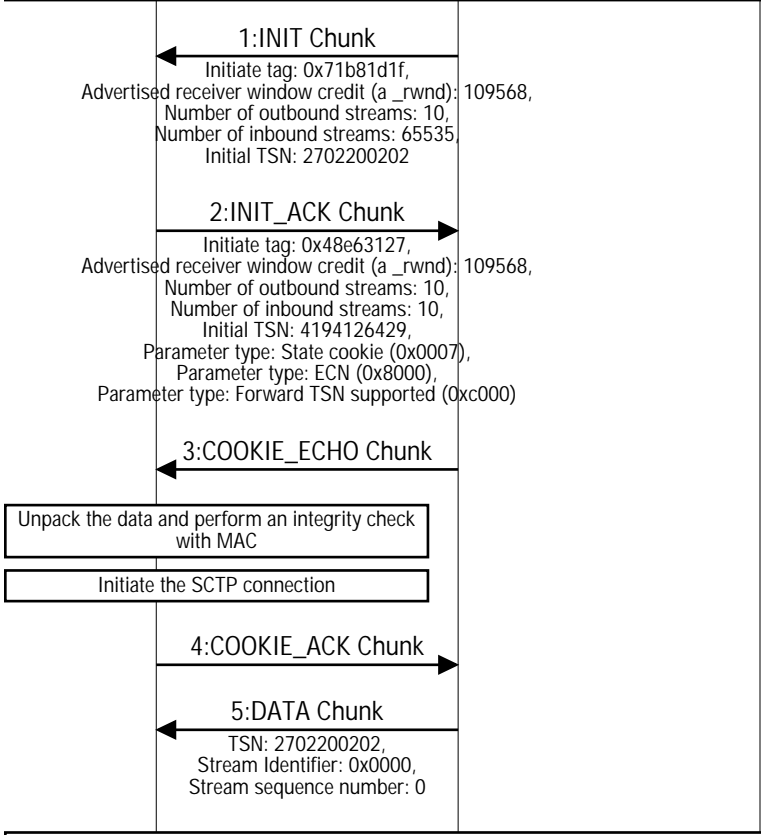
SCTP allows multiple message streams to be exchanged on a single SCTP connection. Data from multiple streams can be sent in a single SCTP message as chunks. Selective acknowledgements are supported at individual chunk level.

Recent additions to the SCTP protocol allow dynamic configuration of the IP addresses. Similar to SS7, SCTP can be switched over from one link to another. SCTP supports a make-before-break changeover, i.e. the packet stream is moved before removing the link that needs to be taken out of service.

In this sequence diagram we will be examining some of the features of SCTP.

- (1) SCTP Connection establishment.
- (2) SCTP data exchange and selective acknowledgement.
- (3) Addition of a new IP address to an SCTP connection.
- (4) Switching over to the new IP address.
- (5) Removing the old IP address.
- (6) SCTP connection release.

Setting up the SCTP connection.



An association setup request is received in the closed state. The server analyzes the received INIT chunk and generates all the values needed at its side to enter an established association, and generates a secure hash of these values and a secret key (e.g. with the MD5 or SHA-1 algorithms).

The secure hash values and a message authentication code (MAC) are stored in a COOKIE parameter. This information is sent by in the INIT-ACK message.

SCTP Endpoint B copies the COOKIE into the COOKIE-ECHO message.

SCTP End Point A validates the COOKIE-ECHO by checking it against the included MAC,

The COOKIE-ECHO validation had passed, so an SCTP instance is created.

SCTP Endpoint A replies with a COOKIE-ACK, indicating that the COOKIE-ECHO has been accepted.

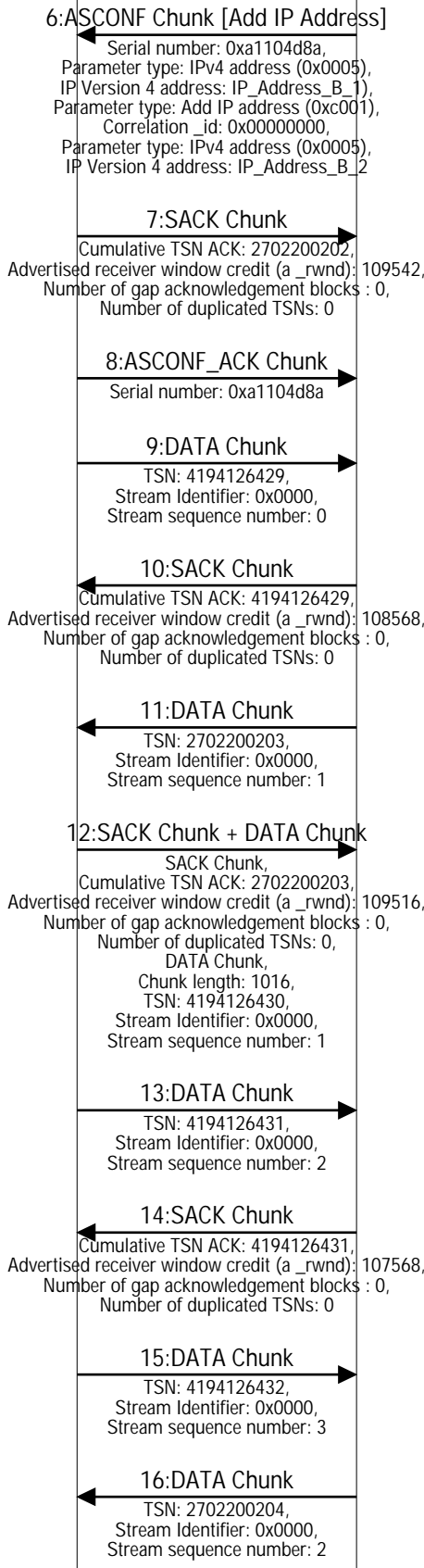
Endpoint B sends stream data using the DATA chunk. The Transport Sequence Number (TSN) is assigned to the chunk. The acknowledgements sent from the receiver to the sender are based on these sequence numbers.

Addition of a new IP address

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SCTP Endpoint B sends an Address configuration change chunk (ASCONF) with an "Add IP Address" indication for IP_Address_B_2.

SCTP Endpoint A acknowledges the data by sending a Cumulative TSN ACK. SCTP supports a powerful selective acknowledgement interface. Gaps in received sequence numbers can be signaled efficiently.

The SCTP Endpoint A acknowledges the addip request. The ack is sent within the Address Configuration Ack (ASCONF_ACK) chunk.

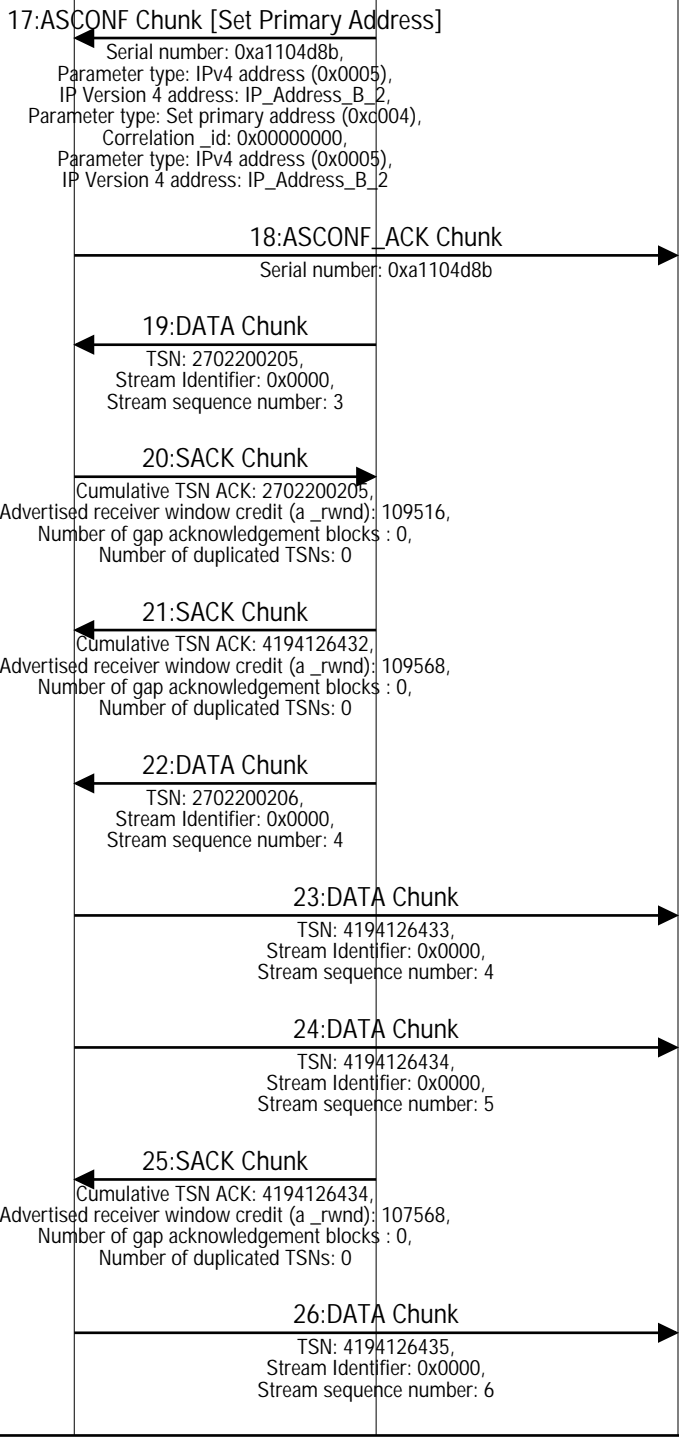
A new IP address has been added but this has no impact on the data communication.

A message containing the SACK and the DATA chunk.

Set the primary address to the newly added IP address.

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The Set Primary Address command is used to indicate that henceforth IP_Address_B_2 should be the primary IP address for SCTP Endpoint B.

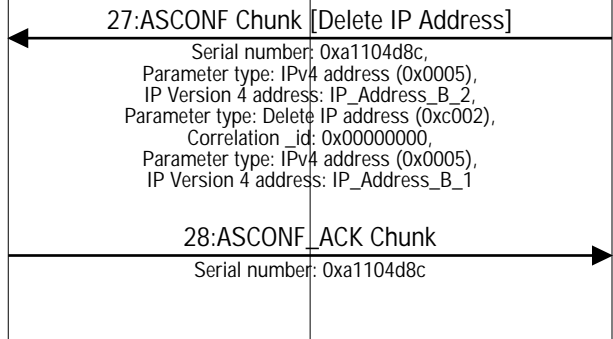
The SCTP Endpoint A acknowledges the message on the new primary IP address (i.e. IP_Address_B_2).

Pending data chunks are still exchanged using IP_Address_B_1.

Endpoint A starts sending DATA chunks to the new primary address (IP_Address_B_2).

Final SACK for Chunks that were received at IP_Address_B_1.

Deleting the old IP address



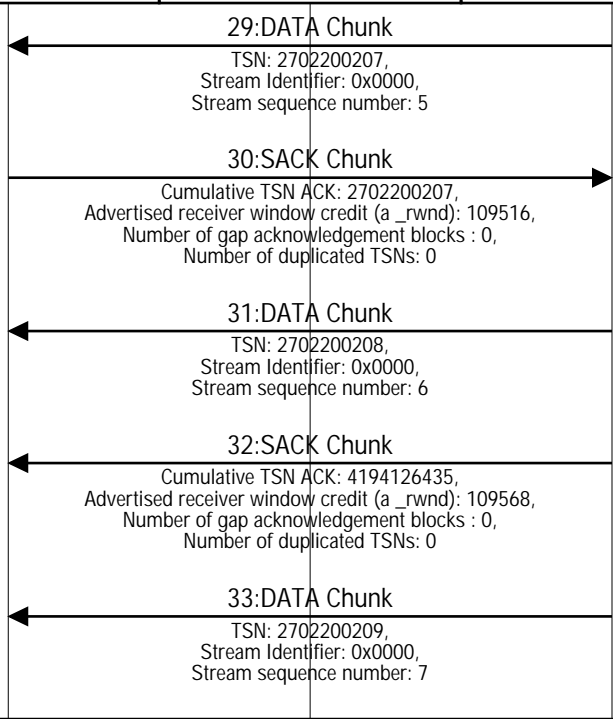
The data session has been completely switched over from IP_Address_B_1 to IP_Address_B_2. Now delete IP_Address_B_1 by sending the Delete IP Address indication.

Endpoint A acknowledges the deletion.

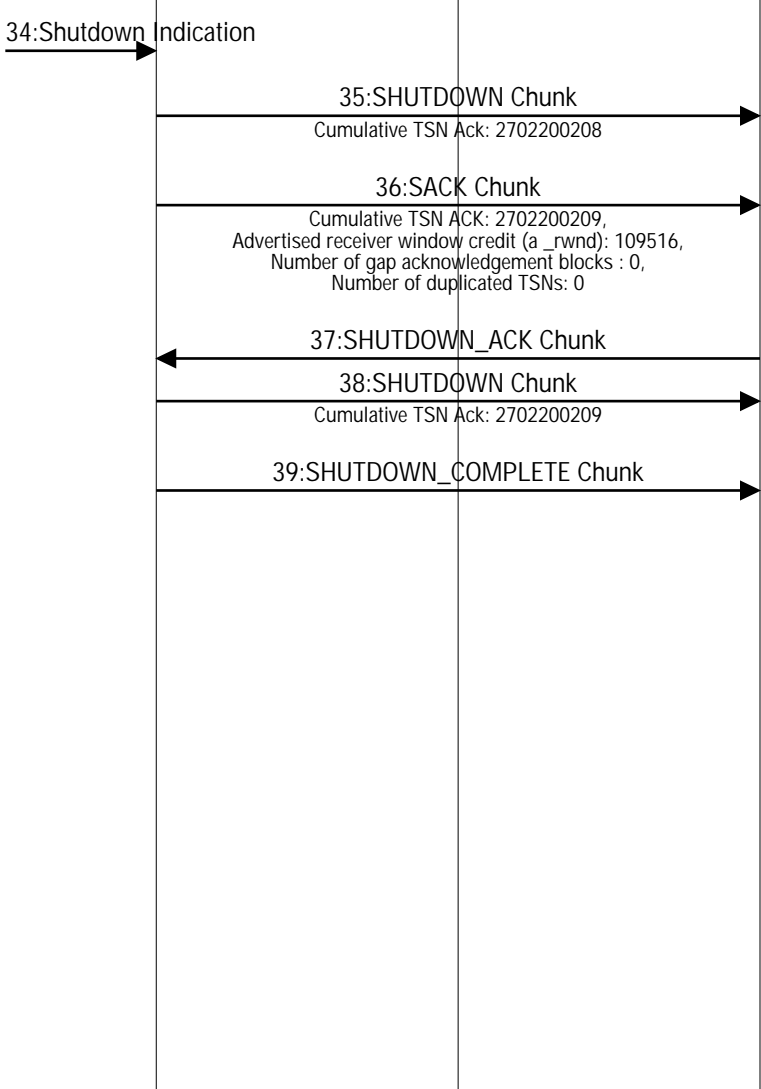
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Releasing the SCTP connection.



The SCTP higher layer decides to release the SCTP connection.
Shutdown Chunk is sent out for releasing the SCTP connection.

A new acknowledgement is received after sending the SHUTDOWN message.

Endpoint B accepts the release of the SCTP connection.
The SHUTDOWN message is resent to reflect the sequence number received in the acknowledgement.

This message completes the release of the SCTP connection.