5 TCP/IP Protocol Suite
Part 3
SCTP and IP Routing

Most slides are from the instructor resources of the following books:

1. Data communications and networking, 4th edition, Forouzan, McGrawHill
2. Computer networks, 4th edition, Tanenbaum, Prentice Hall
3. Textbook

SCTP

Stream Control Transmission Protocol (SCTP) *is a new reliable, message-oriented transport layer protocol. SCTP, however, is mostly designed for Internet applications that have recently been introduced. These new applications need a more sophisticated service than TCP can provide.*

Topics discussed in this section:

SCTP Services and Features
Packet Format
An SCTP Association
Flow Control and Error Control

UDP: a message-oriented protocol

TCP: a byte-oriented protocol

SCTP (Stream Control Transmission Protocol): a reliable message-oriented protocol

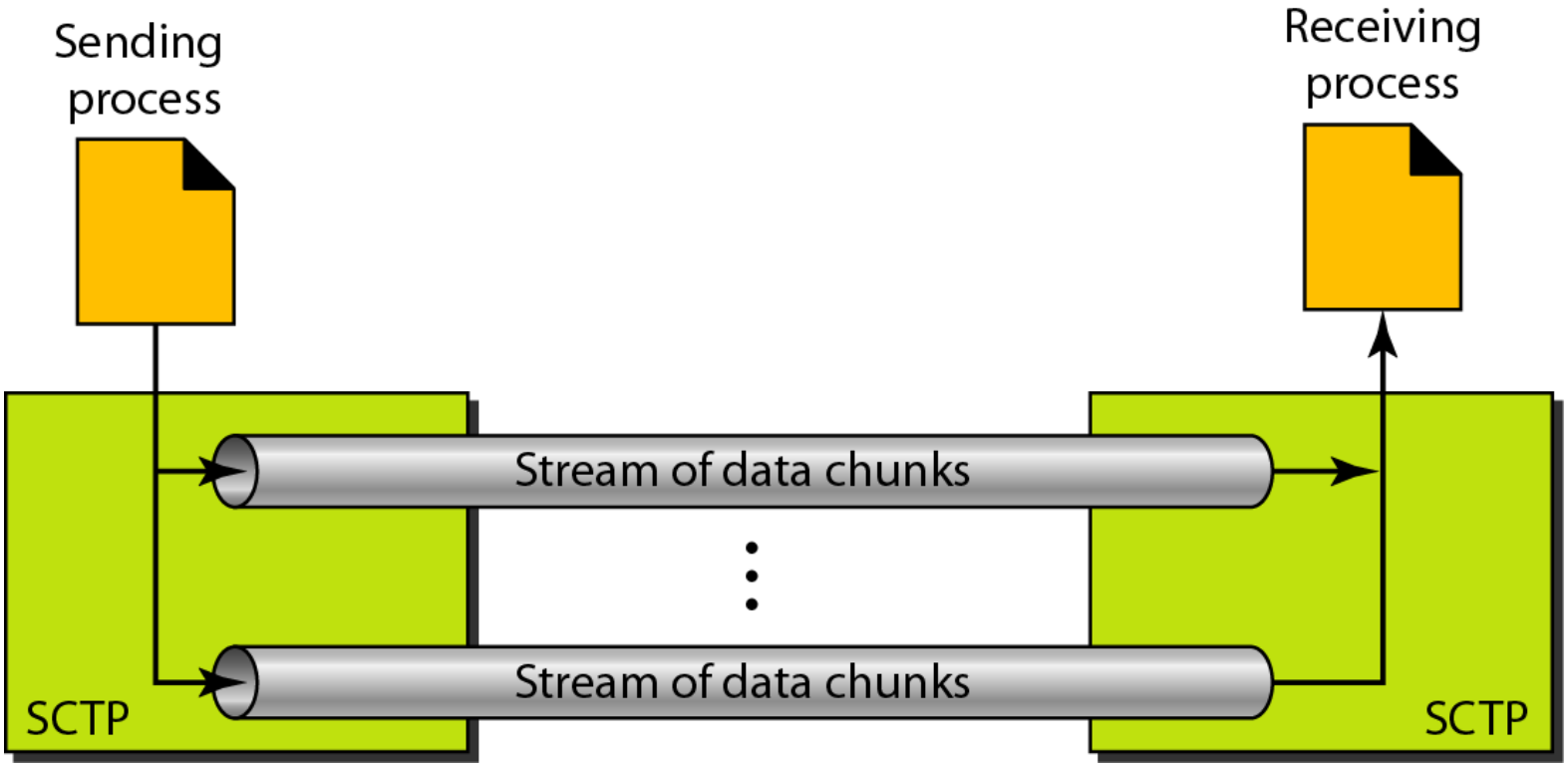
Note

SCTP is a message-oriented, reliable protocol that combines the best features of UDP and TCP.

Some SCTP applications

Protocol	*Port Number*	*Description*
IUA	9990	ISDN over IP
M2UA	2904	SS7 telephony signaling
M3UA	2905	SS7 telephony signaling
H.248	2945	Media gateway control
H.323	1718, 1719, 1720, 11720	IP telephony
SIP	5060	IP telephony

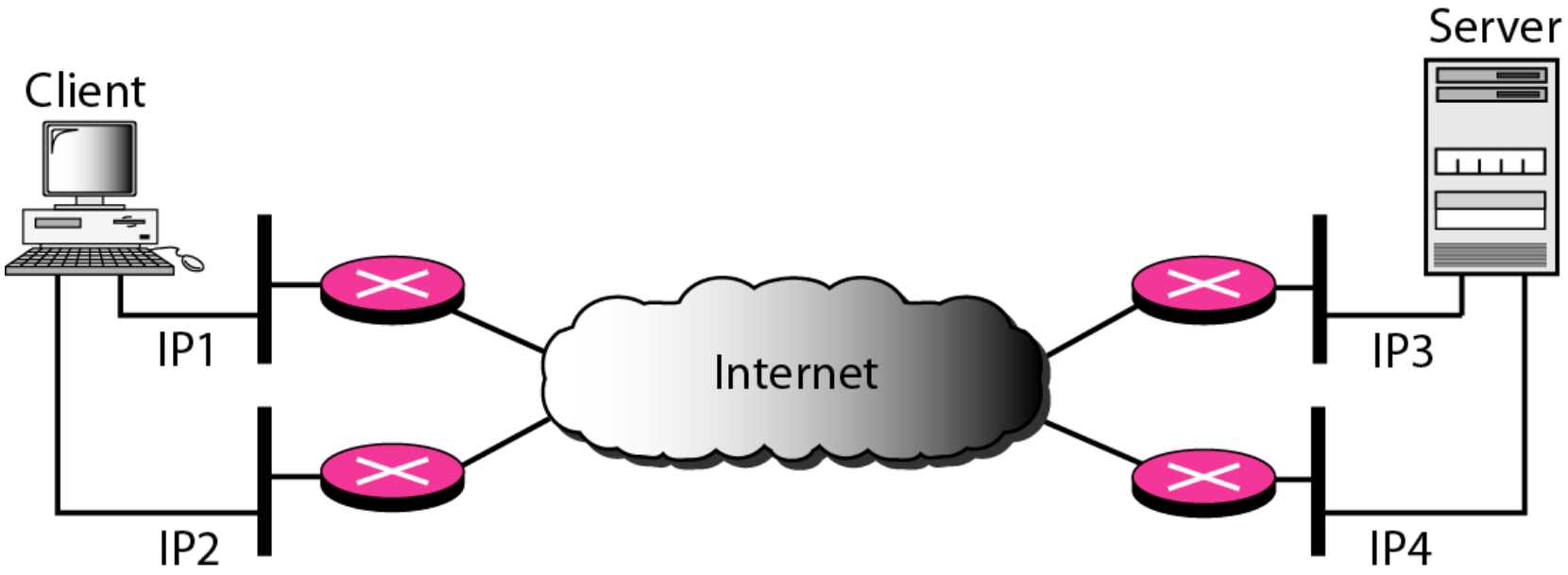
Multiple-stream concept



Note

An **association** in SCTP can involve multiple streams.

Multihoming *concept*



SCTP association allows multiple IP addresses for each end.

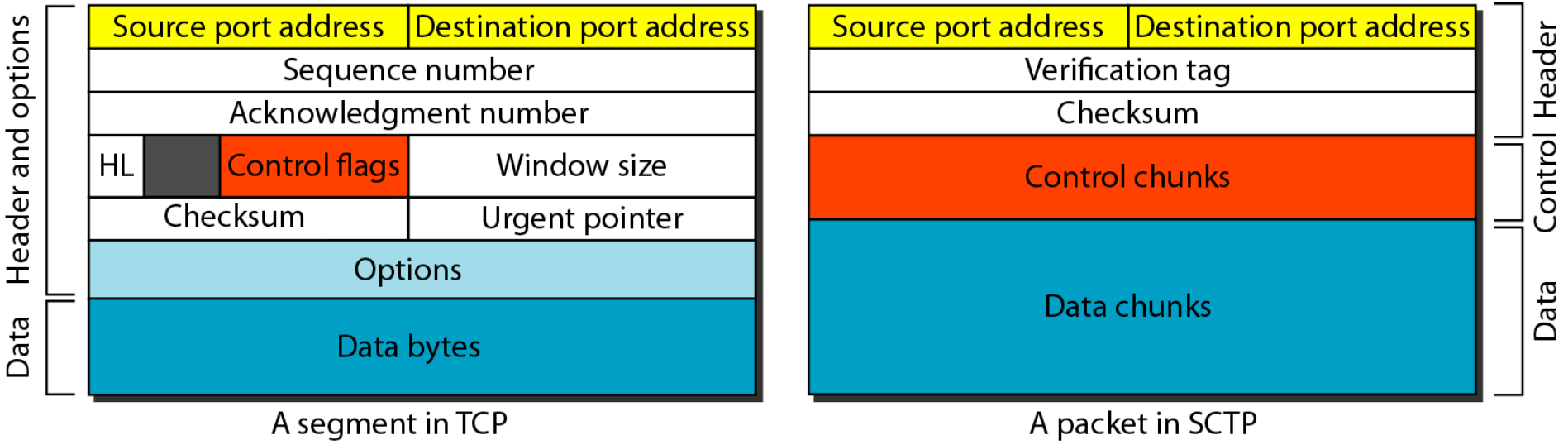
In SCTP, a **data chunk** is numbered using a TSN (Transmission Sequence Number).

To distinguish between different streams, SCTP uses an SI (Stream Identifier).

To distinguish between different data chunks belonging to the same stream, SCTP uses SSNs (Stream Sequence Number).

TCP has segments; SCTP has packets.

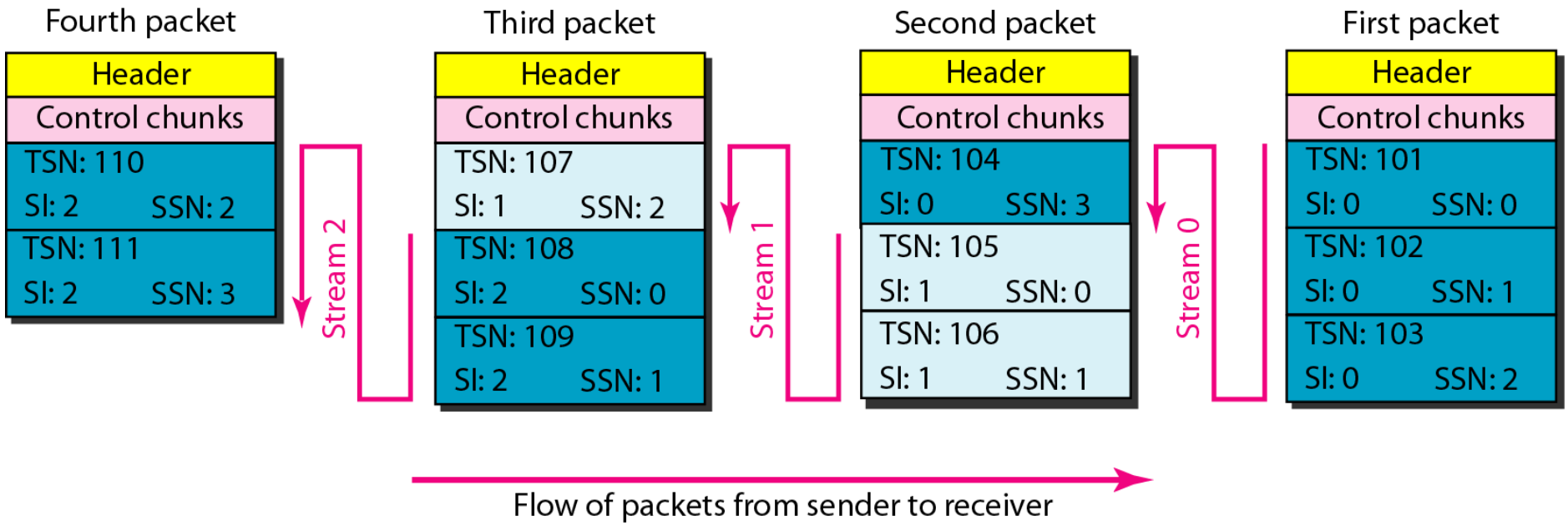
Comparison between a TCP segment and an SCTP packet



Note

In SCTP, control information and data information are carried in separate chunks.

Packet, data chunks, and streams



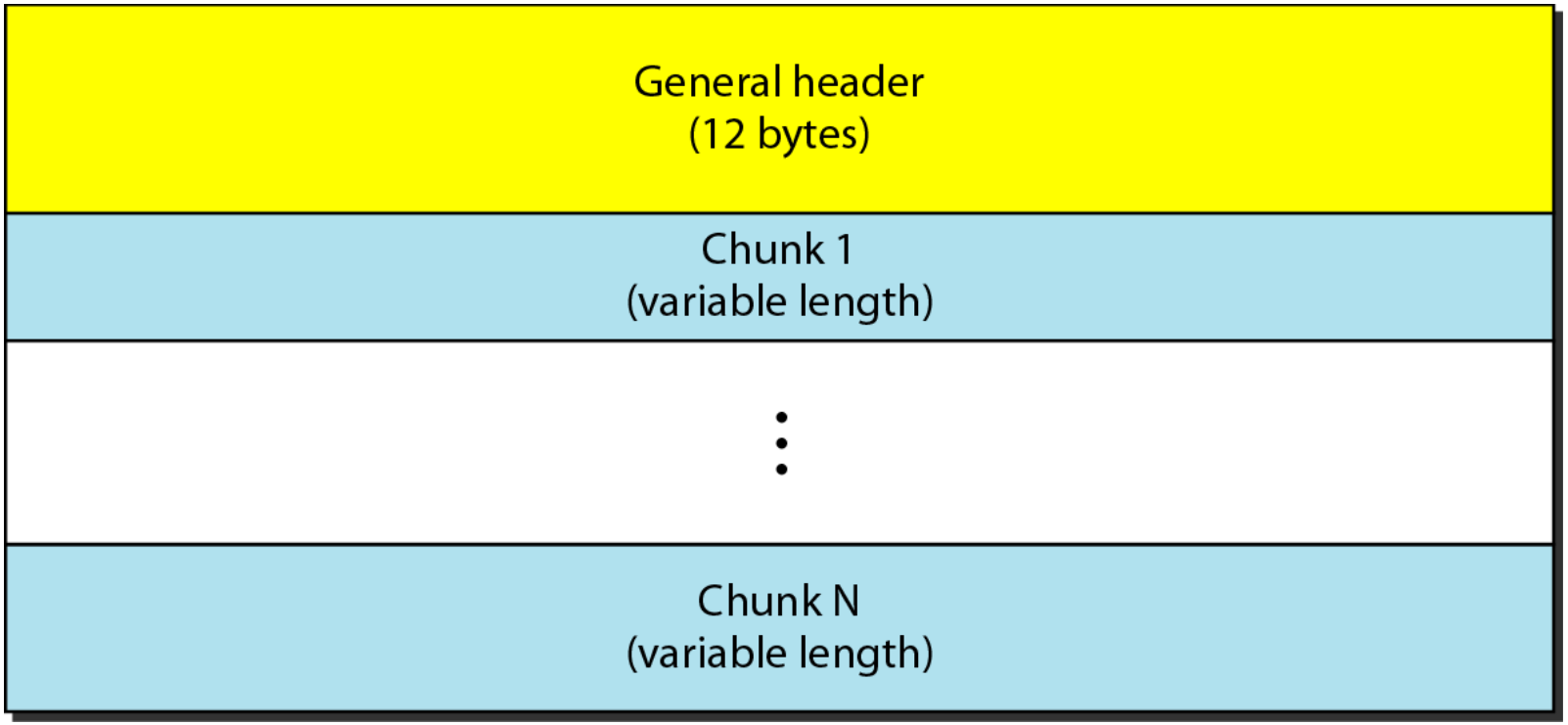
Note

Data chunks are identified by three items: TSN, SI, and SSN. TSN is a cumulative number identifying the association; SI defines the stream; SSN defines the chunk in a stream.

Note

In SCTP, acknowledgment numbers are used to acknowledge only data chunks;
control chunks are acknowledged by other control chunks if necessary.

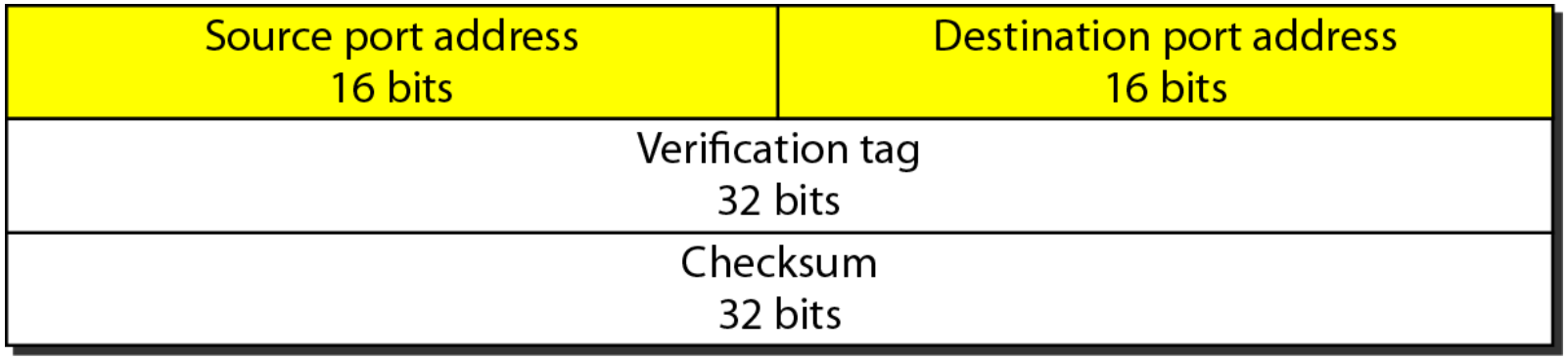
SCTP packet format



Note

In an SCTP packet, control chunks come before data chunks.

General header



Chunks

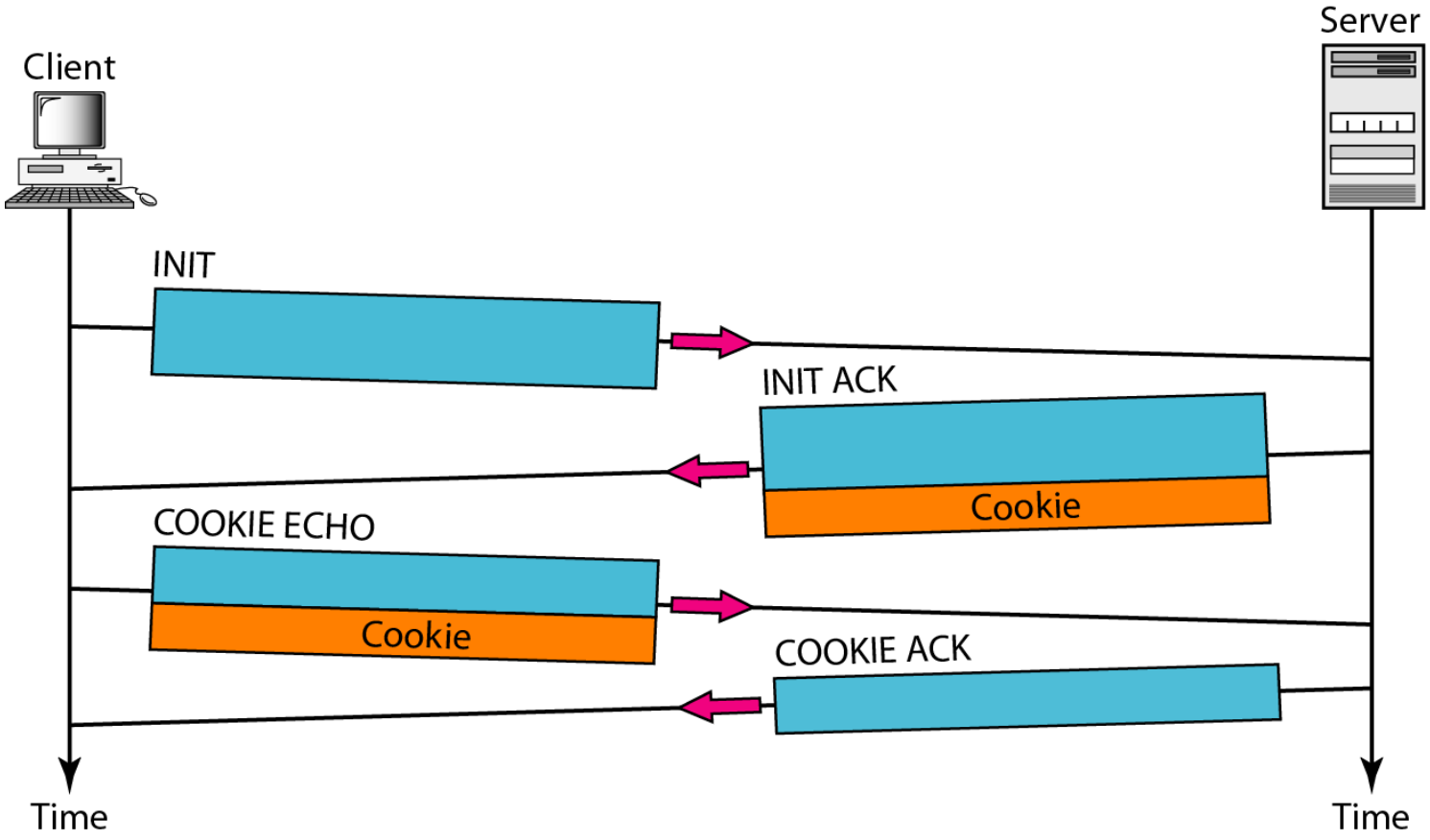
Type	*Chunk*	*Description*
0	**DATA**	User data
1	**INIT**	Sets up an association
2	**INIT ACK**	Acknowledges INIT chunk
3	**SACK**	Selective acknowledgment
4	**HEARTBEAT**	Probes the peer for liveliness
5	**HEARTBEAT ACK**	Acknowledges HEARTBEAT chunk
6	**ABORT**	Aborts an association
7	**SHUTDOWN**	Terminates an association
8	**SHUTDOWN ACK**	Acknowledges SHUTDOWN chunk
9	**ERROR**	Reports errors without shutting down
10	**COOKIE ECHO**	Third packet in association establishment
11	**COOKIE ACK**	Acknowledges COOKIE ECHO chunk
14	**SHUTDOWN COMPLETE**	Third packet in association termination
192	**FORWARD TSN**	For adjusting cumulative TSN

Note

A connection in SCTP is called an association.

No other chunk is allowed in a packet carrying an INIT or INIT ACK chunk.
A COOKIE ECHO or a COOKIE ACK chunk can carry data chunks.

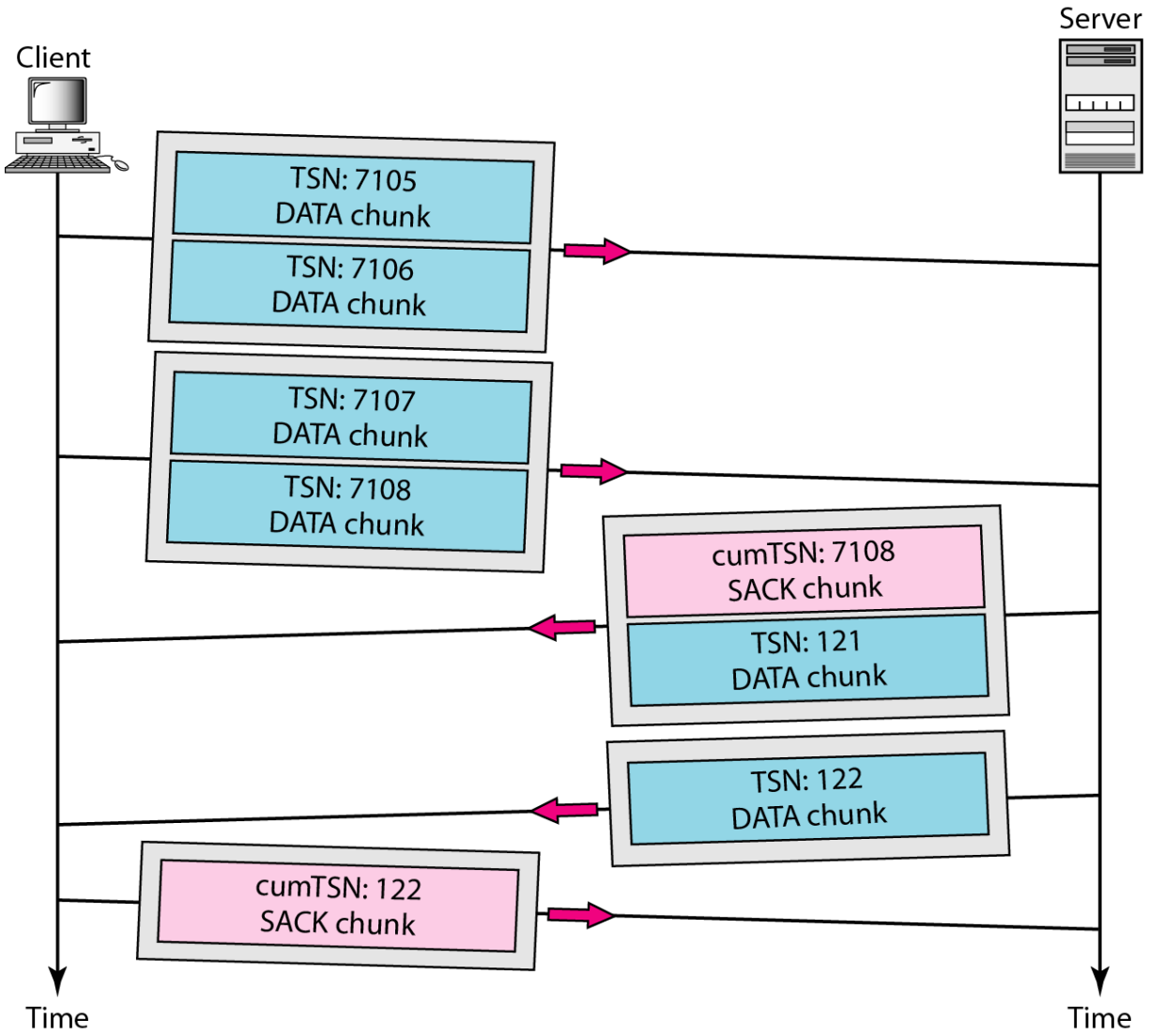
Four-way handshaking



Note

In SCTP, only DATA chunks consume TSNs; DATA chunks are the only chunks that are acknowledged.

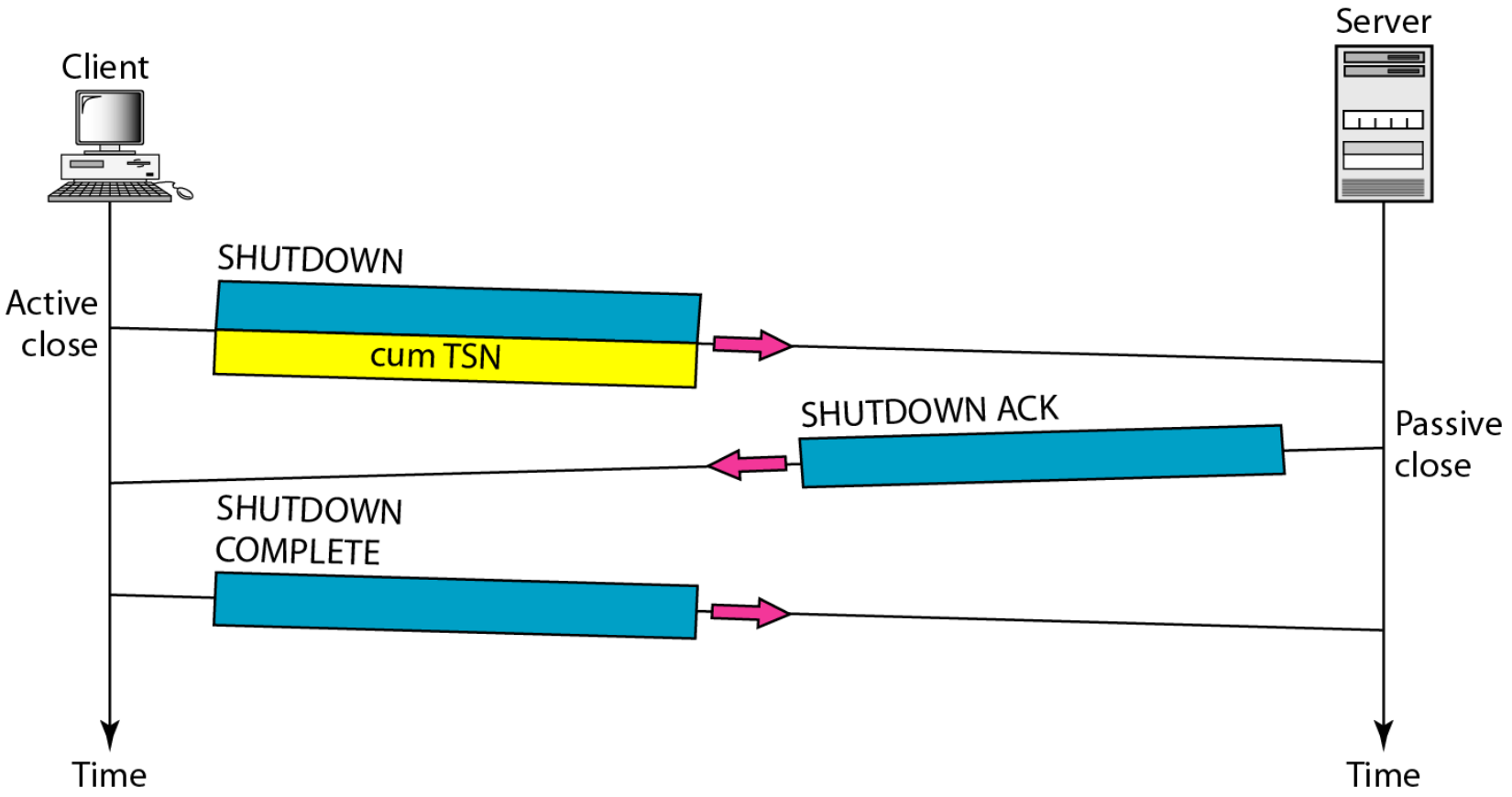
Simple data transfer



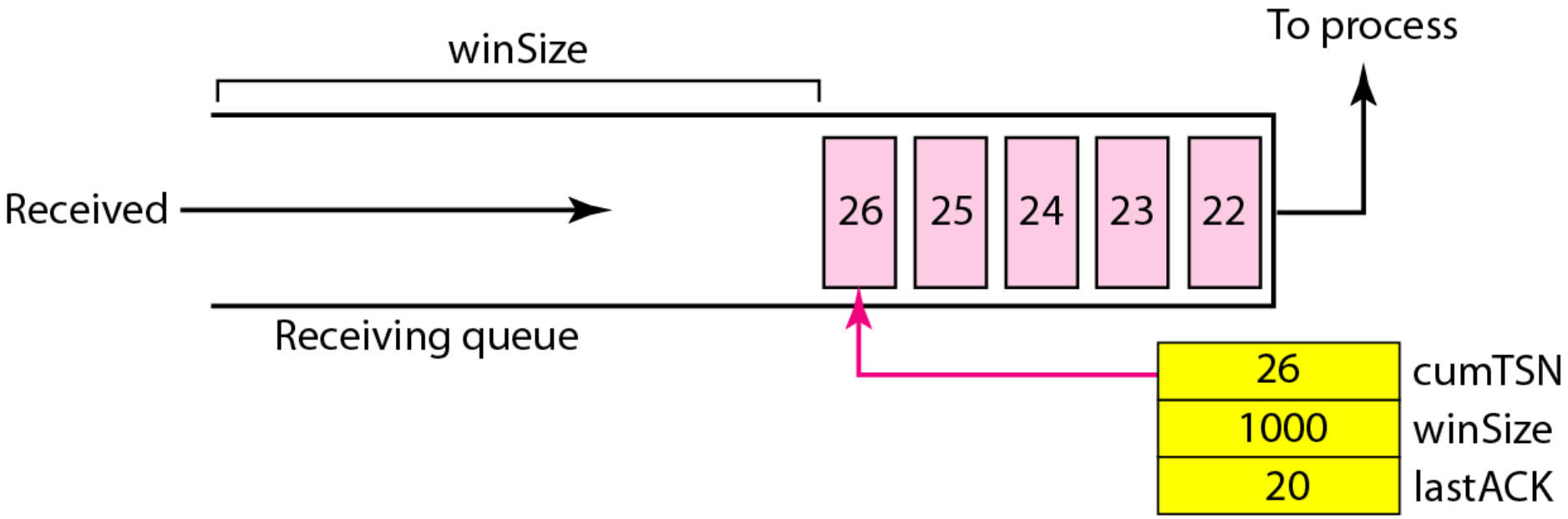
Note

The acknowledgment in SCTP defines the cumulative TSN, the TSN of the last data chunk received in order.

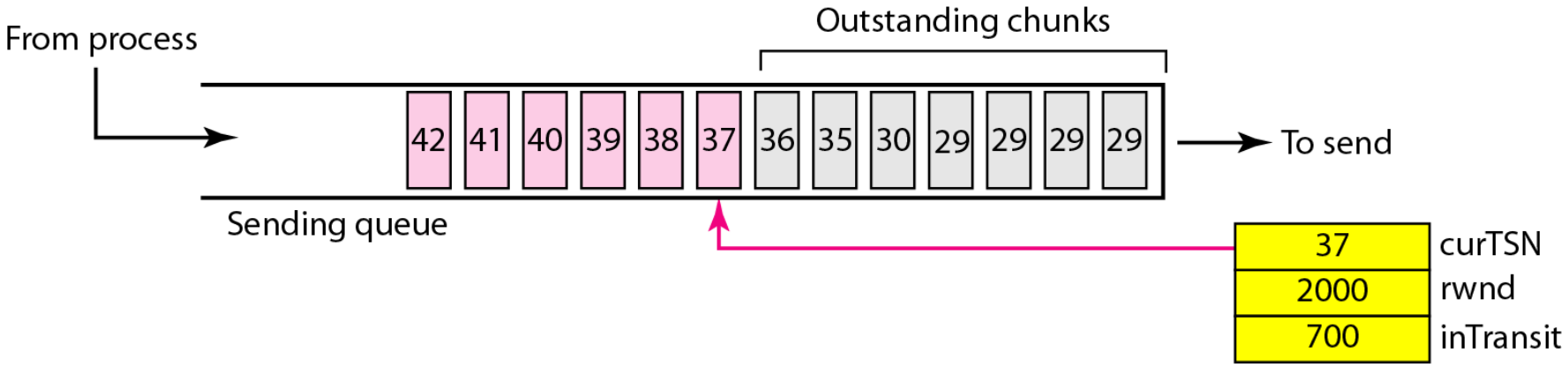
Association termination



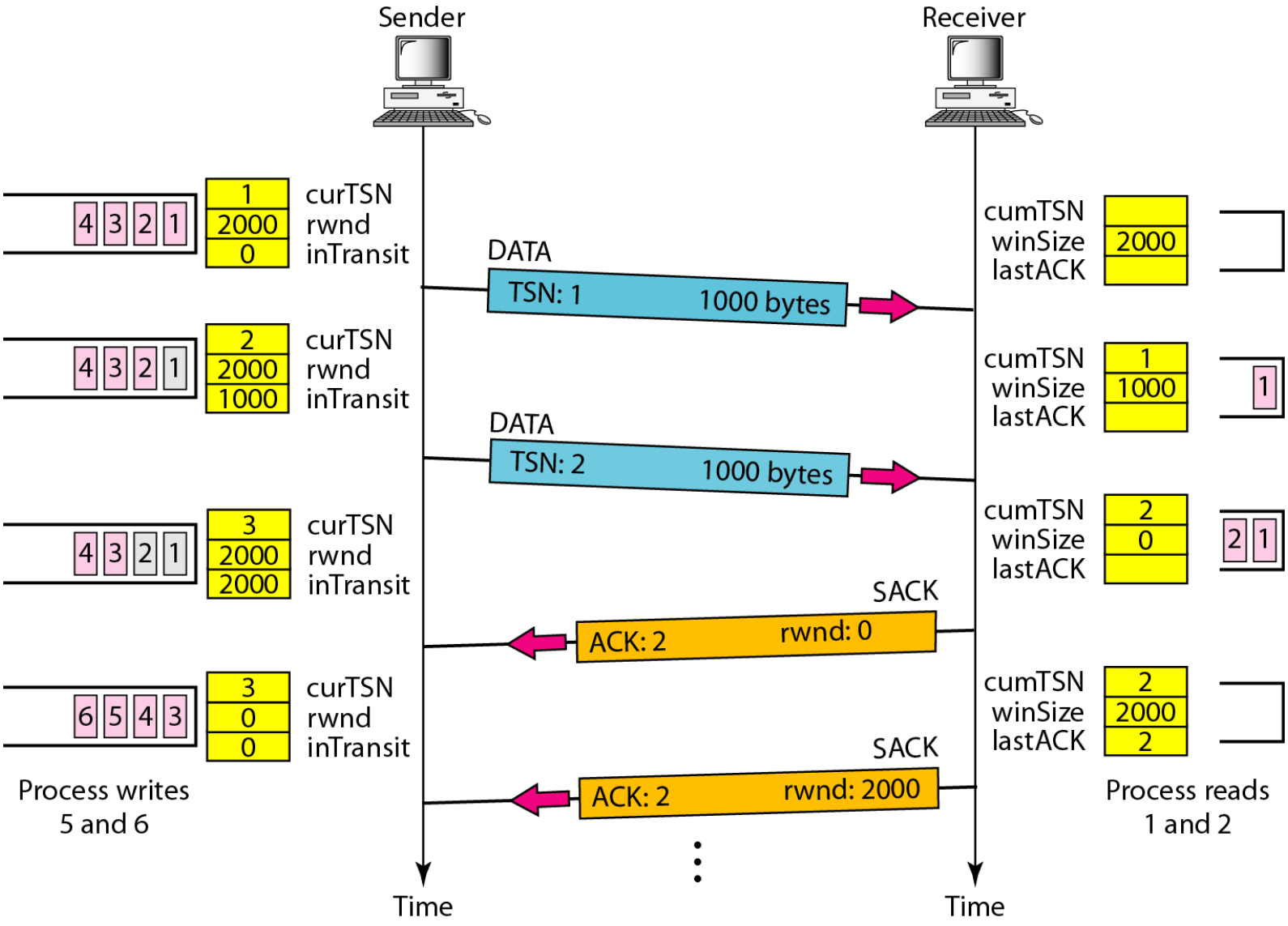
Flow control, receiver site



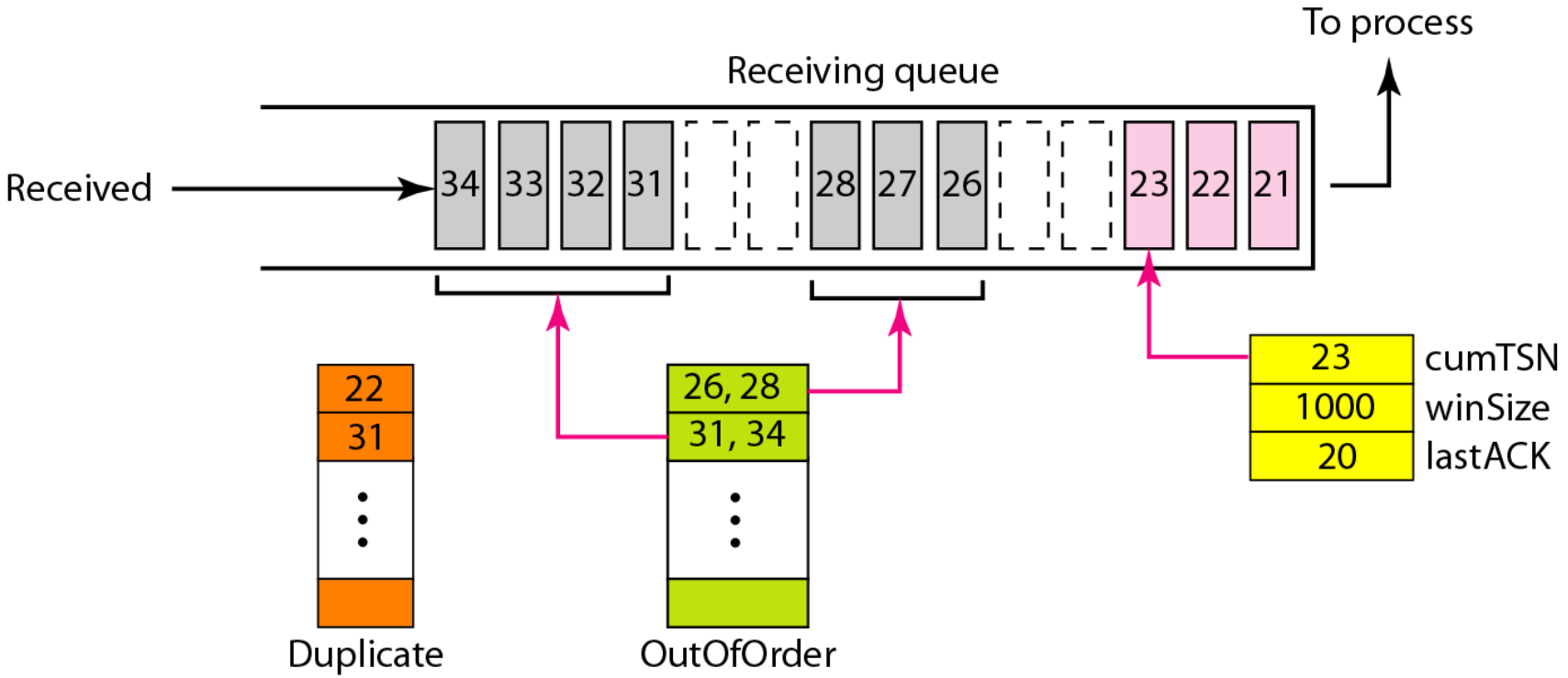
Flow control, sender site



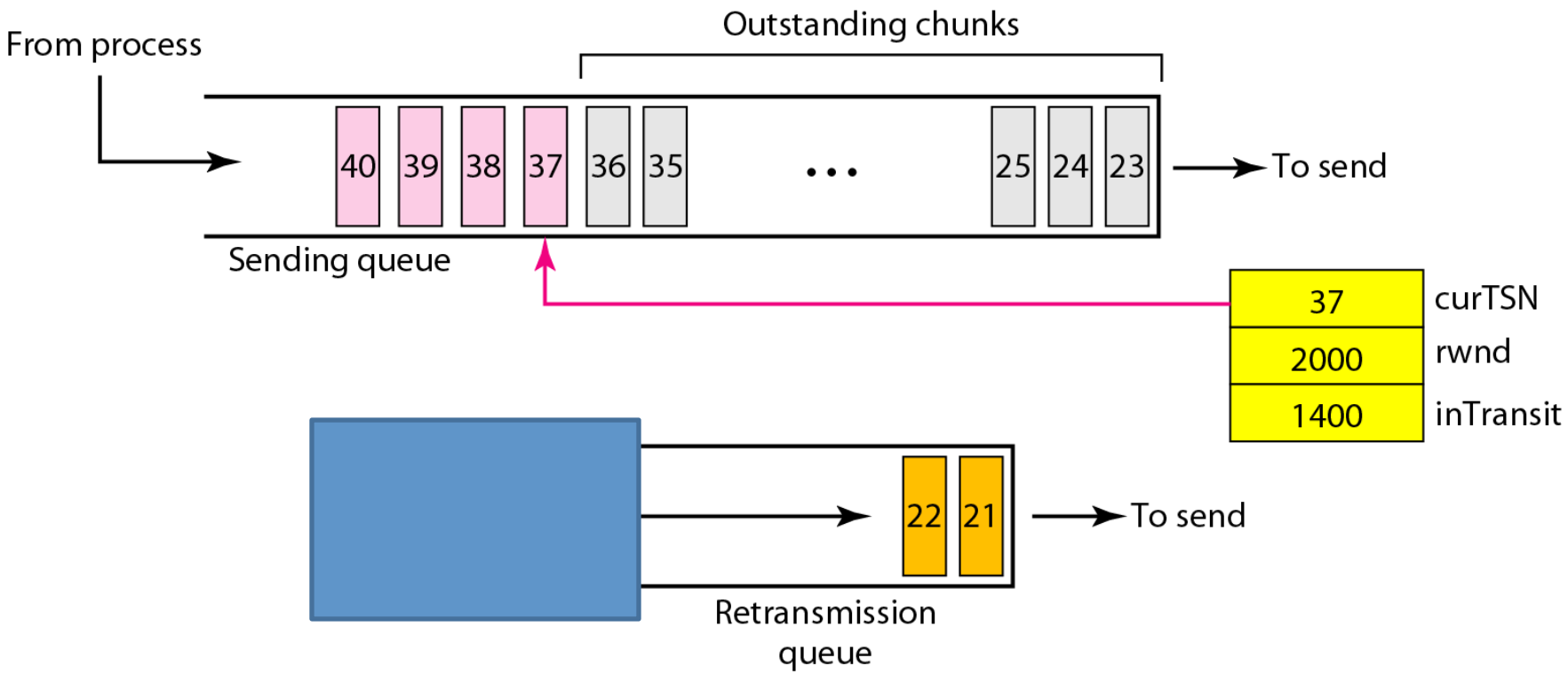
Flow control scenario



Error control, receiver site



Error control, sender site



For more details,

www.ietf.org/rfc.html

UDP: 768

TCP: 675, 700, 721, 761, 793, 879, 896, 1078, 1106, 1100, 1144, 1145, 1146, 1263, 1323, 1337, 1379, 1644, 1693, 1901, 1905, 2001, 2018, 2488, 2580

SCTP: 2960, 3257, 3284, 3285, 3286, 3309, 3436, 3554, 3708, 3758