1 Sliding Window Protocol

A sliding window protocol is a feature of Packet based data transmission protocols. They are used where reliability i. order to delivery of packets is required, such as in data link layer as in the transmission control protocol(TCP).

1.1 Features

Each position of the transmission (Packets) is assigned a unique consecutive sequence number and the receiver uses the numbers to place received packets in the correct order. i.e.

- Discarding duplicate packets.
- Identifying missing packets.

1.2 Problem

There is no limit of the size or sequence numbers that can be required in this protocol.

1.3 Approach to the Problem

This problem can be chacked by placing a limit on the number of packets that can be transmitted or received at any given time.

1.4 Merits

A sliding window protocol allows an unlimited numbers of packets to be communicated using fixed sequence numbers.

1.5 Alertness

For highest possible throughput, it is important that the transmitter is not permitted to stop sending by the sliding window protocol earlier than one Round Trip Delay Time(RTT).
RTT: It is the length of time it takes for a signal to be sent plus the length of time it takes for an acknowledge of that signal to be received.
RTT = SendTime + AckTime

2 Protocol based Communication

In communication based protocol , the receiver must acknowledge received packets. If transmitter does not receive an acknowledgement within a reasonable time, it resends data.

If a transmitter does not receive an acknowledgement it cannot know whether actually receiver received the packet or not, or packet was damaged or it may also happen that acknowledgement was sent but it was lost.

3 Protocol Operation

Basic terms used in it are -

- Transmitter sequence number = n(t)
- Receiver sequence number = n(r)
- Transmitter window size = w(t)
- Receiver window size = w(r)

Window size must be greater than Zero. As we mentioned , n(t) is the next packet to be transmitted and the sequence number of this packet is not yet received and n(r) is the first packet not yet received. These both numbers are in increasing mode.

3.1 Receiver Operation

n(s) is one more than the sequence number of the highest sequence number received.

- *Received a Packet*
- *Updates its Variable*
- *Transmit acknowledgement with the new n(r)*
- *Transmitter keeps track of the highest acknowledgement it has received n(a)*

But it is uncertain about the packets n(a) and n(s).

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n(a)<= n(r)<= n(s)
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3.1.1 Some Facts

There are some facts that are listed below -

- The highest acknowledgement received by the transmitter cannot be higher than the highest acknowledged by the receiver.

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n(a)<= n(r)
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- The span of fully received packets cannot extend beyond the end of the partially received packet.

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n(r)<=n(s).
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- The highest packet received cannot be higher than the highest packet send.

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n(s)<=n(t)
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- The highest packet sent is limited by the highest acknowledgement received and the transmit window size.

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n(t)<=n(a) +w(t)
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3.2 Transmitter Operation

If transmitter wants to send data, it may transmit upto w(t) packets ahead of the latest acknowledgement n(a). A transmitter can send packet number n(t) if and only if

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n(t) < n(a) +w(t)
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3.3 Benefit of Sliding Window Protocol

Some benefits of sliding window protocol -

- *Data Reliability*
- Data Integrity
- Unlimited Sequence numbers are used

3.4 Drawback of Sliding Window Protocol

- Ambiguity occurs
- Maintaining a Sequence number is difficult

Diff. b/w OSI & TCP/IP model. (1)

	TCP/IP	OSI Model
1	Implementation of OSI model	Reference model
2	Model around which Internet is developed	This is a theoretical model
3	Has only 4 layers	Has 7 layers
4	Considered more reliable	Considered a reference tool
5	Protocols are not strictly defined	Stricter boundaries for the protocols
6	Horizontal approach	Vertical approach
7	Combines the session and presentation layer in the application layer and presentation layer	Has separate session
8	Protocols were developed first and then the model was developed before the development of protocols	Model was developed
9	Supports only connectionless communication in the network layer	Supports connectionless and connection-oriented communication in the network layer
10	Protocol dependent standard	Protocol independent standard

OSI

7
6
5 — 4 Appl. — SMTP FTP HTTP DNS TFTP R

4 — 3 Transport — TCP — UDP

3 — 2 Internet — ARP RARP — IP — IGMP

2
1 — 1 link layer → Ethernet — 802.11 wireless