AX.25 Sequence Numbers

AX.25 Sequence Numbers: V_s, V_r, and V_a

The AX.25 Link Access Procedure (Data Link Layer) utilizes a sophisticated **sliding window protocol** to ensure all data frames are delivered reliably and in the correct sequence. The operational state of this link is governed by three primary sequence number variables, which are essential for tracking both sent and received data and enforcing flow control.

V_s (Send Sequence Number)

V_s is the variable that tracks the sequence number of the **next Information (I) frame** your station is preparing to send. It effectively represents the **upper boundary** of the transmit window. When the last I-frame has been successfully transmitted, the V_s counter is incremented.

V_a (Acknowledge Sequence Number)

V_a marks the sequence number of the **earliest unacknowledged I-frame** that has been sent by your station. It defines the **lower boundary** of the transmit window.

Significance: All frames sent with sequence numbers between V_a and V_s are considered **outstanding** (sent but awaiting an acknowledgment). V_a is crucial for **flow control**, as it prevents the station from sending more frames than the current window size permits.

V_r (Receive Sequence Number)

V_r is the counter that tracks the sequence number of the **next sequential I-frame your station expects to receive** from the remote station. It acts as the **inbound frame counter**.

Significance: If the sequence number of an incoming frame (N(S)) matches V_r, the frame is accepted and V_r is incremented. This V_r value is then included in acknowledgment frames (R-frames) sent back, ensuring **cumulative acknowledgment** and correct, in-order data processing.