5G NR: Radio Access Networks

RADIO LINK CONTROL (RLC)

RLC

Functions of RLC

- Segmentation
- ARQ – Retransmissions

RLC modes

Transparent Mode

No retransmission,
No duplicate detection,
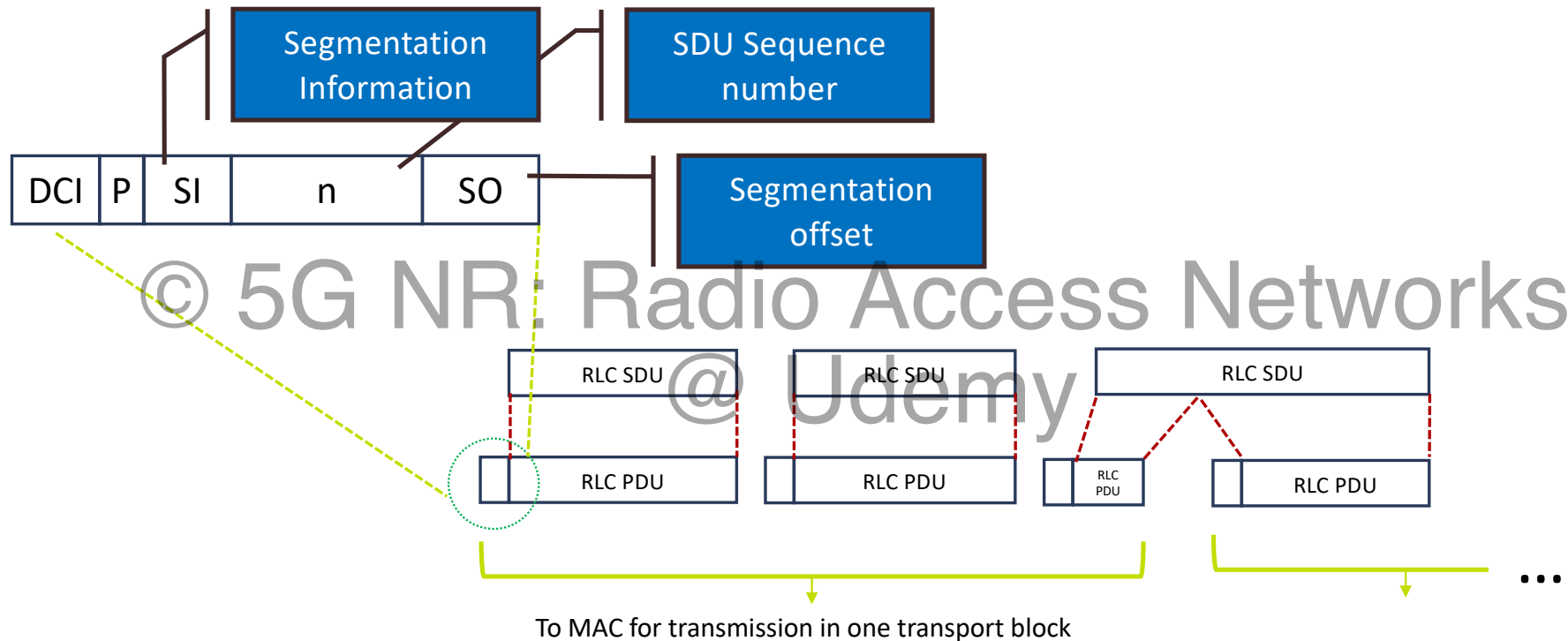No segmentation/ reassembly

Unacknowledged Mode

Segmentation, but no retransmissions

Acknowledged Mode

Retransmissions, segmentation, duplicate removal

Segmentation

Segmentation Information

SDU Sequence number

Segmentation offset

DCI | P | SI | n | SO

© 5G NR: Radio Access Networks @ Udemy

RLC SDU | RLC SDU | RLC SDU

RLC PDU | RLC PDU | RLC PDU | RLC PDU

To MAC for transmission in one transport block

In LTE | RLC PDU

Retransmissions

In-sequence delivery not handled in RLC
- Latency
- Buffering requirements

Retransmissions

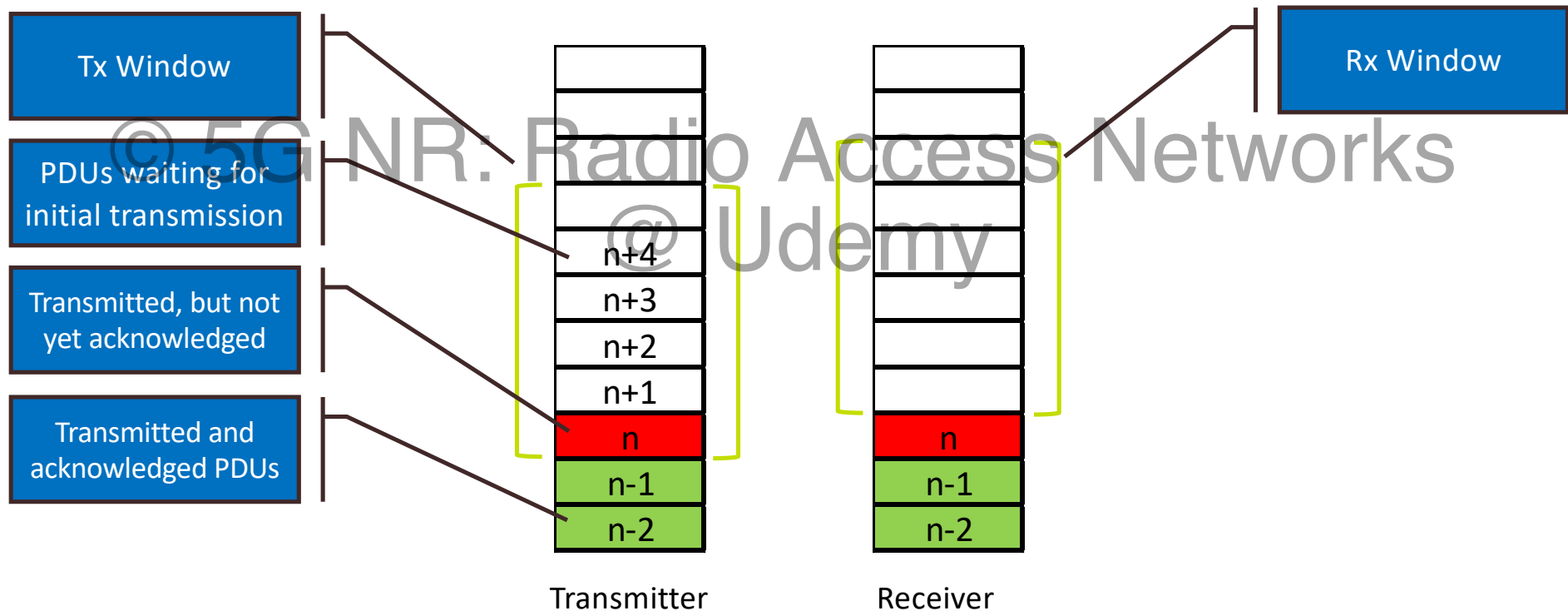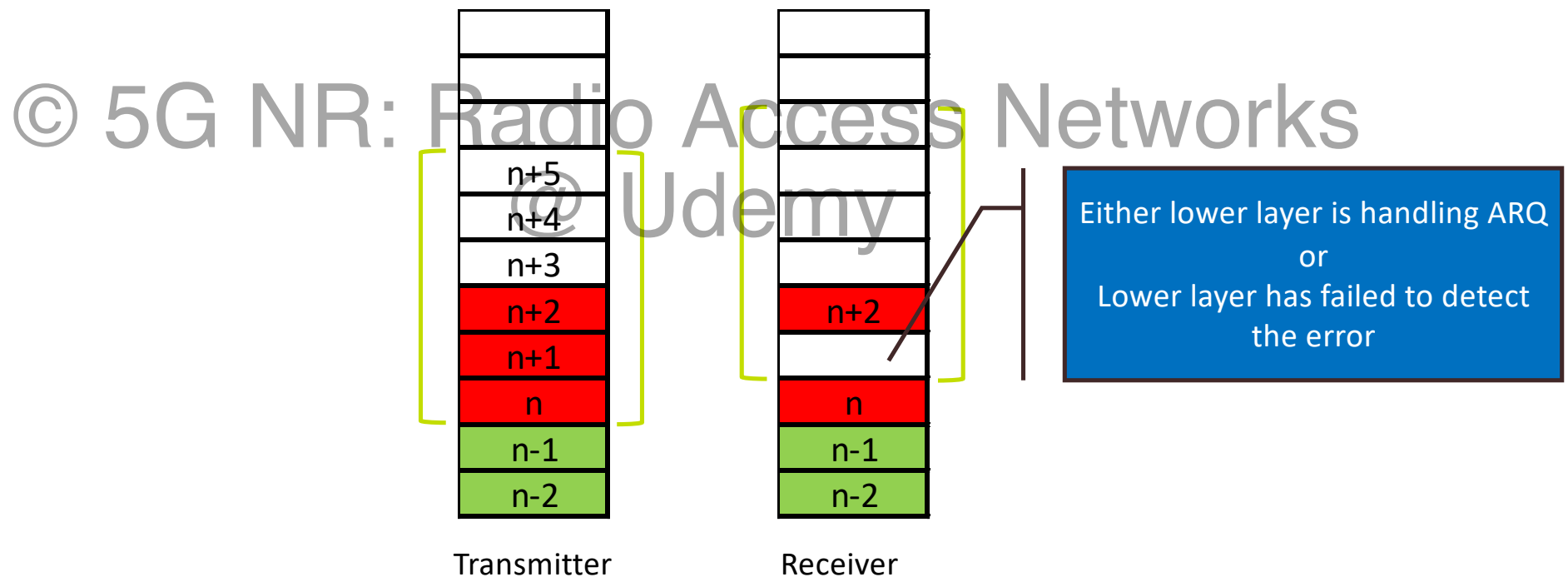| Transmitter	Receiver
n+5	
n+4	
n+3	
n+2	
n+1	
n	
n-1	
n-2	
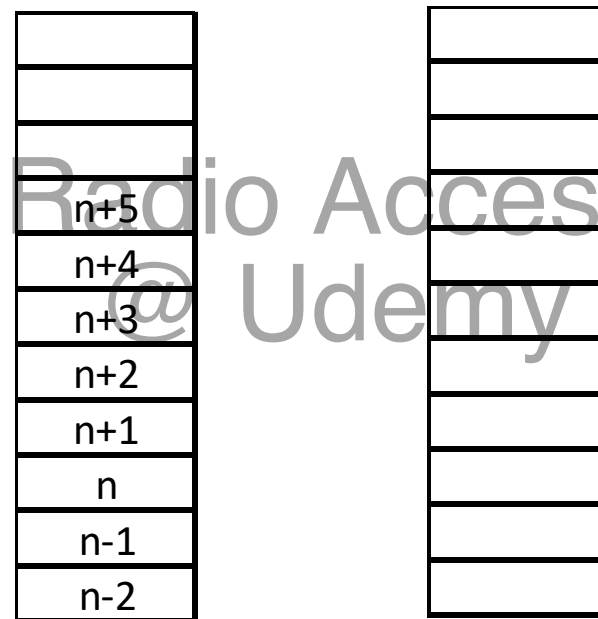
Transmitter   Receiver

Retransmissions

**Time T0: PDUs up to and including n−1 have been acknowledged by the receiver**

Tx Window

PDUs waiting for initial transmission

Transmitted, but not yet acknowledged

Transmitted and acknowledged PDUs

Rx Window

Transmitter

n+4
n+3
n+2
n+1
n
n-1
n-2

Receiver

n
n-1
n-2

Retransmissions

Time T1: PDUs n+1 and n+2 have been transmitted but, at the receiving end, only PDU n+2 has arrived

Either lower layer is handling ARQ
or
Lower layer has failed to detect the error

Transmitter   Receiver

Retransmissions

Time T2: missing PDU arrives
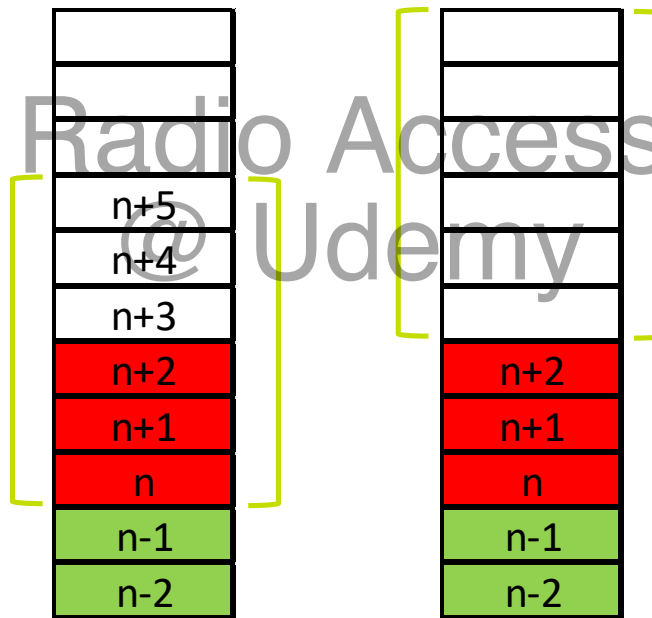
Transmitter   Receiver

Retransmissions

Time T3: transmission continues with PDUs n+3, n+4, and n+5

Transmitter

n+5
n+4
n+3
n+2
n+1
n
n-1
n-2

Receiver

n+5
n+2
n+1
n
n-1
n-2
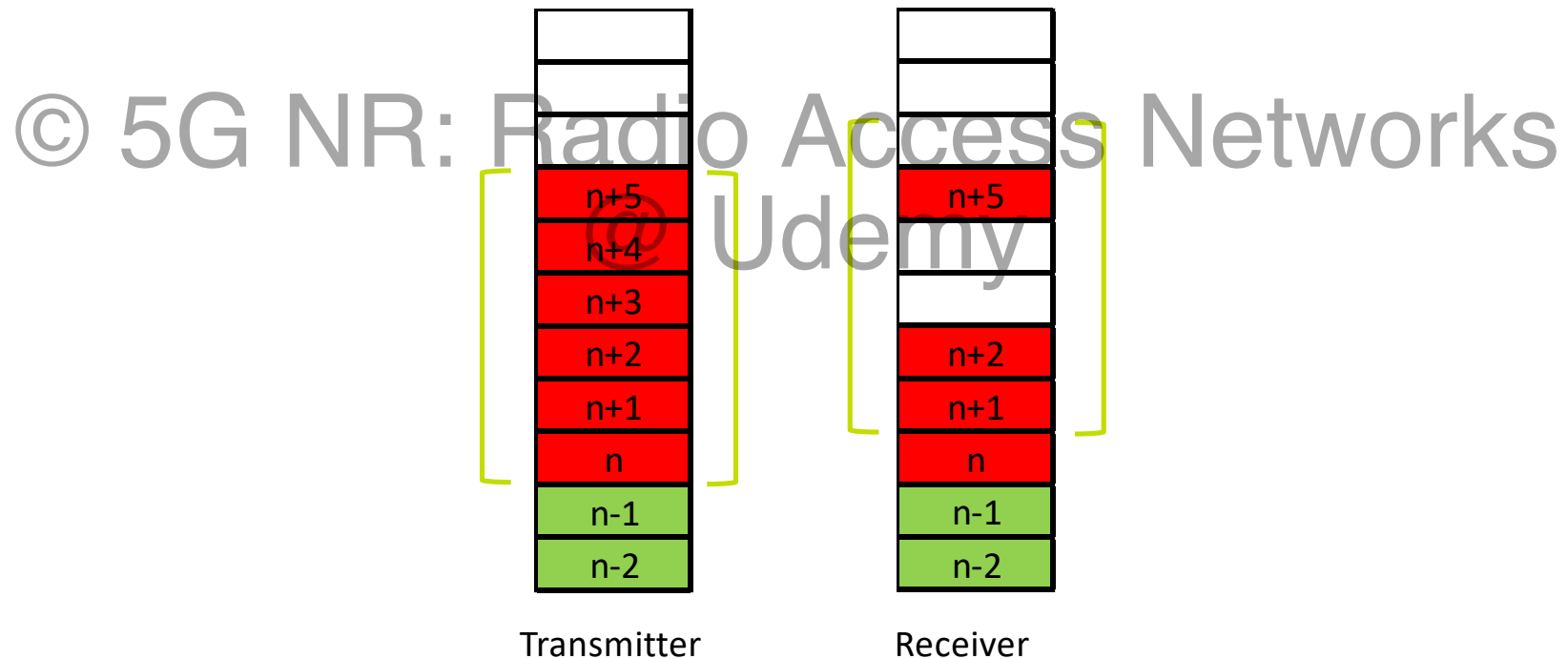
Retransmissions
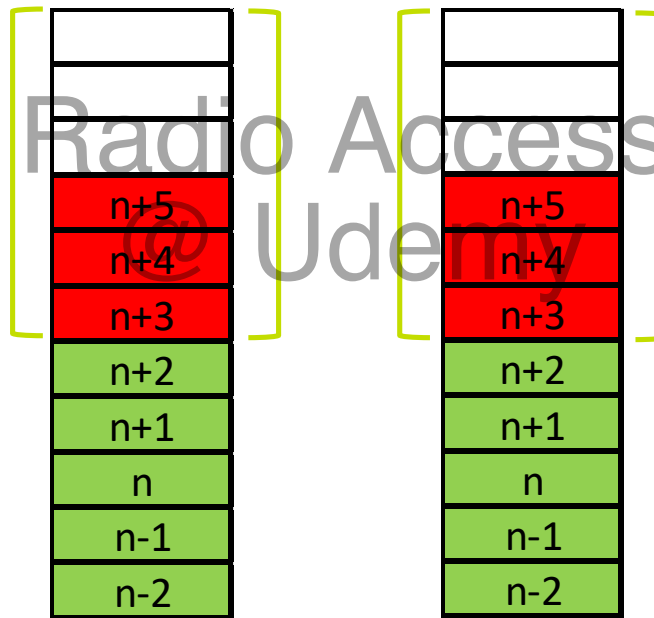
Time T4: status report, indicating the missing PDUs
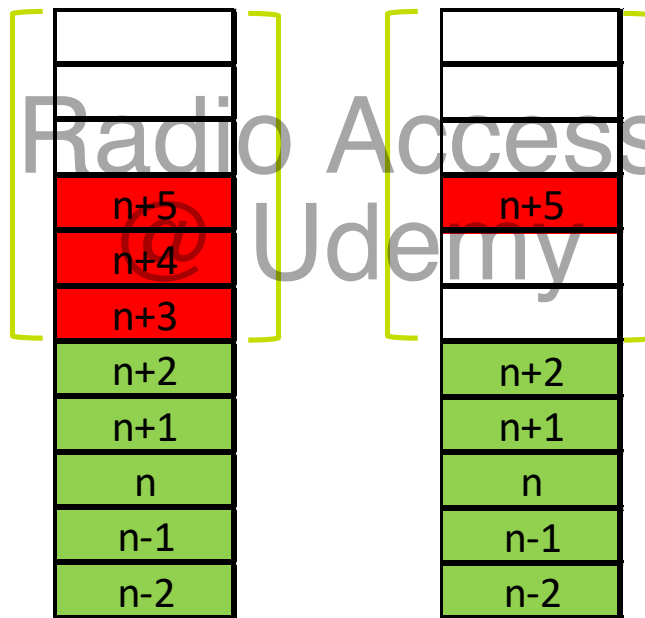
Transmitter   Receiver
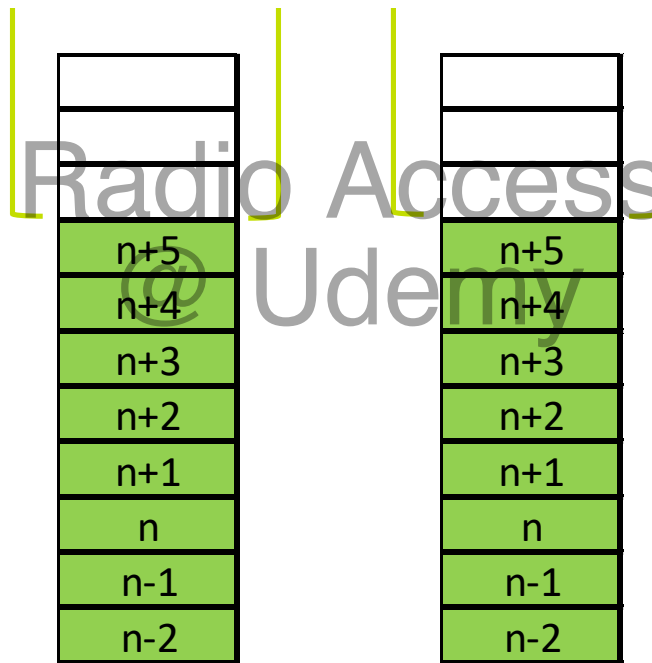
Retransmissions

Time T5: receipt of status report

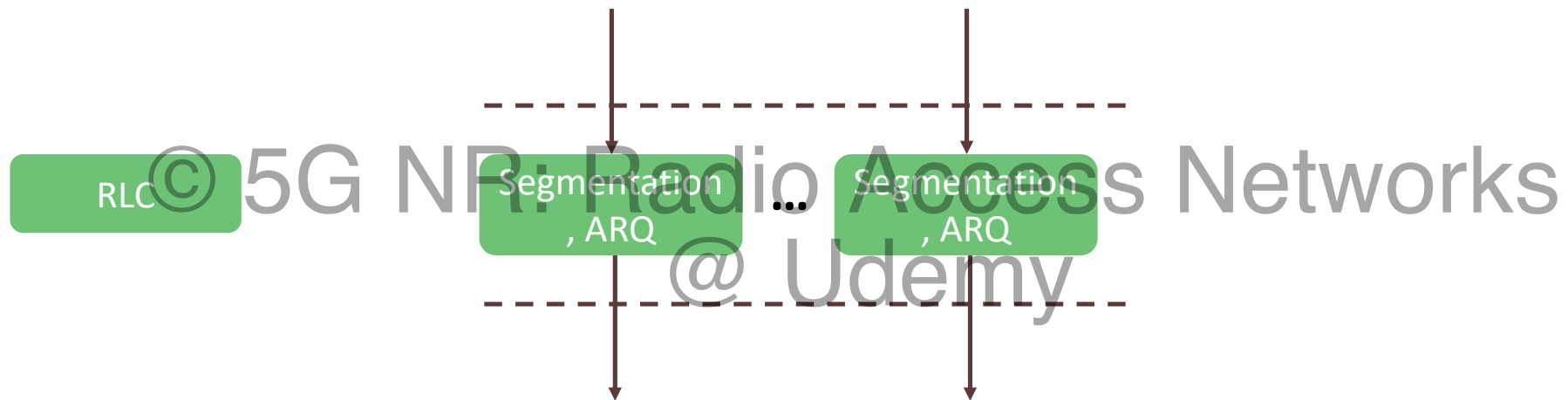Transmitter   Receiver

Retransmissions

Time T6: all PDUs have been successfully received

Transmitter   Receiver

Summary

THANK YOU