

UE

gNB

RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
DL LCID	1 (1)
SRB	1
Trans ID	1
Cipher	nea0
Integrity	nias2
DL LCID	63 (Padding)

🔑 Security Mode Complete

Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
UL LCID	1 (1)
UL LCID	1 (1)
SRB	1
Trans ID	1
UL LCID	61 (Short BSR)
BSR LCG0 idx	0
UL LCID	57 (Single Entry PHR)
UL LCID	63 (Padding)

📡 RLC AM Status PDU

Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
DL LCID	1 (1)
RLC mode	Acknowledged
Bearer	1
RLC SN size	12-bit
ACK SN	2
E1	A set of NACK_SN, E1, E2 and E3 does not follow
DL LCID	1 (1)
RLC mode	Acknowledged
Bearer	1
RLC SN size	12-bit
DL LCID	63 (Padding)

⬇️ Registration accept

Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	1
DL LCID	1 (1)
SRB	1
DL Information Transfer	
DL LCID	63 (Padding)

⬆️ Registration complete

Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
UL LCID	1 (1)
UL LCID	1 (1)
SRB	1
UL Information Transfer	
UL LCID	61 (Short BSR)
BSR LCG0 idx	0
UL LCID	57 (Single Entry PHR)
UL LCID	63 (Padding)

📡 RLC AM Status PDU

cipher) and integrity algorithm **NIA2** (AES-CMAC). SRB1 messages are integrity-protected; NEA0 means AS ciphering does not conceal their payloads. NAS security is a separate layer, so AS NEA0 alone does not prove the NAS ciphering algorithm. In this trace the security-protected NAS payloads are decoded consistently with the configured null-NAS deciphering. DRB integrity is not enabled merely by this command.

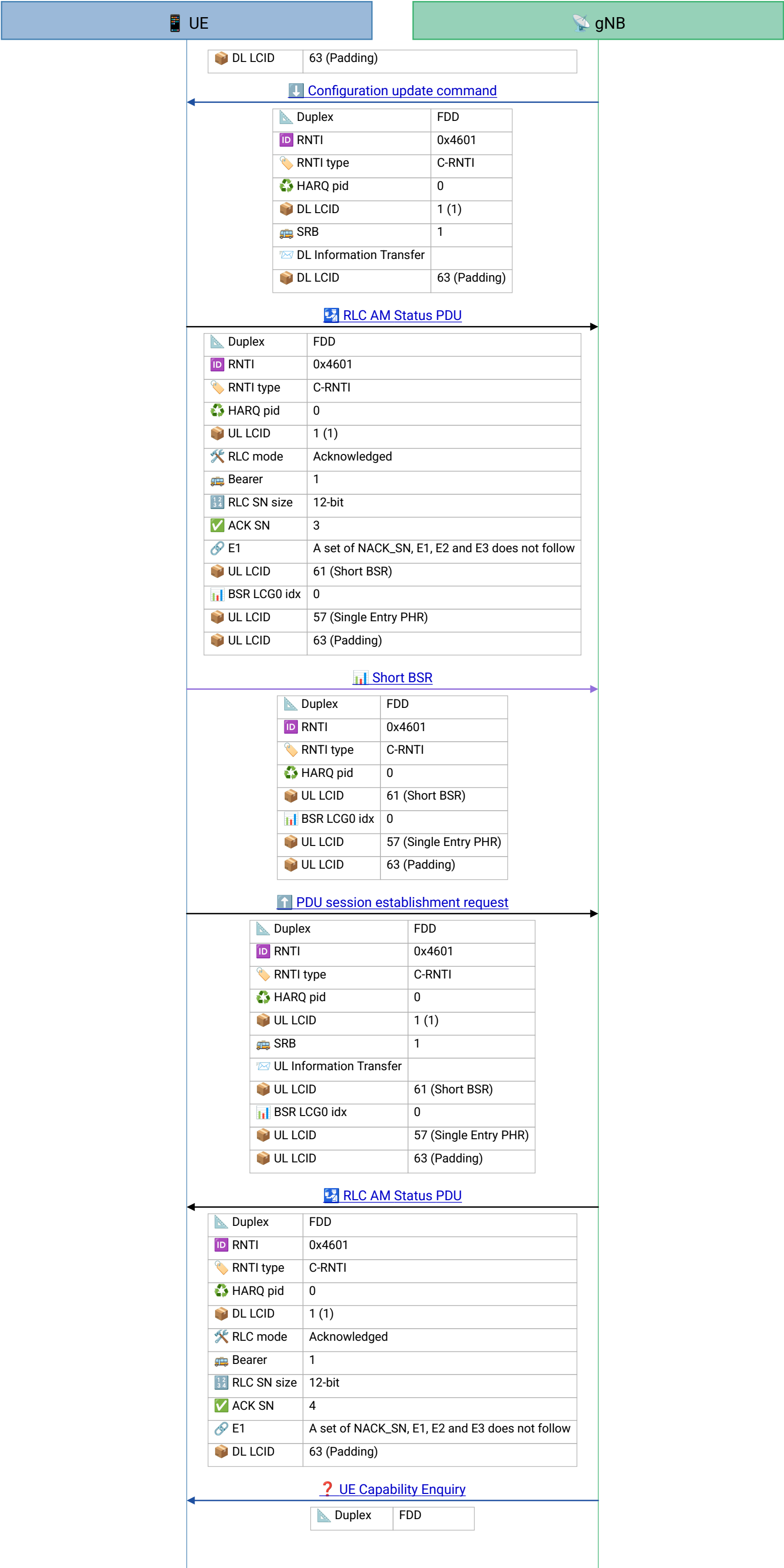
Security Mode Complete. UE -> gNB on SRB1 (RLC SN 1 / PDCP SN 1), protected with a PDCP MAC-I under the new AS integrity configuration. The UE has applied the selected algorithms.

RLC ACK. SRB1 Status PDU, ACK_SN = 2 – cumulative through SN 1, i.e. the Security Mode Complete is confirmed received.

Registration Accept (DL Information Transfer). RRC is just the envelope here; the payload is a **5GMM Registration Accept** from the AMF. The core has accepted the UE onto the network. In this frame, DLInformationTransfer is transporting the NAS PDU transparently over SRB1.

Registration Complete (UL Information Transfer). UE -> gNB, tunnelling the NAS **Registration Complete** back up to the AMF. The 5GMM registration procedure is now finished; the UE is registered.

RLC ACK. SRB1 Status PDU, ACK_SN = 3 – confirms the UE's



Configuration Update Command (final captured copy). A fourth transmission of downlink RLC SN 2 / PDCP SN 2. Frame 17 finally acknowledges it.

RLC ACK (uplink direction). UE -> gNB on UL LCID 1, ACK_SN = 3. The UE now expects downlink RLC SN 3, so it has received downlink SN 2 - the Configuration Update Command. RLC-AM state is independent in each direction.

Short BSR. UE -> gNB for Logical Channel Group 0 with buffer-size index 0. That reports **zero buffered bytes**, not queued data and not a request-sized backlog. The MAC PDU also carries a PHR and padding; the PDU-session request is sent about 80 ms later.

PHASE 3 — Open a data session (PDU session + DRB)

PDU Session Establishment

Request. UL Information Transfer whose NAS body is a 5GSM **PDU Session Establishment Request** wrapped in an **UL NAS Transport**. The UE is asking, via the AMF, for the SMF to establish PDU Session 1. The resulting QoS flow will later be mapped to a data radio bearer.

RLC ACK. The gNB acknowledges uplink SRB1 through SN 3 with $\text{ACK_SN} = 4$. This confirms radio-link delivery to the gNB, not yet acceptance by the 5GC.

UE Capability Enquiry. gNB -> UE,
requesting the UE capability
container for RAT nr . The
response can describe supported



UE

gNB

E1

A set of NACK_SN, E1, E2 and E3 does not follow

DL LCID

63 (Padding)

RRC Reconfiguration

Duplex

FDD

RNTI

0x4601

RNTI type

C-RNTI

HARQ pid

2

DL LCID

1 (1)

SRB

1

Trans ID

3

PDU Session

1

SDAP DL

absent

SDAP UL

absent

Default DRB

True

QFI

1

DRB add

1

PDCP-SN UL

len12bits

PDCP-SN DL

len12bits...

12 more

Single Entry PHR

Duplex

FDD

RNTI

0x4601

RNTI type

C-RNTI

HARQ pid

0

Long BSR

LCG7

Not Present

LCG6

Not Present

LCG5

Not Present

LCG4

Not Present

LCG3

Not Present

LCG2

Not Present

LCG1

Not Present

LCG0

Not Present

Padding

RLC AM Status PDU

Duplex

FDD

RNTI

0x4601

RNTI type

C-RNTI

HARQ pid

0

UL LCID

1 (1)

RLC mode

Acknowledged

Bearer

1

RLC SN size

12-bit

ACK SN

4

E1

A set of NACK_SN, E1, E2 and E3 does not follow

UL LCID

61 (Short BSR)

BSR LCG0 idx

0

UL LCID

63 (Padding)

RRC Reconfiguration

Duplex

FDD

RNTI

0x4601

RNTI type

C-RNTI

HARQ pid

0

DL LCID

1 (1)

SRB

1

Trans ID

3

PDU Session

1

SDAP DL

absent

RRC Reconfiguration - PDU session accepted and DRB configured.

gNB -> UE.

The message carries a dedicated NAS PDU Session Establishment Accept for PDU Session 1 and maps its default QoS flow, QFI 1, to DRB identity 1 / LCID 4.

The DRB uses 12-bit PDCP SNs in both directions, no ROHC, and RLC-AM with t-PollRetransmit = 50 ms, pollPDU = 16, and pollByte = 6500 kB; SDAP headers are absent on this default DRB.

The reconfiguration repeats the existing cell-group p-NR-FR1 = 10 dBm limit first seen in frame 2. That is a cell-group FR1 transmit-power cap, substantially below the UE's advertised PC2 capability; the trace does not establish why it was chosen.

The dissector labels LCID 4 as RLC "Bearer 4," while the RRC DRB identity remains 1.

PHR (with this frame's MAC control elements).

UE -> gNB Single-Entry Power Headroom Report — how much transmit-power margin the UE has left.

It shares the frame with a Long BSR (sub 2) and padding (sub 3).

Long BSR.

All eight Logical Channel Groups reported "Not Present" (no buffered data on any LCG at this instant) — the UE momentarily has nothing queued.

Padding.

MAC padding to fill the transport block. No information content.

RLC ACK.

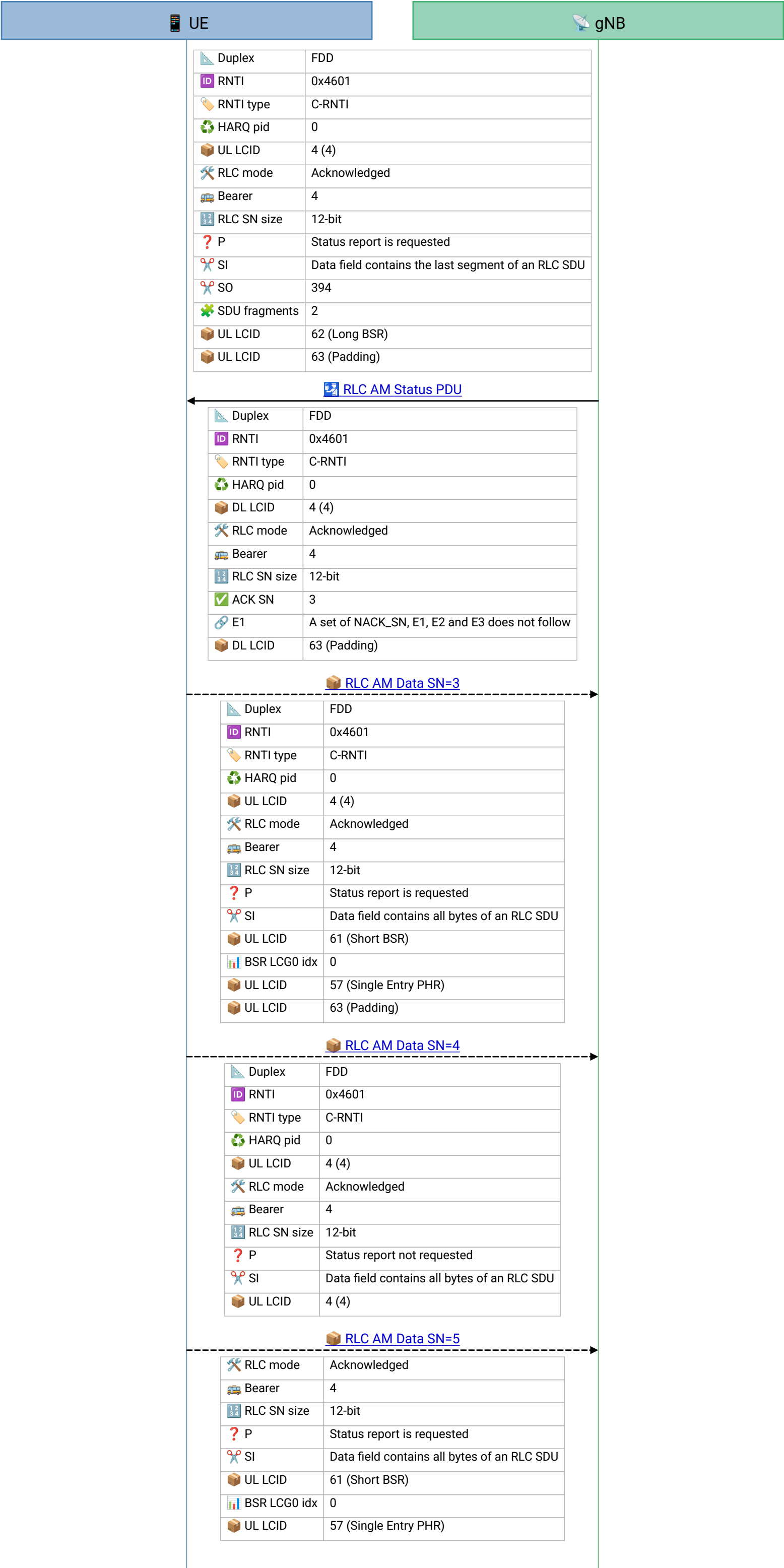
UE -> gNB with ACK_SN = 4: downlink SRB1 SN 4 (the first Reconfiguration transmission) is still not acknowledged.

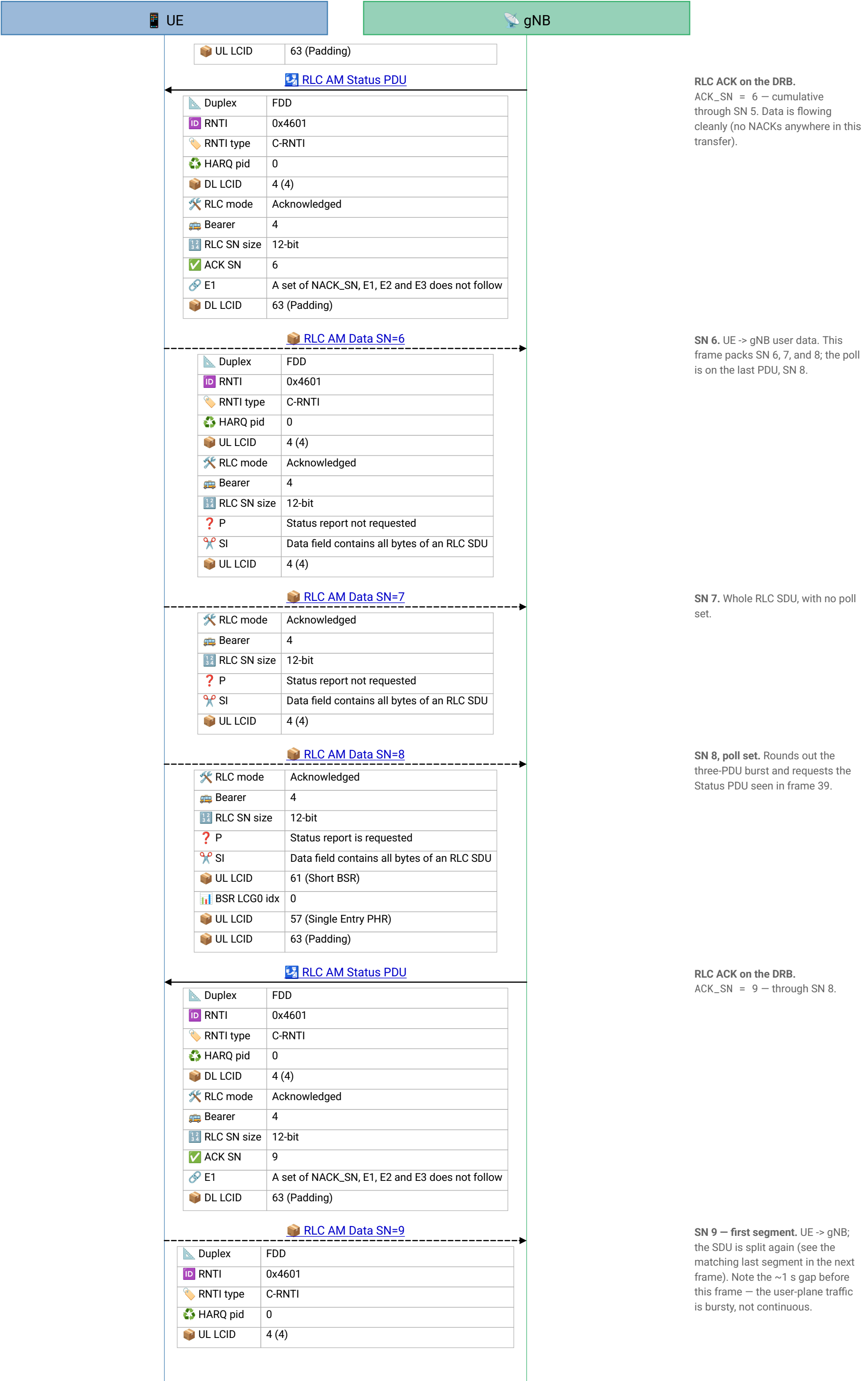
That explains the retransmission in frame 29.

RRC Reconfiguration (retransmission).

Same downlink RLC SN 4 / PDCP SN 4 as frame 26, including the DRB configuration and embedded NAS PDU Session Establishment Accept.

The gNB is still awaiting an RLC acknowledgement.





UE

gNB

RLC mode	Acknowledged
Bearer	4
RLC SN size	12-bit
P	Status report not requested
SI	Data field contains the first segment of an RLC SDU
UL LCID	61 (Short BSR)
UL LCID	57 (Single Entry PHR)

RLC AM Data SN=9

Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
UL LCID	4 (4)
RLC mode	Acknowledged
Bearer	4
RLC SN size	12-bit
P	Status report is requested
SI	Data field contains the last segment of an RLC SDU
SO	534
SDU fragments	2
UL LCID	62 (Long BSR)
UL LCID	63 (Padding)

RLC AM Status PDU

Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
DL LCID	4 (4)
RLC mode	Acknowledged
Bearer	4
RLC SN size	12-bit
ACK SN	10
E1	A set of NACK_SN, E1, E2 and E3 does not follow
DL LCID	63 (Padding)

RLC AM Data SN=10

Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
UL LCID	4 (4)
RLC mode	Acknowledged
Bearer	4
RLC SN size	12-bit
P	Status report is requested
SI	Data field contains all bytes of an RLC SDU
UL LCID	61 (Short BSR)
BSR LCG0 idx	0
UL LCID	57 (Single Entry PHR)
UL LCID	63 (Padding)

RLC AM Data SN=11

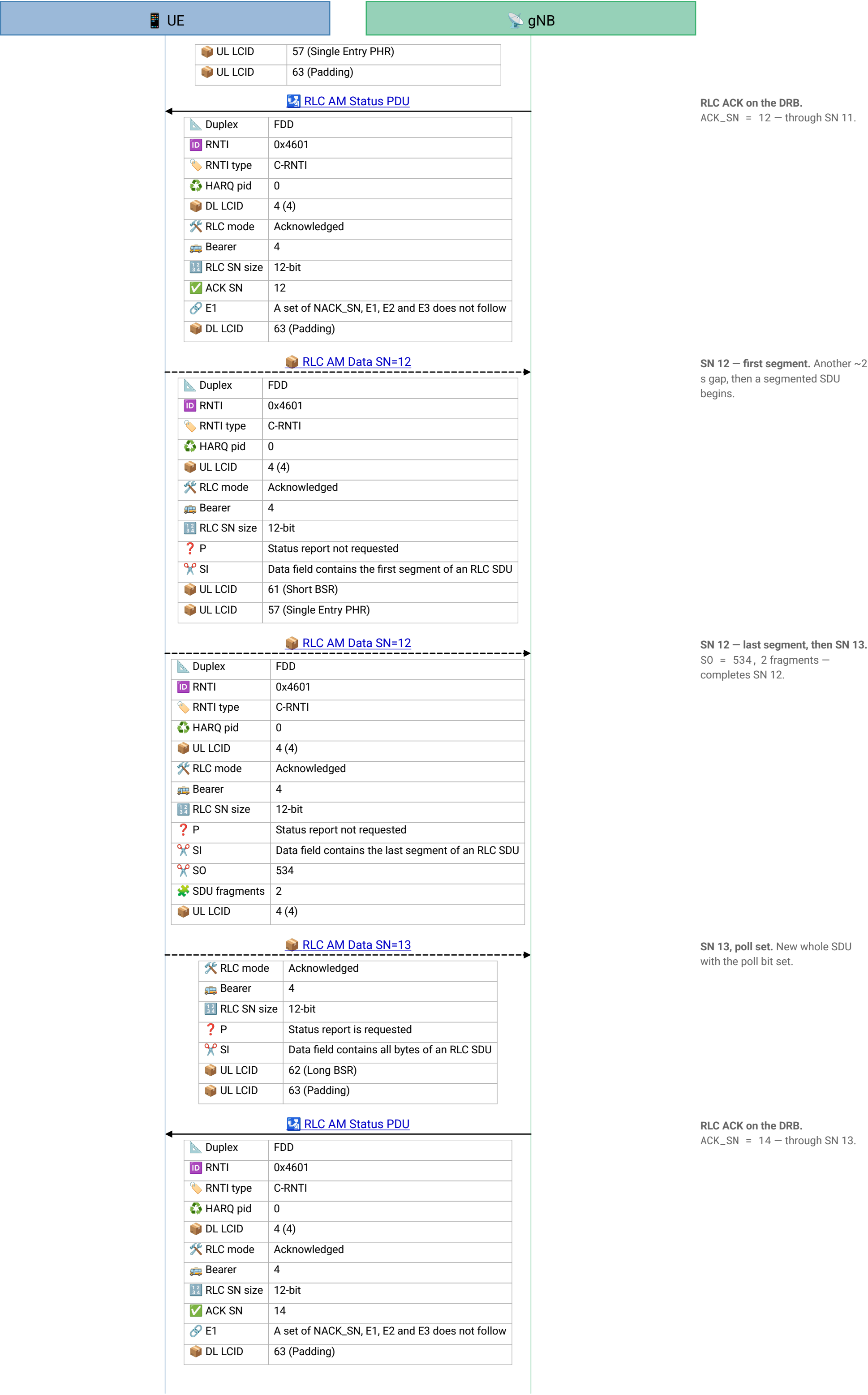
Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
UL LCID	4 (4)
RLC mode	Acknowledged
Bearer	4
RLC SN size	12-bit
P	Status report is requested
SI	Data field contains all bytes of an RLC SDU
UL LCID	61 (Short BSR)
BSR LCG0 idx	0

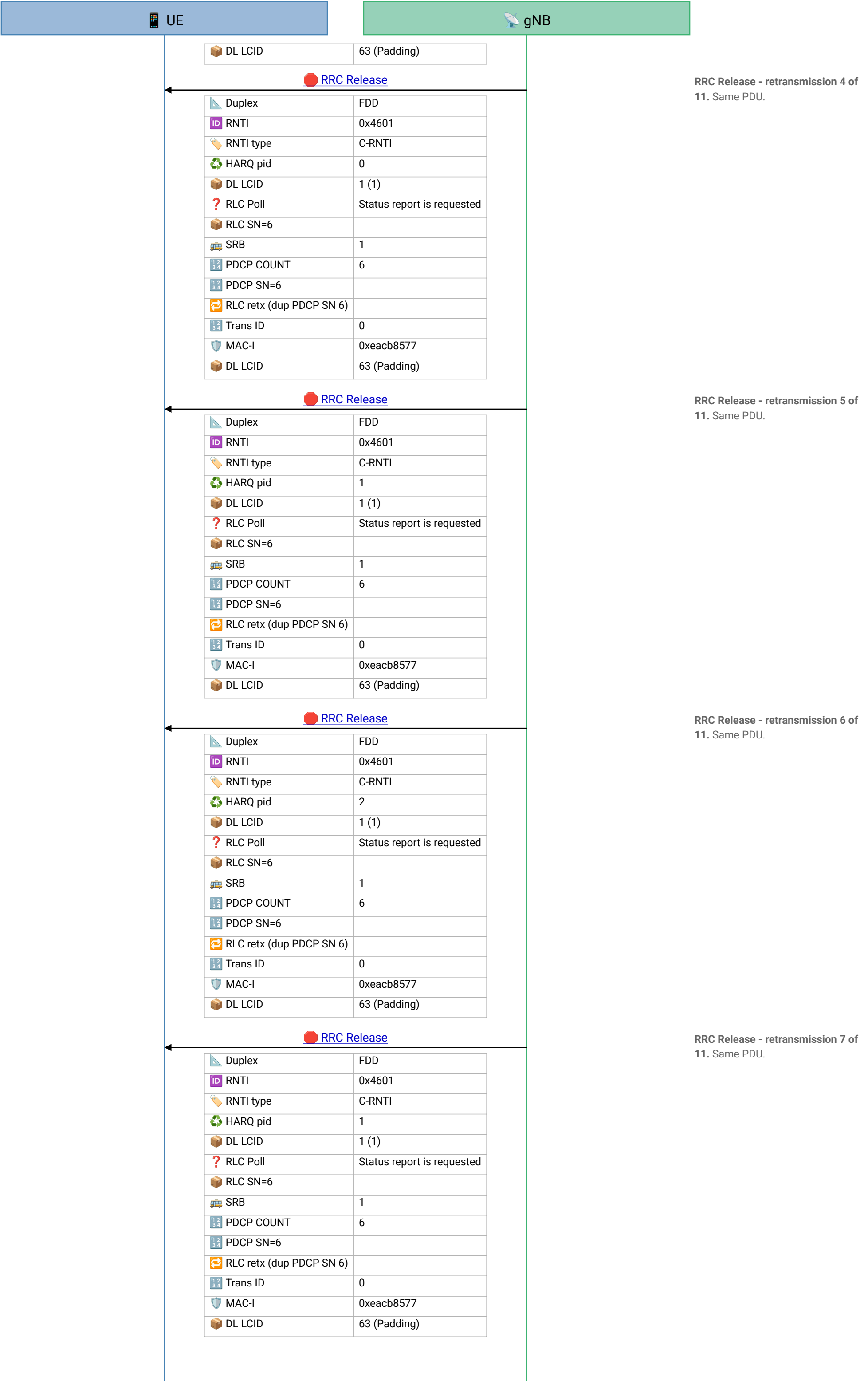
SN 9 – last segment, poll set.
SO = 534, 2 fragments
reassembled; poll set to demand a
status report.

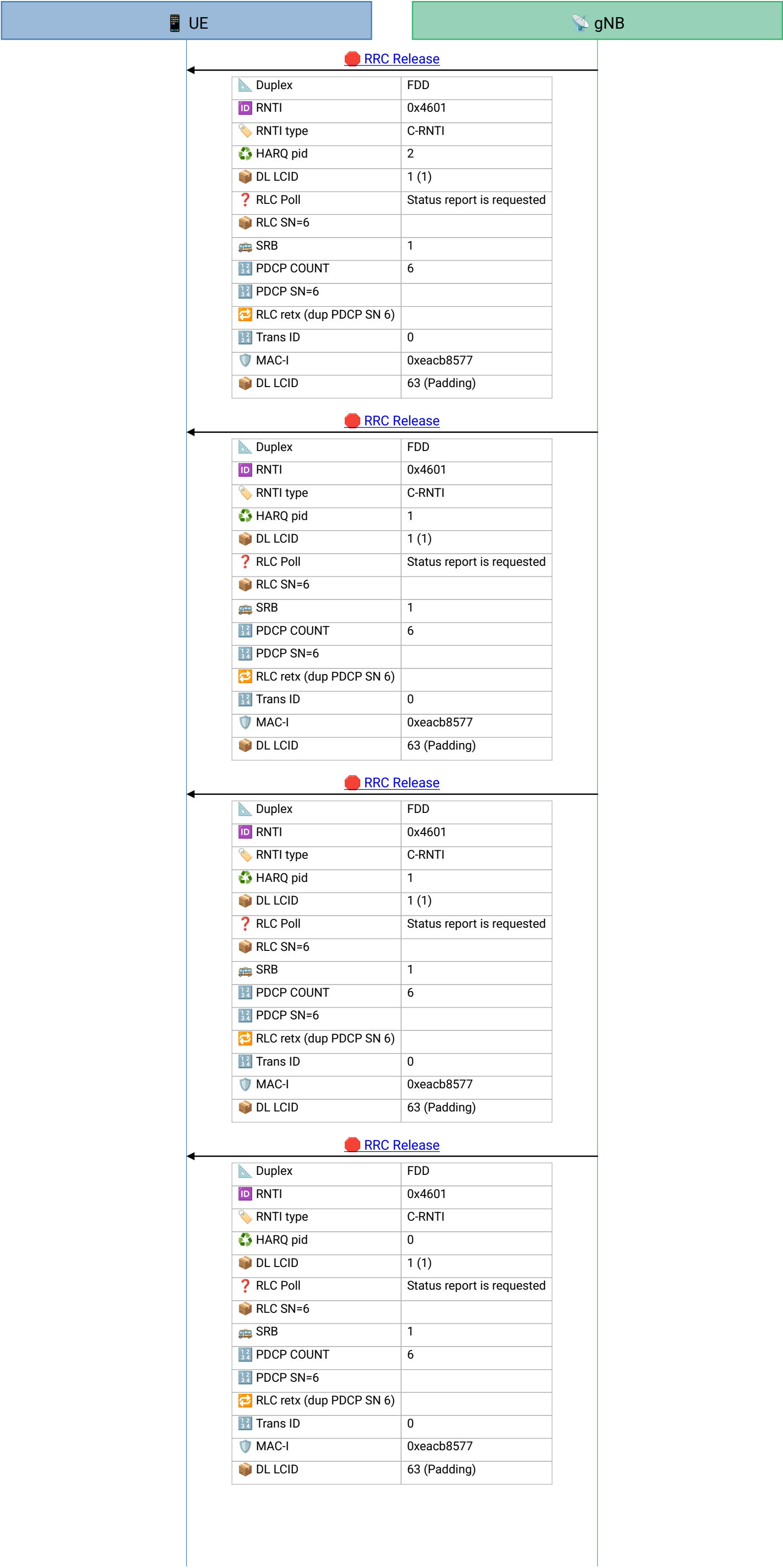
RLC ACK on the DRB.
ACK_SN = 10 – through SN 9
(both segments).

SN 10, poll set. Whole RLC SDU
with a status request.

SN 11, poll set. Another whole RLC
SDU with a status request.
Consecutive polls do not by
themselves indicate packet loss;
the following Status PDU has no
NACKs.







RRC Release - retransmission 8 of 11. Same PDU. The SRB1 configuration has `maxRetxThreshold = t8`; RLC's internal RETX_COUNT is zero-based when an SDU is first considered for retransmission, so the threshold is reached on the next copy, not this one.

RRC Release - retransmission 9 of 11. Same PDU. Assuming each timer-driven repeat increments RETX_COUNT as specified, this is where RETX_COUNT reaches the configured t8 threshold and RLC indicates max retransmission to upper layers. The capture does not expose the gNB's upper-layer reaction.

RRC Release - retransmission 10 of 11. Same PDU.

RRC Release - retransmission 11 of 11 (end of capture). This is the twelfth over-the-air copy of the same RLC SDU. The capture ends without a UE Status PDU or other uplink response.

Reading the retransmissions: all twelve copies carry RLC SN 6, PDCP SN 6, PDCP COUNT 6, and the same MAC-I, so they represent one RRC Release PDU repeatedly submitted by RLC-AM - not twelve RRC Release procedures. The switch-off deregistration makes an absent UE the likely cause. It is still too strong to call the sequence unconditionally benign: `maxRetxThreshold = t8` is reached at frame 67, and only an upper-layer or NGAP trace could show how the gNB handled the result. The same pattern during an otherwise active session would warrant checking downlink

 UE

 gNB

coverage, UE loss, and
radio-link-failure handling.