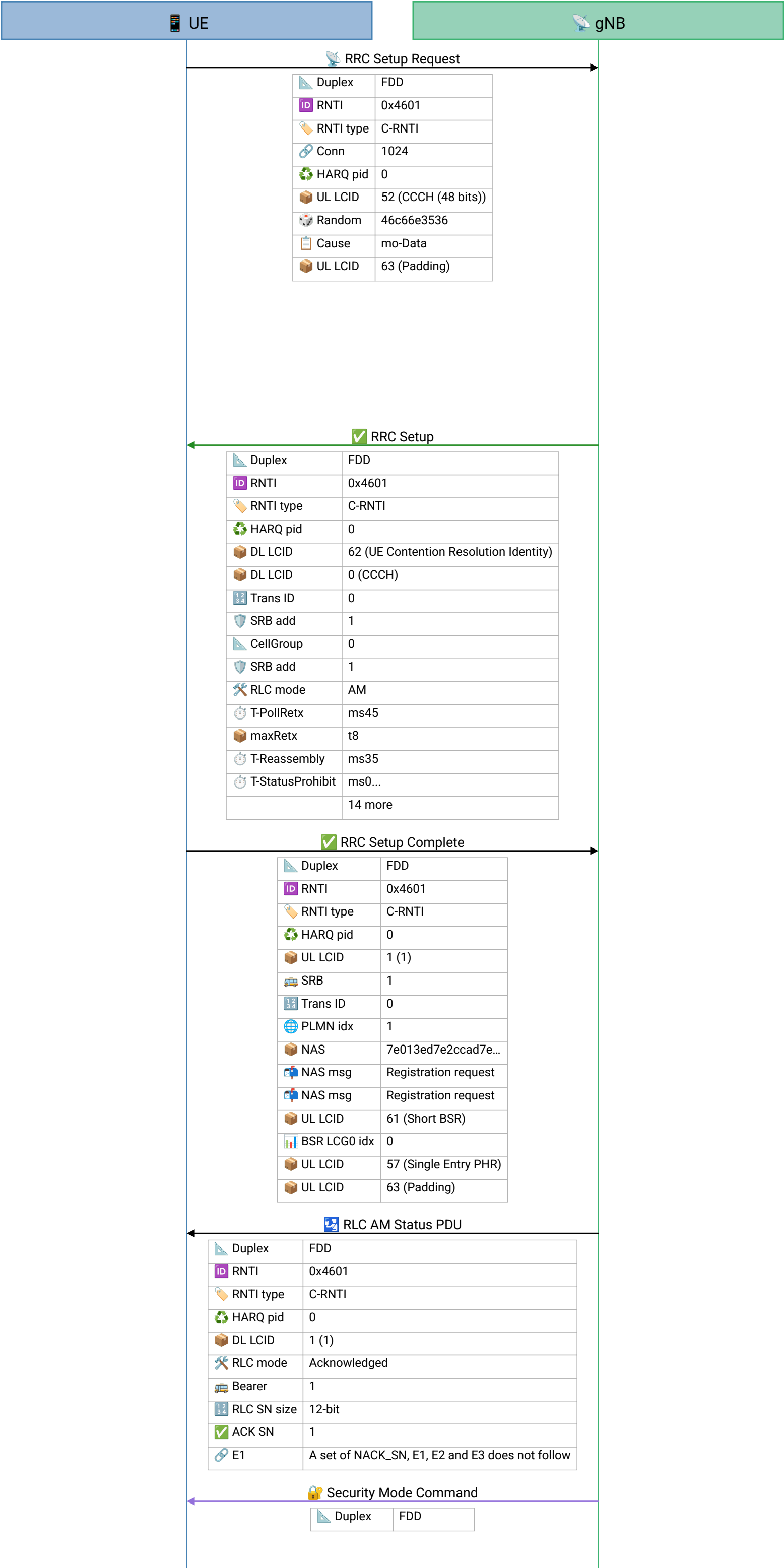




UE

gNB

	RNTI	0x4601
	RNTI type	C-RNTI
	HARQ pid	0
	DL LCID	1 (1)
	SRB	1
	Trans ID	1
	Cipher	nea0
	Integrity	nia2
	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

	Duplex	FDD
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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.

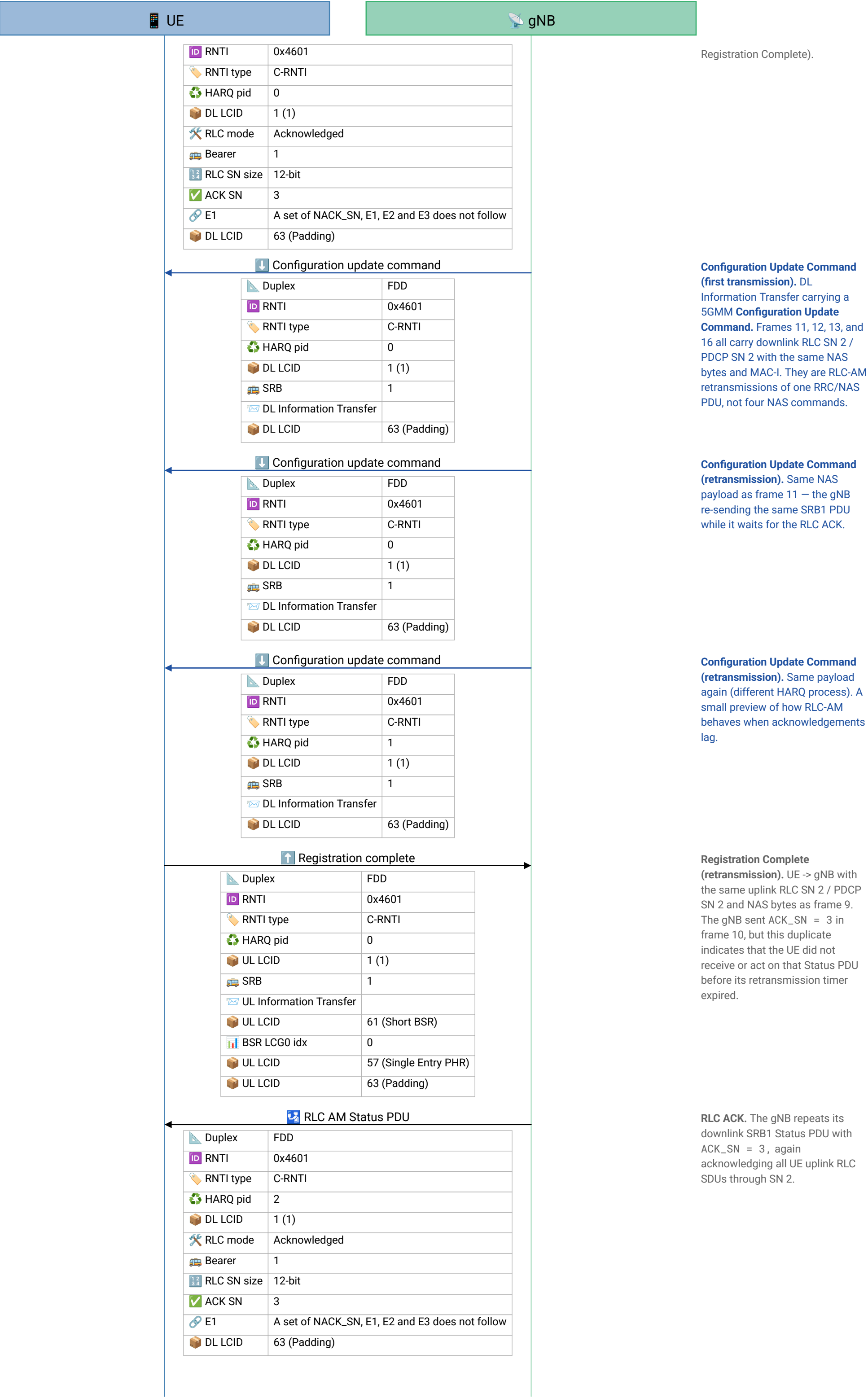
Security Mode Complete. UE -> gNB on SRB1 (RLC SN 1 / PDCP SN 1), protected with a PDCP MAC-I under the new AS integrity configuration. The UE has applied the selected algorithms.

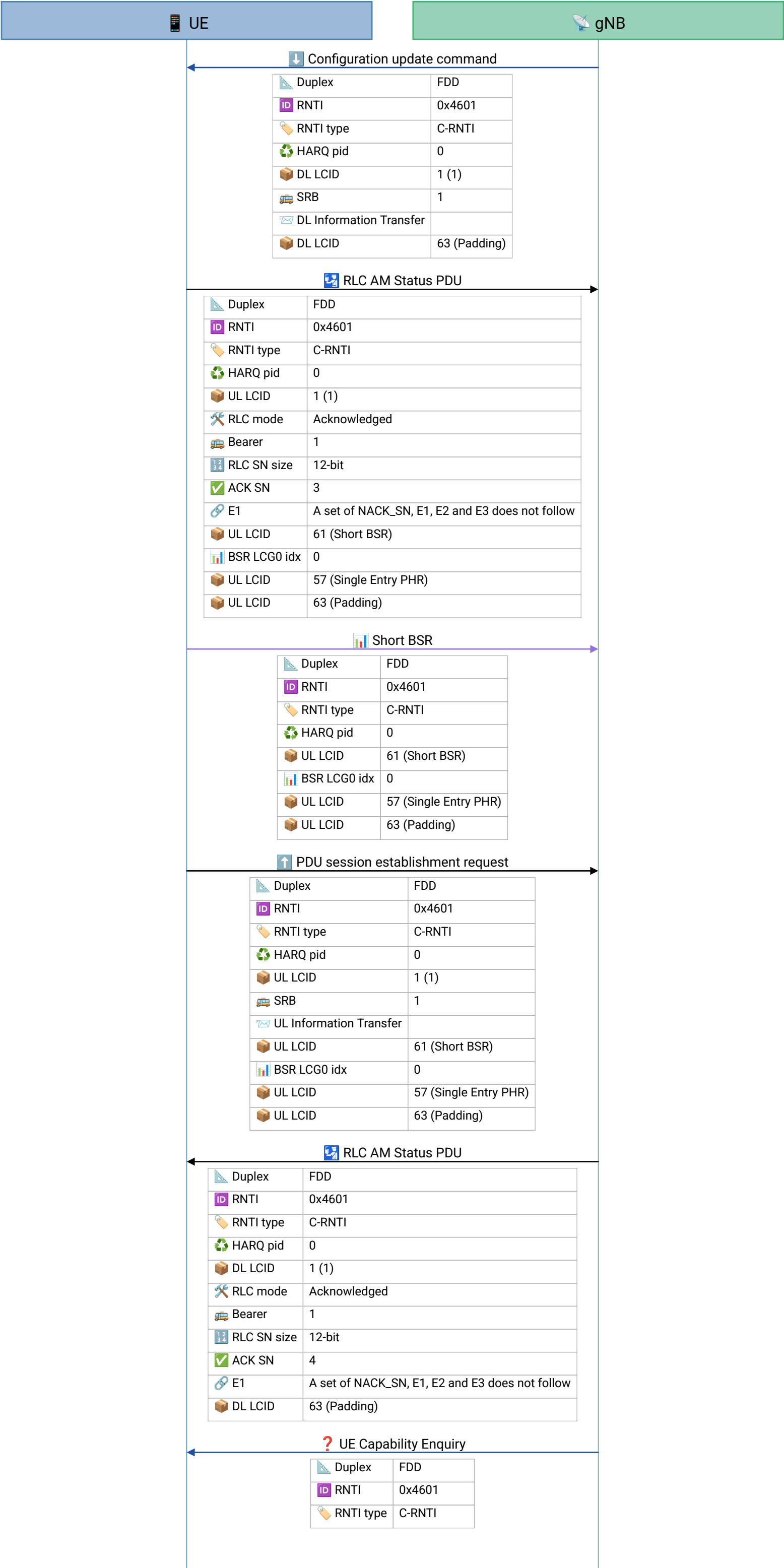
RLC ACK. SRB1 Status PDU, ACK_SN = 2 — cumulative through SN 1, i.e. the Security Mode Complete is confirmed received.

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 uplink through SN 2 (the





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.

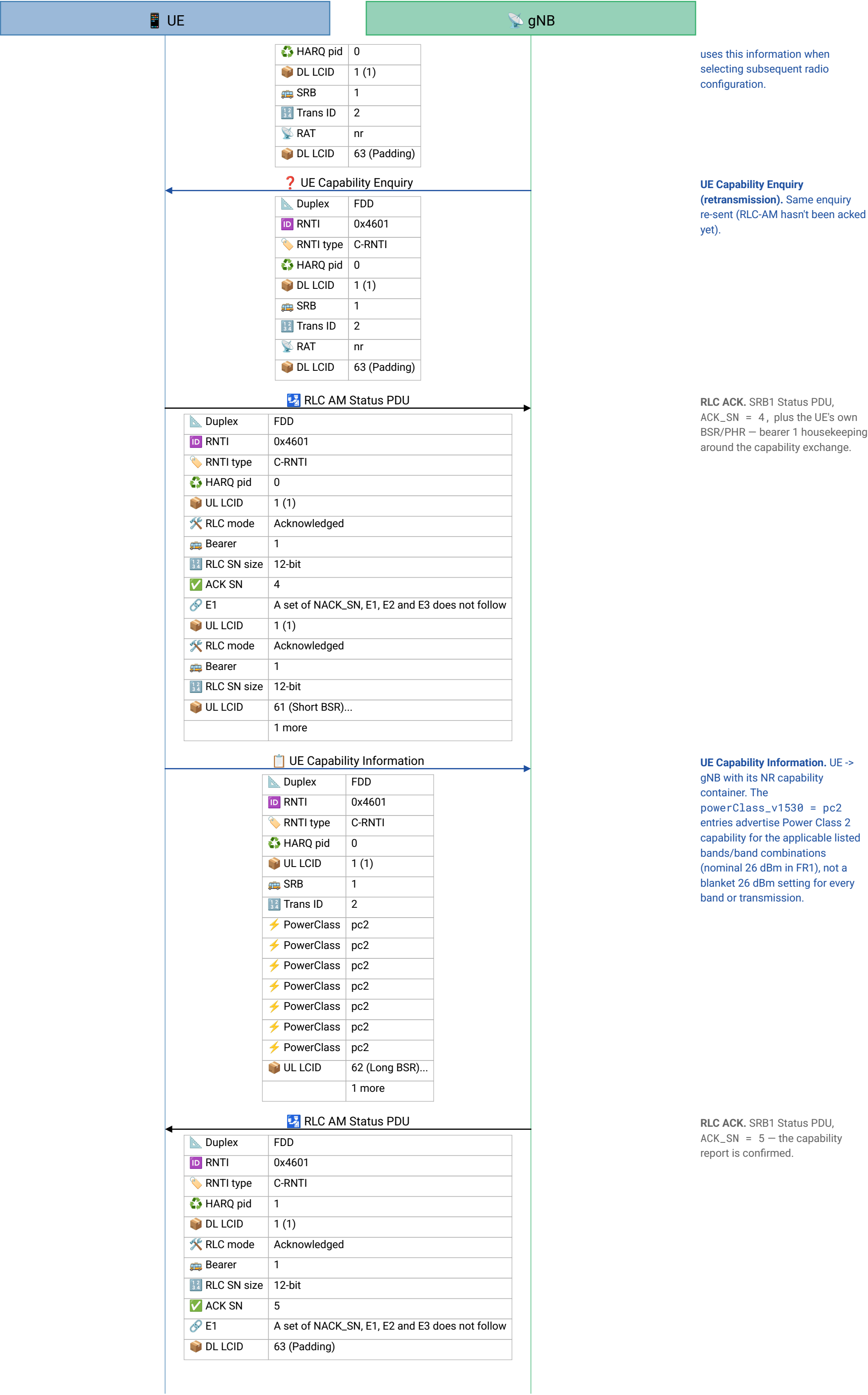
Short BSR. UE -> gNB for Logical Channel Group 0 with buffer-size index 0. That reports **zero buffered bytes**, not queued data and not a request-sized backlog. The MAC PDU also carries a PHR and padding; the PDU-session request is sent about 80 ms later.

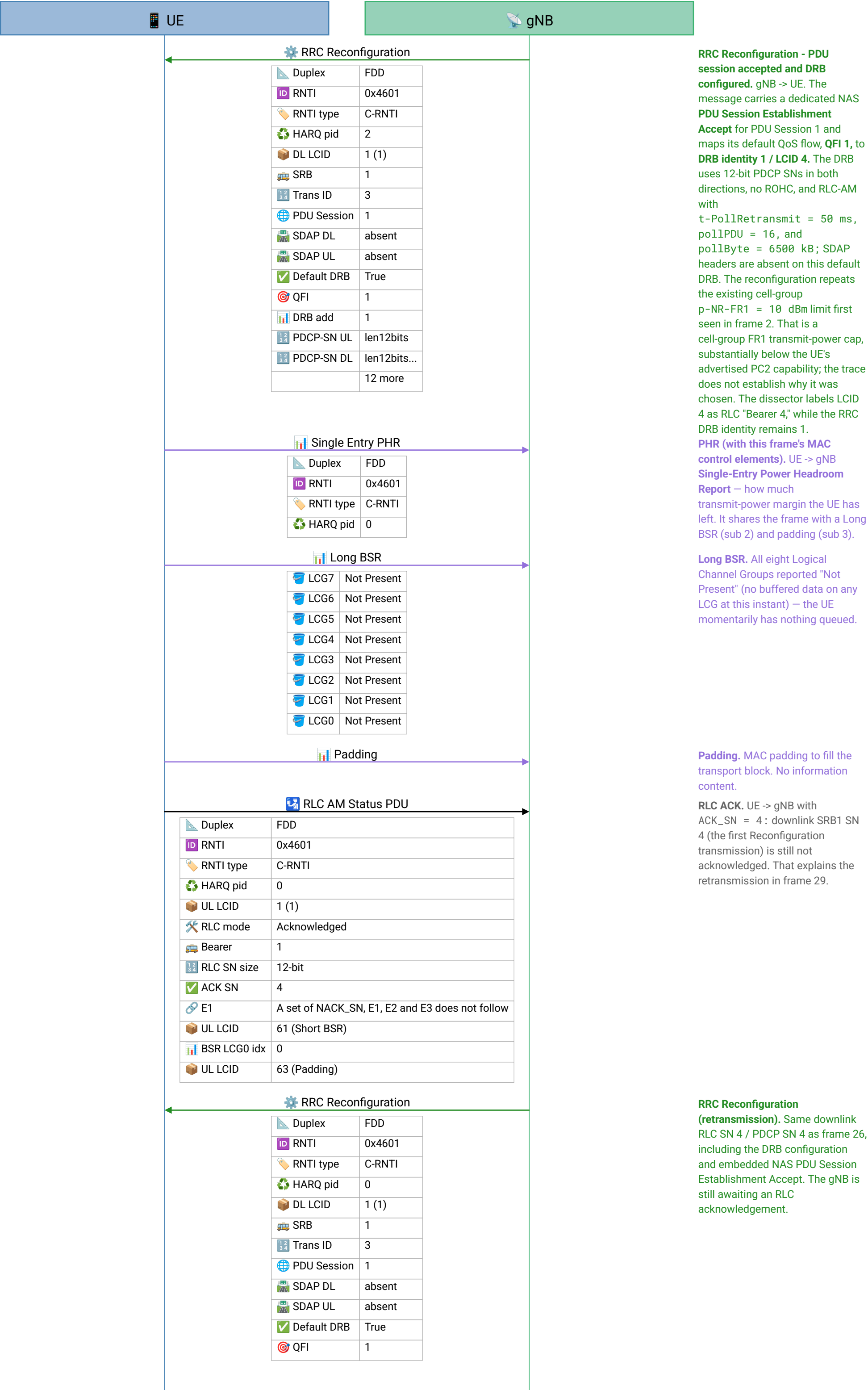
PHASE 3 – Open a data session (PDU session + DRB)

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 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 bands, feature sets, MIMO and modulation capabilities, and related radio features. The gNB





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

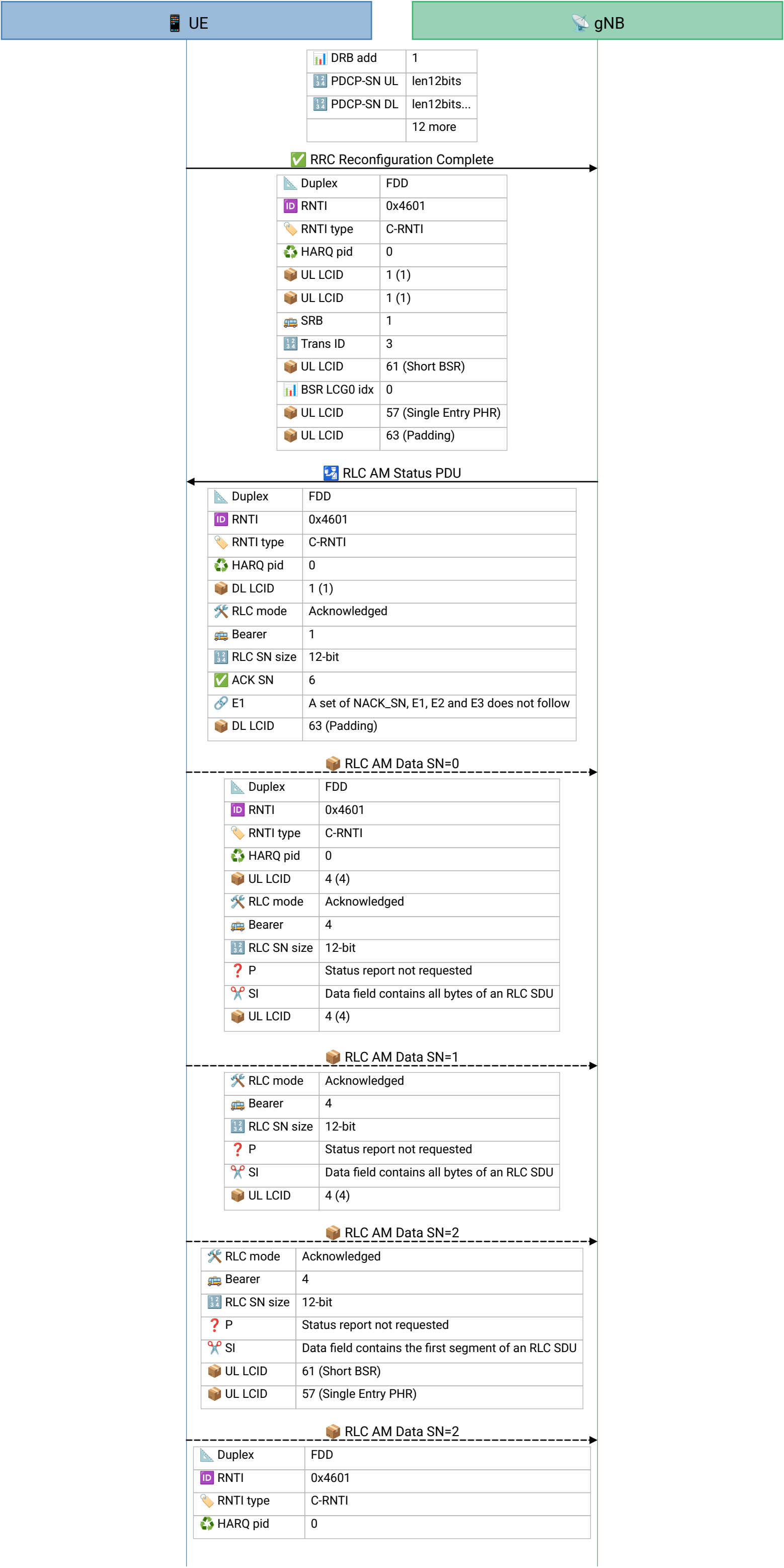
Single-Entry Power Headroom Report — how much transmit-power margin the UE has left. It shares the frame with a Long BSR (sub 2) and padding (sub 3).

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.



RRC Reconfiguration Complete. UE
-> gNB: the DRB and new PHY
config are applied. **The data radio
bearer is now live** – Phase 4 can
carry user traffic.

RLC ACK. SRB1 Status PDU, ACK_SN = 6 – confirms the Reconfiguration Complete. This is the last SRB1 signalling ack before the flow shifts to the DRB.

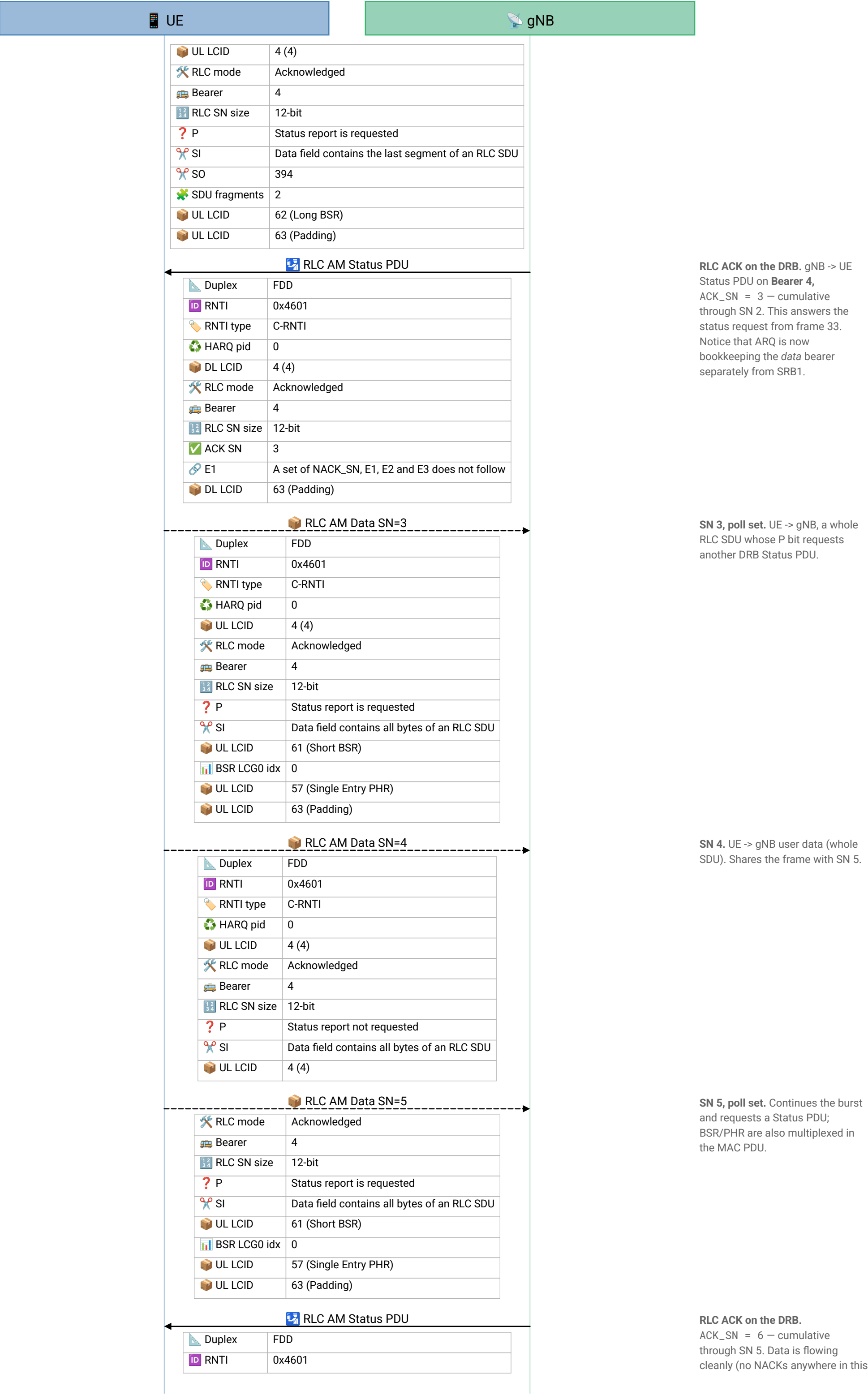
PHASE 4 – User-plane data on the DRB (Bearer 4 / LCID 4)

First user-plane RLC PDUs. UE -> gNB on LCID 4. Frame 32 contains whole RLC SDUs SN 0 and SN 1, followed by the first segment of RLC SDU SN 2. Each RLC SDU carries one PDCP data PDU; NEA0 means AS ciphering is null, although this diagram does not decode the payload above PDCP. SI identifies a whole SDU or a first/middle/last segment. The P bit requests a peer Status PDU, subject to the receiver's status-reporting rules.

SN 1 - whole SDU. The second RLC PDU in frame 32 is SN 1 with SI = 0, so it contains all bytes of that RLC SDU.

SN 2 - first segment. The third RLC PDU has $SI = 1$, beginning a segmented RLC SDU. MAC also multiplexes a Short BSR and PHR in the same transport block.

SN 2 - last segment, poll set.
SI = 2, SO = 394; together with frame 32 this completes RLC SDU SN 2 in two segments. The P bit requests a Status PDU. With t-StatusProhibit = 0, the gNB answers in the next frame.



UE

gNB

RNTI type	C-RNTI
HARQ pid	0
DL LCID	4 (4)
RLC mode	Acknowledged
Bearer	4
RLC SN size	12-bit
ACK SN	6
E1	A set of NACK_SN, E1, E2 and E3 does not follow
DL LCID	63 (Padding)

RLC AM Data SN=6

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 not requested
SI	Data field contains all bytes of an RLC SDU
UL LCID	4 (4)

RLC AM Data SN=7

RLC mode	Acknowledged
Bearer	4
RLC SN size	12-bit
P	Status report not requested
SI	Data field contains all bytes of an RLC SDU
UL LCID	4 (4)

RLC AM Data SN=8

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 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	9
E1	A set of NACK_SN, E1, E2 and E3 does not follow
DL LCID	63 (Padding)

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 not requested
SI	Data field contains the first segment of an RLC SDU
UL LCID	61 (Short BSR)

transfer).

SN 6. UE -> gNB user data. This frame packs SN 6, 7, and 8; the poll is on the last PDU, SN 8.

SN 7. Whole RLC SDU, with no poll set.

SN 8, poll set. Rounds out the three-PDU burst and requests the Status PDU seen in frame 39.

RLC ACK on the DRB.
ACK_SN = 9 – through SN 8.

SN 9 – first segment. UE -> gNB; the SDU is split again (see the matching last segment in the next frame). Note the ~1 s gap before this frame – the user-plane traffic is bursty, not continuous.

UE

gNB

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
UL LCID	57 (Single Entry PHR)
UL LCID	63 (Padding)

RLC AM Status PDU

Duplex	FDD
RNTI	0x4601
RNTI type	C-RNTI

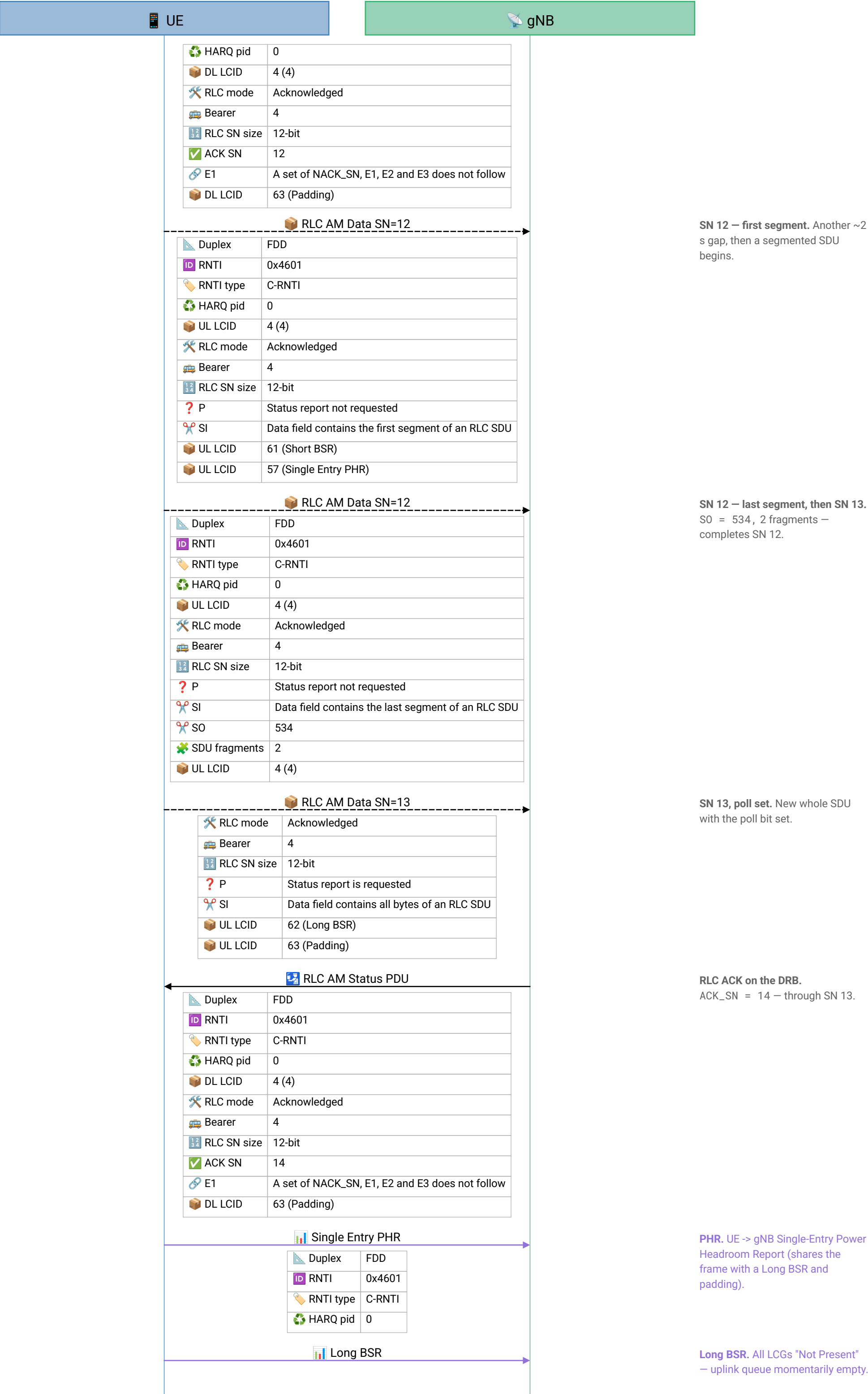
SN 9 – last segment, poll set.
S0 = 534, 2 fragments
reassembled; poll set to demand a
status report.

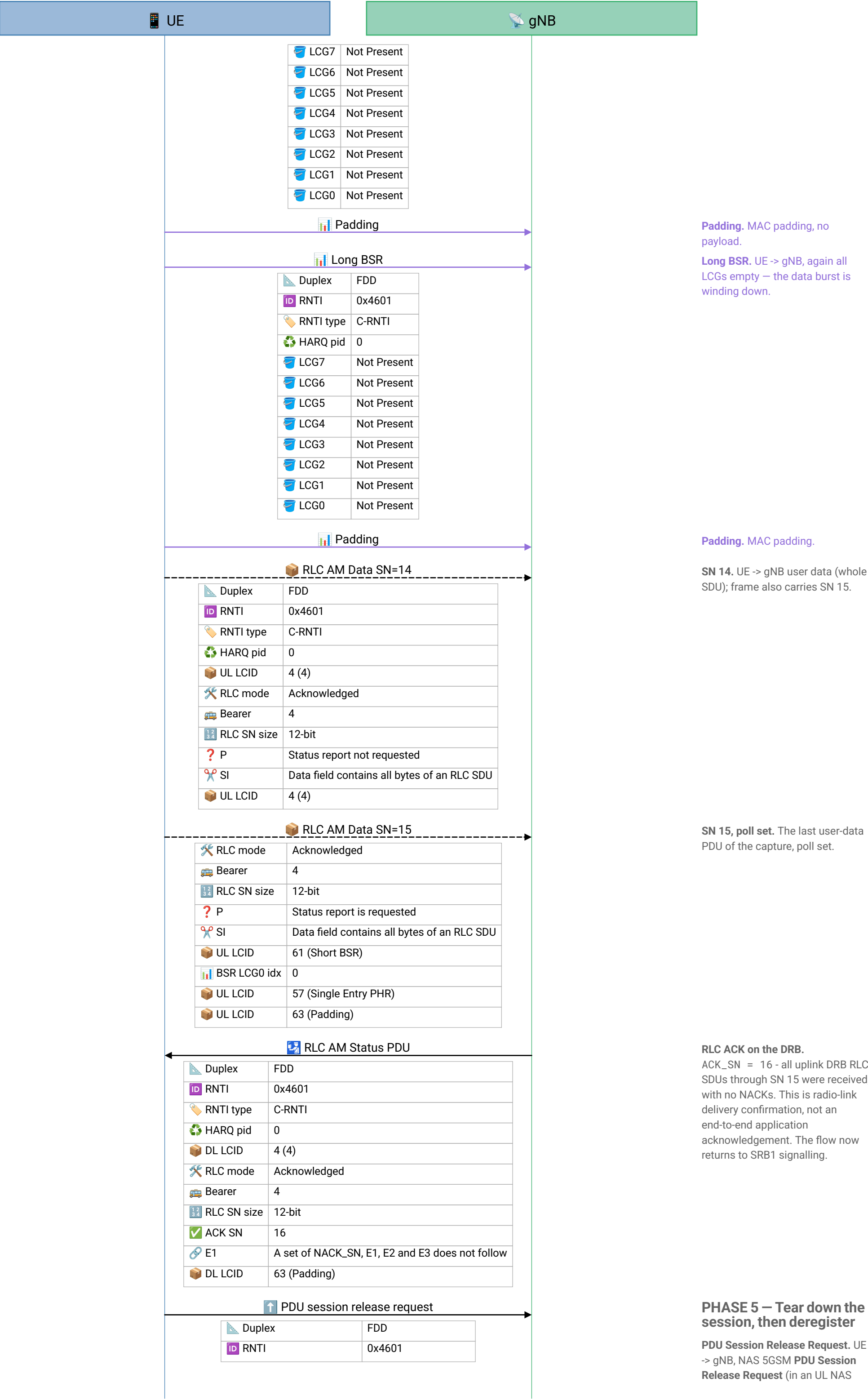
RLC ACK on the DRB.
ACK_SN = 10 – through SN 9
(both segments).

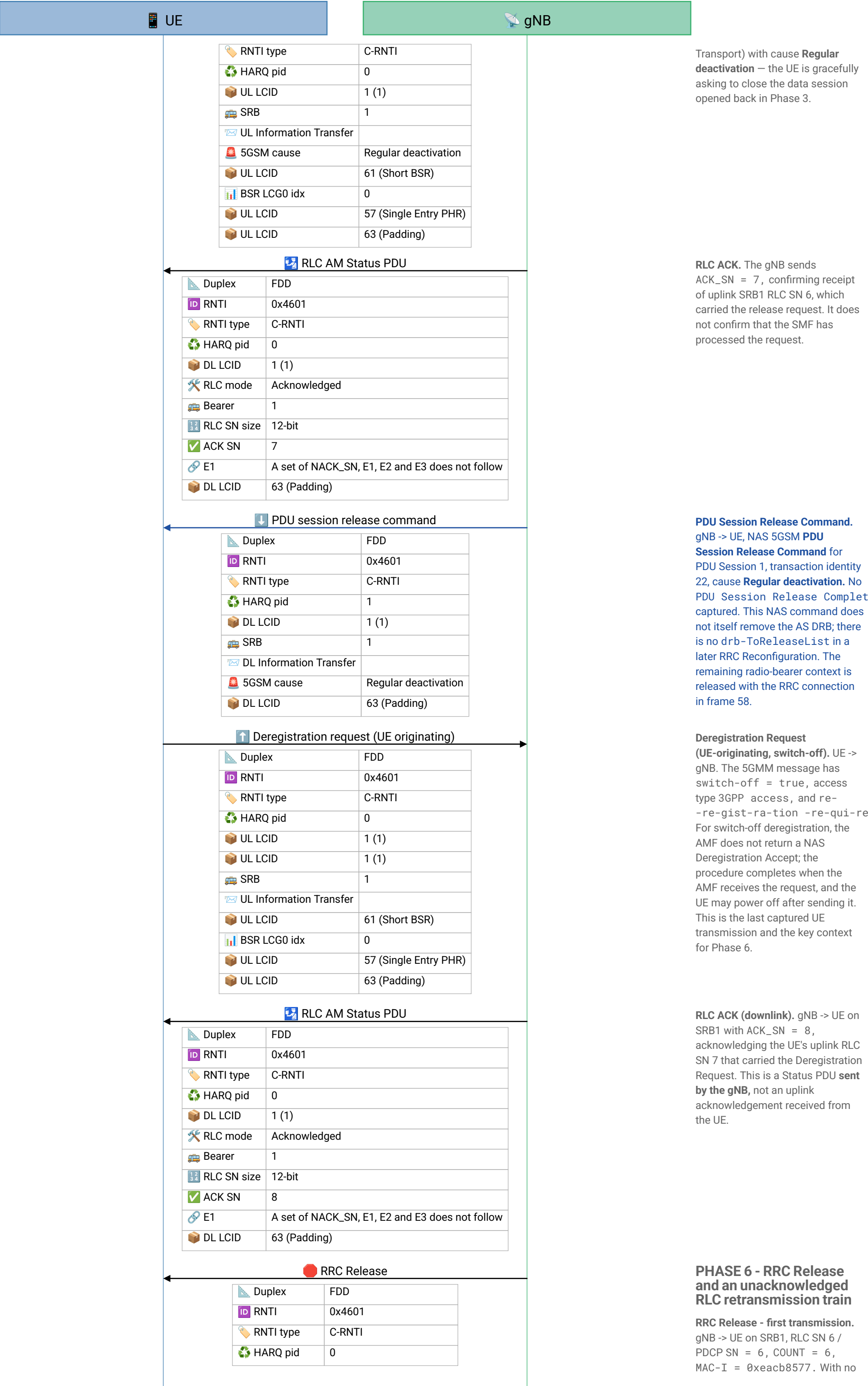
SN 10, poll set. Whole RLC SDU
with a status request.

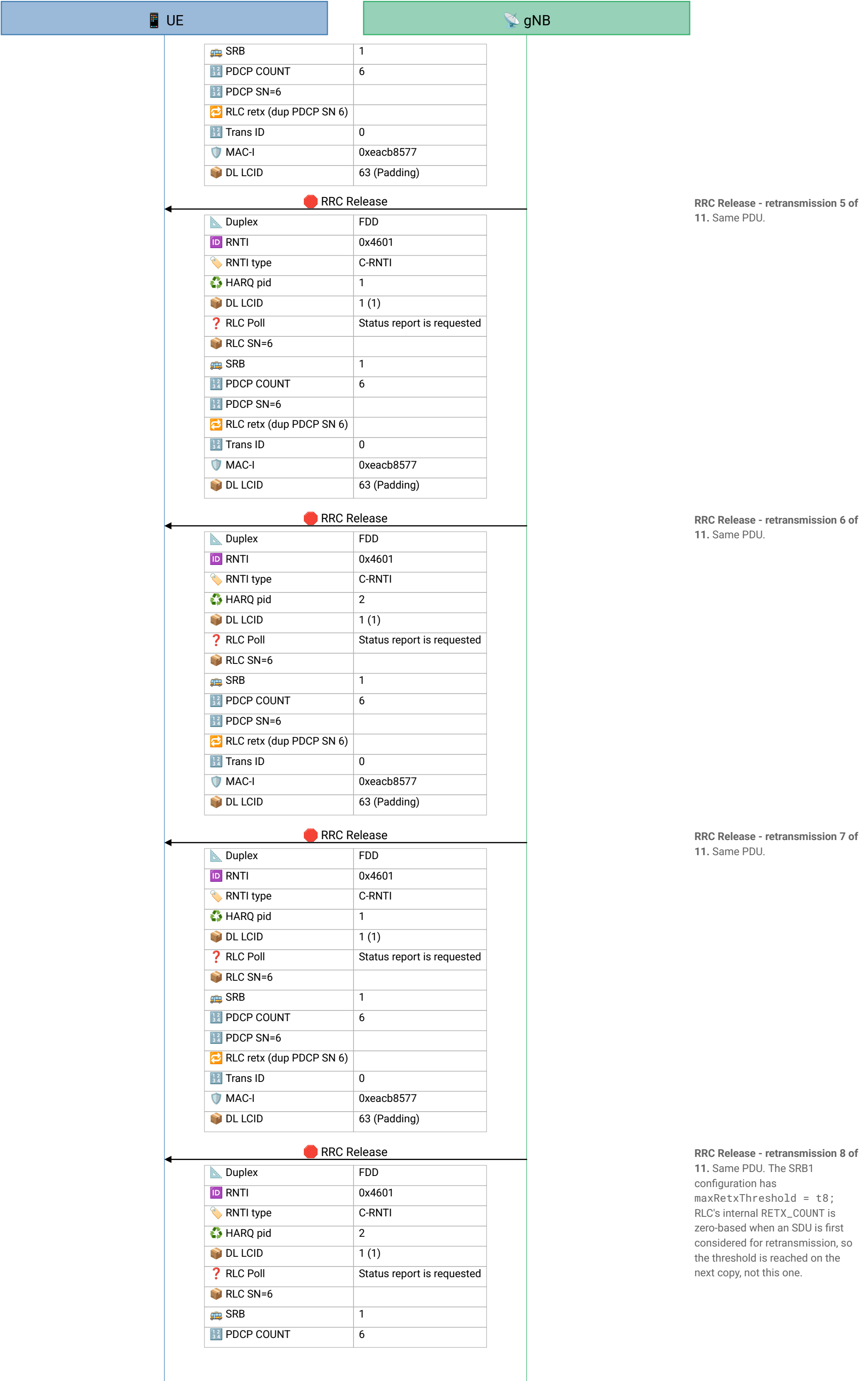
SN 11, poll set. Another whole RLC
SDU with a status request.
Consecutive polls do not by
themselves indicate packet loss;
the following Status PDU has no
NACKs.

RLC ACK on the DRB.
ACK_SN = 12 – through SN 11.









UE

gNB

1234 PDCP SN=6	
RLC retx (dup PDCP SN 6)	
1234 Trans ID	0
MAC-I	0xeacb8577
DL LCID	63 (Padding)

RRC Release

Duplex	FDD
ID RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	1
DL LCID	1 (1)
RLC Poll	Status report is requested
RLC SN=6	
SRB	1
1234 PDCP COUNT	6
1234 PDCP SN=6	
RLC retx (dup PDCP SN 6)	
1234 Trans ID	0
MAC-I	0xeacb8577
DL LCID	63 (Padding)

RRC Release

Duplex	FDD
ID RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	1
DL LCID	1 (1)
RLC Poll	Status report is requested
RLC SN=6	
SRB	1
1234 PDCP COUNT	6
1234 PDCP SN=6	
RLC retx (dup PDCP SN 6)	
1234 Trans ID	0
MAC-I	0xeacb8577
DL LCID	63 (Padding)

RRC Release

Duplex	FDD
ID RNTI	0x4601
RNTI type	C-RNTI
HARQ pid	0
DL LCID	1 (1)
RLC Poll	Status report is requested
RLC SN=6	
SRB	1
1234 PDCP COUNT	6
1234 PDCP SN=6	
RLC retx (dup PDCP SN 6)	
1234 Trans ID	0
MAC-I	0xeacb8577
DL LCID	63 (Padding)

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