lte-attach-air-interface.annotated

📱 UE	📡 eNB	☁️ MME

[1] 📨 RAR

📅 SFN	421
🕒 SF	6
🆔 RNTI	2
🏷️ RNTI type	RA-RNTI
✅ CRC	OK
🎲 RAPID	0x24
⏱️ TA	0
📤 UL Grant raw	26124
🦘 Hop	0
📦 RBA	51
📈 TMCS	0
🔋 TPC	0 dB
⏲️ UL delay	0
📊 CQI-req	0
🆕 Temp C-RNTI	70

[Frame 1] Phase 1 - UE 70 onto the cell. Random Access Response (Msg2). The preamble itself (Msg1) is a physical-layer event and is not in a MAC capture. The eNB answers preamble `RAPID 0x24` on `RA-RNTI 2`, an identity derived from when the preamble arrived, since the eNB does not yet know who sent it. It hands out Temporary C-RNTI 70, a Timing Advance of 0 and the uplink grant for Msg3.

[2] 📡 RRC Connection Request

📅 SFN	422
🕒 SF	2
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
📤 UL grant	7 B
✅ CRC	OK
🧱 UL UEs in TTI	1
📦 UL LCID	0x00 (CCCH)
🪪 UE-Identity	randomValue
📋 Cause	mo-Signalling

[Frame 2] RRC Connection Request (Msg3) on the common control channel (`CCCH`, LCID 0), using the grant from frame 1. The UE has no dedicated identity yet, so it sends a random value for contention resolution. Cause `mo-Signalling`: the UE wants to talk to the core network.

[3] ✅ RRC Connection Setup

📅 SFN	422
🕒 SF	8
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🧱 DL UEs in TTI	1
📦 DL LCID	0x1c (UE Contention Resolution Identity)
📦 DL LCID	0x00 (CCCH)
📦 DL LCID	0x1f (Padding)
🔢 Trans ID	0
🛡️ SRB add	1
📦 maxHARQ-Tx	n4
⏰ periodicBSR	sf20
⏰ retxBSR	sf320
⏰ TAT	infinity...
	3 more

[Frame 3] Msg4 does two jobs. The MAC UE `Contention Resolution Identity` element (LCID 0x1c) echoes the UE's Msg3 bytes, so the UE knows it won the random access. The RRC Connection Setup installs SRB1 and the MAC rules the UE follows from now on: a BSR every 20 subframes, a PHR every 50, and transmission mode 1.

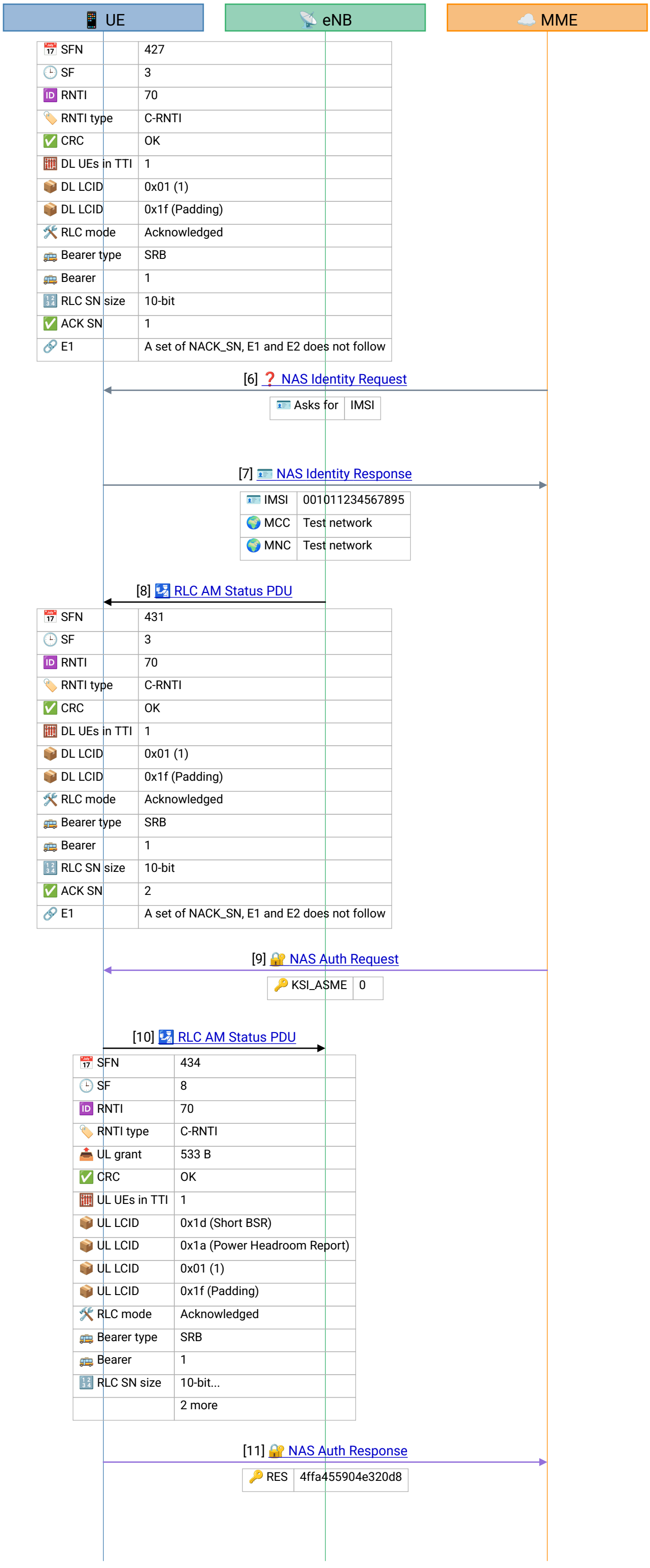
[4] ✅ RRC Connection Setup Complete

📅 SFN	426
🕒 SF	8
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
📤 UL grant	533 B
✅ CRC	OK
🧱 UL UEs in TTI	1
📦 UL LCID	0x1d (Short BSR)
📦 UL LCID	0x1a (Power Headroom Report)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0
🌐 PLMN idx	1

[Frame 4] RRC Connection Setup Complete (Msg5) on SRB1. The UE is now RRC_CONNECTED. It piggybacks its first NAS message: an **Attach Request** (combined EPS/IMSI attach) carrying a PDN Connectivity Request. The UE identifies itself with an old GUTI, a temporary identity from an earlier visit.

[5] 🛂 RLC AM Status PDU

[Frame 5] RLC AM Status PDU: the eNB confirms SRB1 data up to `ACK_SN 1`. No NACKs follow, which means nothing is missing. These acknowledgements thread through every



reliable exchange below.

[Frame 6] Phase 2 - Identify, authenticate, secure. The MME does not recognize the old GUTI, so it asks for the permanent identity (IMSI). The NAS message rides an RRC DL Information Transfer; the diagram draws it on the MME lane because the eNB only relays it.

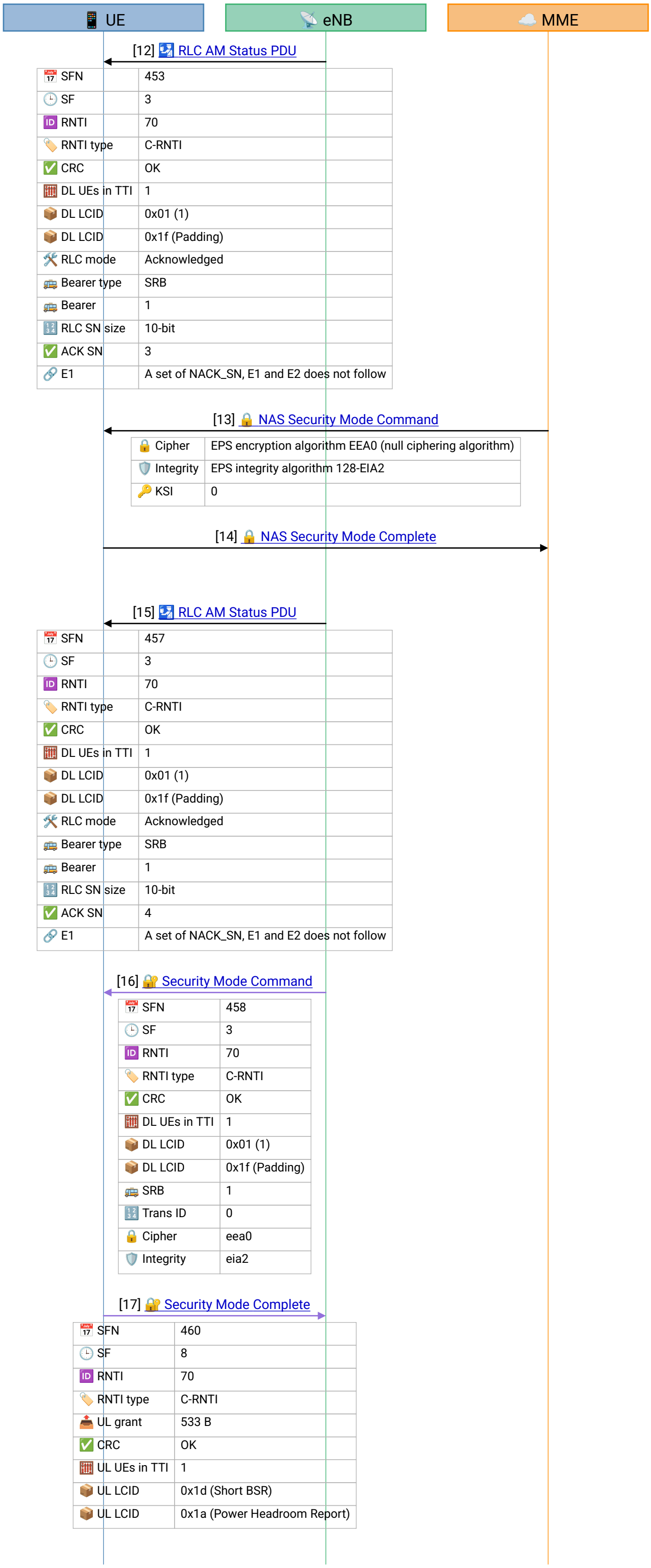
[Frame 7] Identity Response: IMSI `001011234567895`. MCC 001 / MNC 01 is the 3GPP test network, as expected on an srsRAN lab rig.

[Frame 8] RLC status: SRB1 delivered up to `ACK_SN` 2.

[Frame 9] Authentication Request (EPS AKA). The MME sends a random challenge (RAND) and an authentication token (AUTN), and names the key set `KSI_ASME` 0 that this run will create.

[Frame 10] The UE's own RLC status for the downlink SRB1 PDUs it has received.

[Frame 11] Authentication Response. The SIM's computed RES matches what the network expects, so both sides now hold the same root key, K_ASME.



[Frame 12] RLC status: `ACK_SN 3` .

[Frame 13] NAS Security Mode Command. The MME selects `EEA0` (null ciphering) and `128-EIA2` (AES-CMAC integrity) for NAS. The null cipher is why this capture needs no keys: from here on, NAS messages are integrity-protected but readable.

[Frame 14] NAS Security Mode Complete, the first NAS message under the new context. Its header says "integrity protected and ciphered", but the cipher is EEA0, so the body is plaintext.

[Frame 15] RLC status: `ACK_SN 4` .

[Frame 16] AS Security Mode Command, the *radio* security handshake between UE and eNB. It is separate from the NAS one in frame 13 and uses keys derived from the same K_ASME. Again `eea0` / `eia2` : every PDCP PDU from now on carries a real MAC-I integrity tag, but nothing is encrypted.

[Frame 17] AS Security Mode Complete. Radio security is active on SRB1.

UE | eNB | MME

📦 UL LCID	0x01 (1)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0

[18] 🔄 RLC AM Status PDU

📅 SFN	461
🕒 SF	3
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🧱 DL UEs in TTI	1
📦 DL LCID	0x01 (1)
📦 DL LCID	0x1f (Padding)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	1
🔢 RLC SN size	10-bit
✅ ACK SN	5
🔗 E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 18] RLC status: ACK_SN 5 .

[19] ❔ UE Capability Enquiry

📅 SFN	461
🕒 SF	4
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🧱 DL UEs in TTI	1
📦 DL LCID	0x01 (1)
📦 DL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0
📡 RAT requested	eutra

[Frame 19] Phase 3 - Capabilities and the default bearer. UE Capability Enquiry for `eutra`. Note the PDCP trailer: `MAC-I 0xd8c5635b`, a real integrity digest now that AS security is on.

[20] 🔄 RLC AM Status PDU

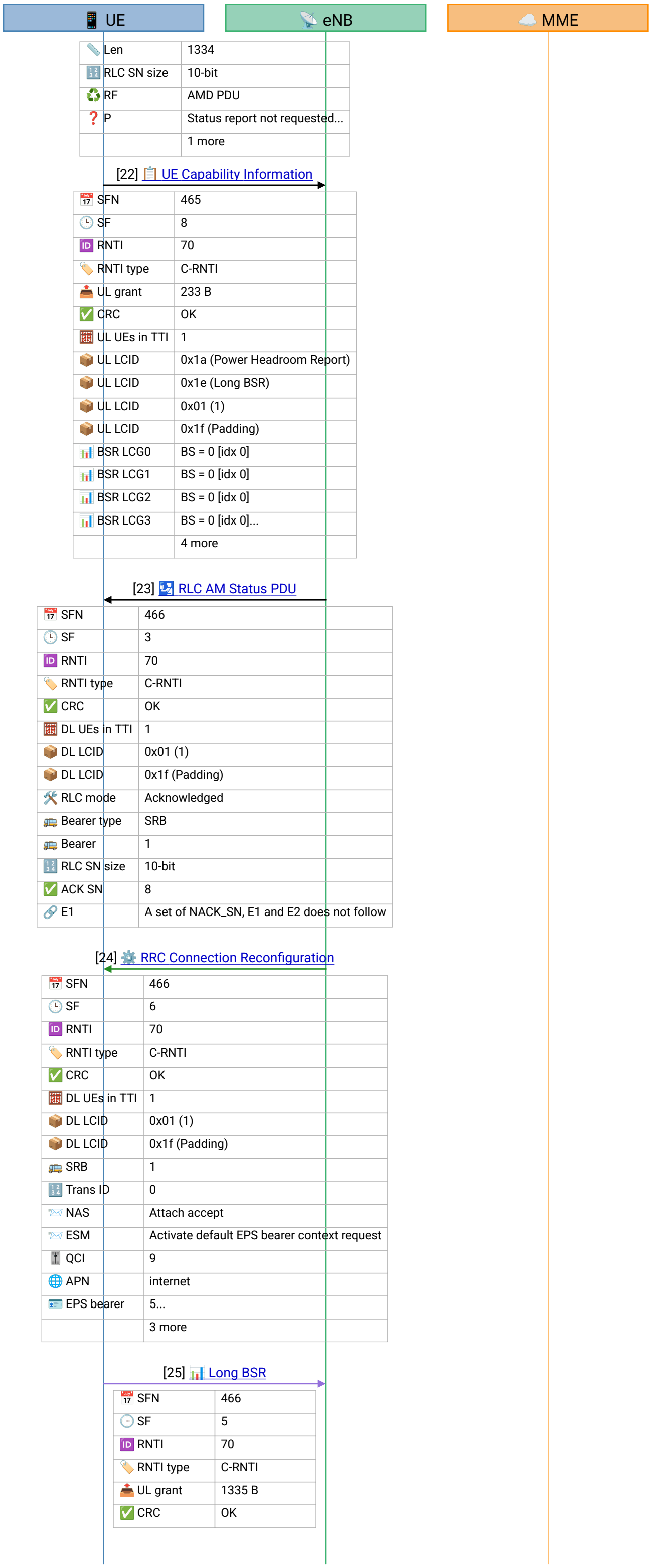
📅 SFN	464
🕒 SF	8
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
📤 UL grant	533 B
✅ CRC	OK
🧱 UL UEs in TTI	1
📦 UL LCID	0x1d (Short BSR)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x01 (1)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	1
🔢 RLC SN size	10-bit
✅ ACK SN	5...
	1 more

[Frame 20] Two RLC PDUs in one MAC PDU: the UE's status report, and the **first segment** (RLC SN 5) of its capability report. The report is too large for one uplink grant.

[21] 📦 RLC AM Data SN=6

📅 SFN	465
🕒 SF	7
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
📤 UL grant	1335 B
✅ CRC	OK
🧱 UL UEs in TTI	1
📦 UL LCID	0x01 (1)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	1

[Frame 21] Middle segment of the capability report: RLC SN 6, 1,334 bytes. Its framing info says the PDU neither starts nor ends an SDU.



[Frame 22] Last segment (RLC SN 7). The eNB reassembles SN 5-7 into the **UE Capability Information:** release 12, UE category 4. A Long BSR reporting all-zero buffers rides along.

[Frame 23] RLC status ACK_SN 8 : all three segments (SN 5, 6, 7) arrived, with no NACK.

[Frame 24] The pivotal frame of the attach. One RRC Connection Reconfiguration carries the NAS **Attach Accept** with **Activate Default EPS Bearer Context Request:** APN `internet`, QCI 9 (best-effort data), EPS bearer 5. The radio side builds the matching data radio bearer, DRB 1 on LCID 3 in RLC AM, and adds SRB2. The UE asked for IPv4v6; ESM cause 50 says only IPv4 is allowed.

[Frame 25] Long BSR: all four logical-channel groups report empty buffers.

UE | eNB | MME

UL UEs in TTI	1
UL LCID	0x1e (Long BSR)
UL LCID	0x1f (Padding)
BSR LCG0	BS = 0 [idx 0]
BSR LCG1	BS = 0 [idx 0]
BSR LCG2	BS = 0 [idx 0]
BSR LCG3	BS = 0 [idx 0]

[26] Long BSR

SFN	466
SF	6
RNTI	70
RNTI type	C-RNTI
UL grant	233 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1e (Long BSR)
UL LCID	0x1f (Padding)
BSR LCG0	BS = 0 [idx 0]
BSR LCG1	BS = 0 [idx 0]
BSR LCG2	BS = 0 [idx 0]
BSR LCG3	BS = 0 [idx 0]

[Frame 26] Another all-zero Long BSR on the next grant.

[27] RRC Connection Reconfiguration Complete

SFN	468
SF	8
RNTI	70
RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x01 (1)
UL LCID	0x01 (1)
UL LCID	0x02 (2)
UL LCID	0x1f (Padding)
SRB	1
Trans ID	0

[Frame 27] RRC Connection Reconfiguration Complete. In the same MAC PDU, on the brand-new SRB2 (LCID 2), a UL Information Transfer carries **Attach Complete** + Activate Default EPS Bearer Accept. UE 70 is attached and has an IPv4 address on the internet PDN.

[28.1] RLC AM Status PDU

SFN	469
SF	3
RNTI	70
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x02 (2)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1
RLC SN size	10-bit
ACK SN	9
E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 28.1] RLC status for SRB1: `ACK_SN 9 .`

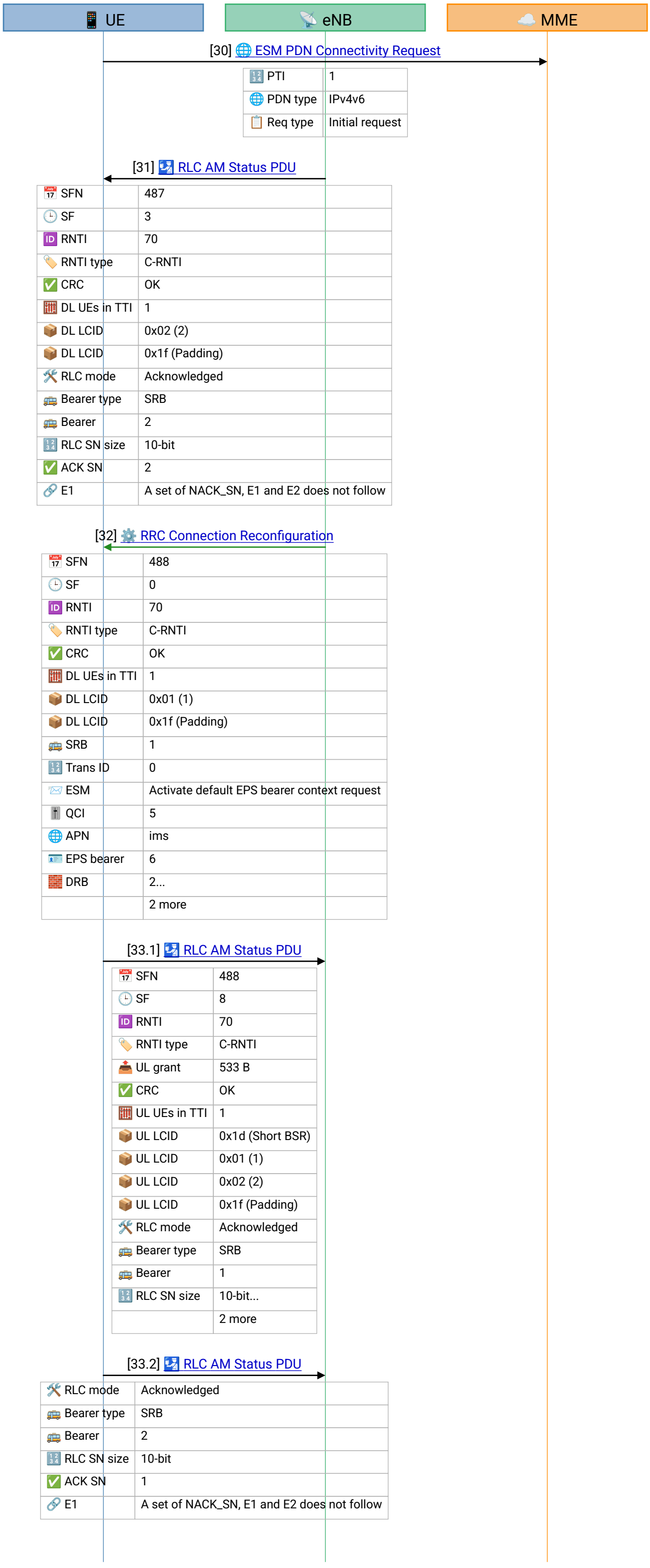
[28.2] RLC AM Status PDU

RLC mode	Acknowledged
Bearer type	SRB
Bearer	2
RLC SN size	10-bit
ACK SN	1
E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 28.2] RLC status for SRB2: `ACK_SN 1 .` SRB2 is a separate RLC entity with its own sequence numbers.

[29] NAS EMM Information

[Frame 29] EMM Information: the network's name and time zone. Housekeeping after attach.



[Frame 30] Phase 4 - The IMS PDN. A second PDN Connectivity Request, this time for the `ims` APN that VoLTE needs. It is UE-initiated, 0.2 s after the attach completes.

[Frame 31] RLC status for SRB2: ACK_SN 2 .

[Frame 32] RRC Reconfiguration carrying Activate Default EPS Bearer for APN `ims` : `QCI 5` (IMS signalling), EPS bearer 6, built on DRB 2 / LCID 4 in RLC AM. The PCO in this message also hands the UE its P-CSCF address. This bearer will carry all SIP.

[Frame 33.1] UE's RLC status for SRB1.

[Frame 33.2] UE's RLC status for SRB2.



[34] ✅ RRC Connection Reconfiguration Complete

📅 SFN	490
🕒 SF	8
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
📤 UL grant	533 B
✅ CRC	OK
🚦 UL UEs in TTI	1
📦 UL LCID	0x1d (Short BSR)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x02 (2)
📦 UL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0

[Frame 34] Reconfiguration Complete, with the Activate Default EPS Bearer Accept on SRB2 in the same MAC PDU. UE 70 now has two PDNs: internet (192.168.100.2) and ims (192.168.101.2).

[35.1] 🔄 RLC AM Status PDU

📅 SFN	491
🕒 SF	3
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🚦 DL UEs in TTI	1
📦 DL LCID	0x01 (1)
📦 DL LCID	0x02 (2)
📦 DL LCID	0x1f (Padding)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	1
🔢 RLC SN size	10-bit
✅ ACK SN	10
🔗 E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 35.1] RLC status, SRB1 `ACK_SN 10`.

[35.2] 🔄 RLC AM Status PDU

🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	2
🔢 RLC SN size	10-bit
✅ ACK SN	3
🔗 E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 35.2] RLC status, SRB2 `ACK_SN 3`.

[36] 🔼 UL PDCP SN=0

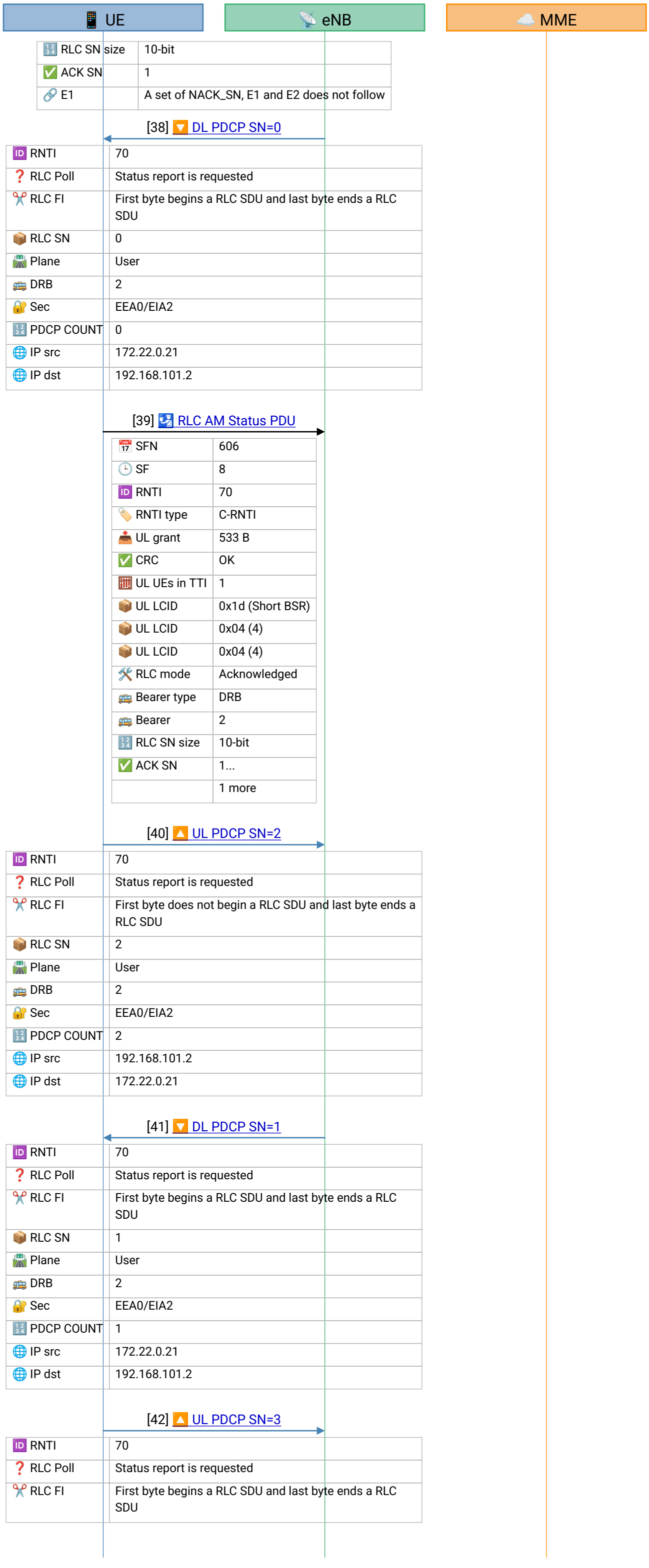
🆔 RNTI	70
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	0
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	0
🌐 IP src	192.168.101.2
🌐 IP dst	172.22.0.21

[Frame 36] Phase 5 - IMS registration. The first user-plane packet on DRB 2, 1.1 s later: a TCP SYN from 192.168.101.2 to the P-CSCF at 172.22.0.21, port 5060. PDCP SN 0, COUNT 0 on a fresh bearer.

[37] 🔄 RLC AM Status PDU

📅 SFN	603
🕒 SF	3
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🚦 DL UEs in TTI	1
📦 DL LCID	0x04 (4)
📦 DL LCID	0x1f (Padding)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	DRB
🚌 Bearer	2

[Frame 37] eNB's RLC status for **DRB** 2. The bearer-type field (DRB, not SRB) keeps it apart from SRB 2.



[Frame 38] TCP SYN-ACK from the P-CSCF.

[Frame 39] The UE's RLC status, plus the TCP ACK that completes the handshake.

[Frame 40] First TCP segment (1,398 bytes) of the SIP REGISTER. It is too big for one segment, so TCP splits it.

[Frame 41] TCP ACK from the P-CSCF.

[Frame 42] The last 211 bytes complete the **SIP REGISTER,** sent in the clear because no IPsec exists yet. Its `Security-Client` header offers four IPsec combinations (HMAC-MD5 or HMAC-SHA-1, AES-CBC or null encryption) and the UE's SPIs and ports (client 53360, server 55092).

UE	eNB	MME

📦 RLC SN	3
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	3
🌐 IP src	192.168.101.2
🌐 IP dst	172.22.0.21
☎️ SIP	REGISTER sip:ims.mnc001.mcc001.3gppnetwork.org

[43] 🔽 DL PDCP SN=2

[Frame 43] TCP ACK.

🆔 RNTI	70
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	2
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	2
🌐 IP src	172.22.0.21
🌐 IP dst	192.168.101.2

[44] 🔽 DL PDCP SN=3

[Frame 44] SIP 100 Trying from the P-CSCF.

🆔 RNTI	70
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	3
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	3
🌐 IP src	172.22.0.21
🌐 IP dst	192.168.101.2
☎️ SIP	100 Trying

[45] 🔄 RLC AM Status PDU

[Frame 45] RLC status, DRB 2 ACK_SN 4 .

📅 SFN	609
🕒 SF	3
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🧱 DL UEs in TTI	1
📦 DL LCID	0x04 (4)
📦 DL LCID	0x1f (Padding)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	DRB
🚌 Bearer	2
🔢 RLC SN size	10-bit
✅ ACK SN	4
🔗 E1	A set of NACK_SN, E1 and E2 does not follow

[46] 📊 Long BSR

[Frame 46] Long BSR, buffers empty.

📅 SFN	609
🕒 SF	4
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
📤 UL grant	293 B
✅ CRC	OK
🧱 UL UEs in TTI	1
📦 UL LCID	0x1e (Long BSR)
📦 UL LCID	0x1f (Padding)
📊 BSR LCG0	BS = 0 [idx 0]
📊 BSR LCG1	BS = 0 [idx 0]
📊 BSR LCG2	BS = 0 [idx 0]
📊 BSR LCG3	BS = 0 [idx 0]



[47] Long BSR

SFN	610
SF	2
RNTI	70
RNTI type	C-RNTI
UL grant	293 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1e (Long BSR)
UL LCID	0x1f (Padding)
BSR LCG0	BS = 0 [idx 0]
BSR LCG1	BS = 0 [idx 0]
BSR LCG2	BS = 0 [idx 0]
BSR LCG3	BS = 0 [idx 0]

[Frame 47] Long BSR, buffers empty.

[48] DL PDCP SN=4

RNTI	70
RLC Poll	Status report is requested
RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
RLC SN	4
Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	4
IP src	172.22.0.21
IP dst	192.168.101.2
SIP	401 Unauthorized - Challenging the UE

[Frame 48] SIP 401 Unauthorized: the IMS-AKA challenge (`algorithm=AKAv1-MD5`). Its `Security-Server` header picks `alg=hmac-sha-1-96` with **`ealg=null`:** the IPsec tunnel about to start authenticates SIP but does not encrypt it. That choice is what lets the SIP call below be read inside ESP. The P-CSCF's SPIs are 4096/4097, on ports 5100/6100.

[63] UL PDCP SN=11

RNTI	70
RLC Poll	Status report is requested
RLC FI	First byte does not begin a RLC SDU and last byte ends a RLC SDU
RLC SN	11
Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	11
IP src	192.168.101.2
IP dst	172.22.0.21
ESP SPI	0x00001001
SIP	REGISTER sip:ims.mnc001.mcc001.3gppnetwork.org

[Frame 63] The **protected REGISTER,** now inside ESP: from the UE's client port 53360 to the P-CSCF's server port 6100, under SPI `0x00001001` (4097, the P-CSCF's `spi-s` from frame 48). The RLC framing info shows this PDU ends an SDU that began in an earlier frame.

[64] DL PDCP SN=8

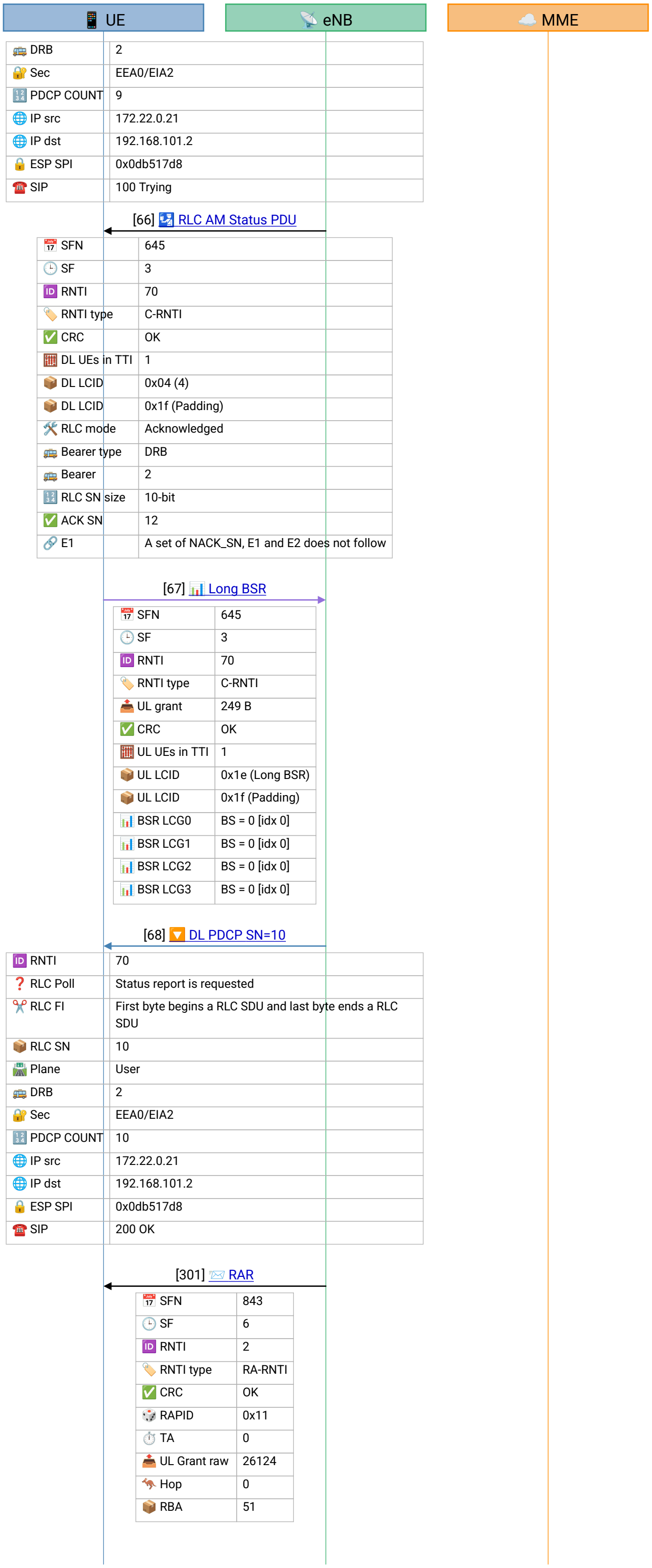
RNTI	70
RLC Poll	Status report is requested
RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
RLC SN	8
Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	8
IP src	172.22.0.21
IP dst	192.168.101.2
ESP SPI	0x0db517d8

[Frame 64] TCP ACK inside ESP, downlink under SPI `0x0db517d8`. That is 229971928, the UE's own `spi-c` from frame 42.

[65] DL PDCP SN=9

RNTI	70
RLC Poll	Status report is requested
RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
RLC SN	9
Plane	User

[Frame 65] SIP 100 Trying, inside ESP.



[Frame 66] RLC status, DRB 2 ACK_SN 12 .

[Frame 67] Long BSR.

[Frame 68] SIP 200 OK: UE 70 is registered with IMS, 2.3 s after its first random access. A SUBSCRIBE / NOTIFY for the registration event follows (not shown).

[Frame 301] Phase 6 - UE 71 attaches. 14.5 s later, a second phone starts the same sequence: RAR on `RA-RNTI` 2 with a different preamble (`RAPID` `0x11`) and Temporary C-RNTI 71.

UE | eNB | MME

TMCS	0
TPC	0 dB
UL delay	0
CQI-req	0
Temp C-RNTI	71

[302] RRC Connection Request

SFN	844
SF	2
RNTI	71
RNTI type	C-RNTI
UL grant	7 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x00 (CCCH)
UE-Identity	randomValue
Cause	mo-Signalling

[Frame 302] RRC Connection Request, cause `mo-Signalling`, exactly as frame 2.

[303] RRC Connection Setup

SFN		844
SF		8
RNTI		71
RNTI type		C-RNTI
CRC		OK
DL UEs in TTI		1
DL LCID		0x1c (UE Contention Resolution Identity)
DL LCID		0x00 (CCCH)
DL LCID		0x1f (Padding)
Trans ID		0
SRB add		1
maxHARQ-Tx		n4
periodicBSR		sf20
retxBSR		sf320
TAT		infinity...
		3 more

[Frame 303] Contention resolution + RRC Connection Setup (SRB1).

[304] RRC Connection Setup Complete

SFN	847
SF	0
RNTI	71
RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x1a (Power Headroom Report)
UL LCID	0x01 (1)
UL LCID	0x1f (Padding)
SRB	1
Trans ID	0
PLMN idx	1
NAS	1775305cd1110741…

[Frame 304] Setup Complete + Attach Request (old GUTI). One difference from UE 70: this UE sets the **ESM information transfer flag.** It holds back its PDN details until security is up.

[305] RLC AM Status PDU

SFN	847
SF	5
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1

[Frame 305] RLC status.

UE | eNB | MME

RLC SN size	10-bit
ACK SN	1
E1	A set of NACK_SN, E1 and E2 does not follow

[306] NAS Identity Request

Asks for	IMSI

[Frame 306] Identity Request (IMSI). This GUTI is unknown to the MME too.

[307] NAS Identity Response

IMSI	001011234567896
MCC	Test network
MNC	Test network

[Frame 307] Identity Response: IMSI `001011234567896`, one digit after UE 70.

[308] RLC AM Status PDU

SFN	851
SF	5
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1
RLC SN size	10-bit
ACK SN	2
E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 308] RLC status.

[309] NAS Auth Request

KSI_ASME	0

[Frame 309] Authentication Request.

[310] RLC AM Status PDU

SFN	855
SF	0
RNTI	71
RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x1a (Power Headroom Report)
UL LCID	0x01 (1)
UL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1
RLC SN size	10-bit...
	2 more

[Frame 310] UE's RLC status.

[311] NAS Auth Response

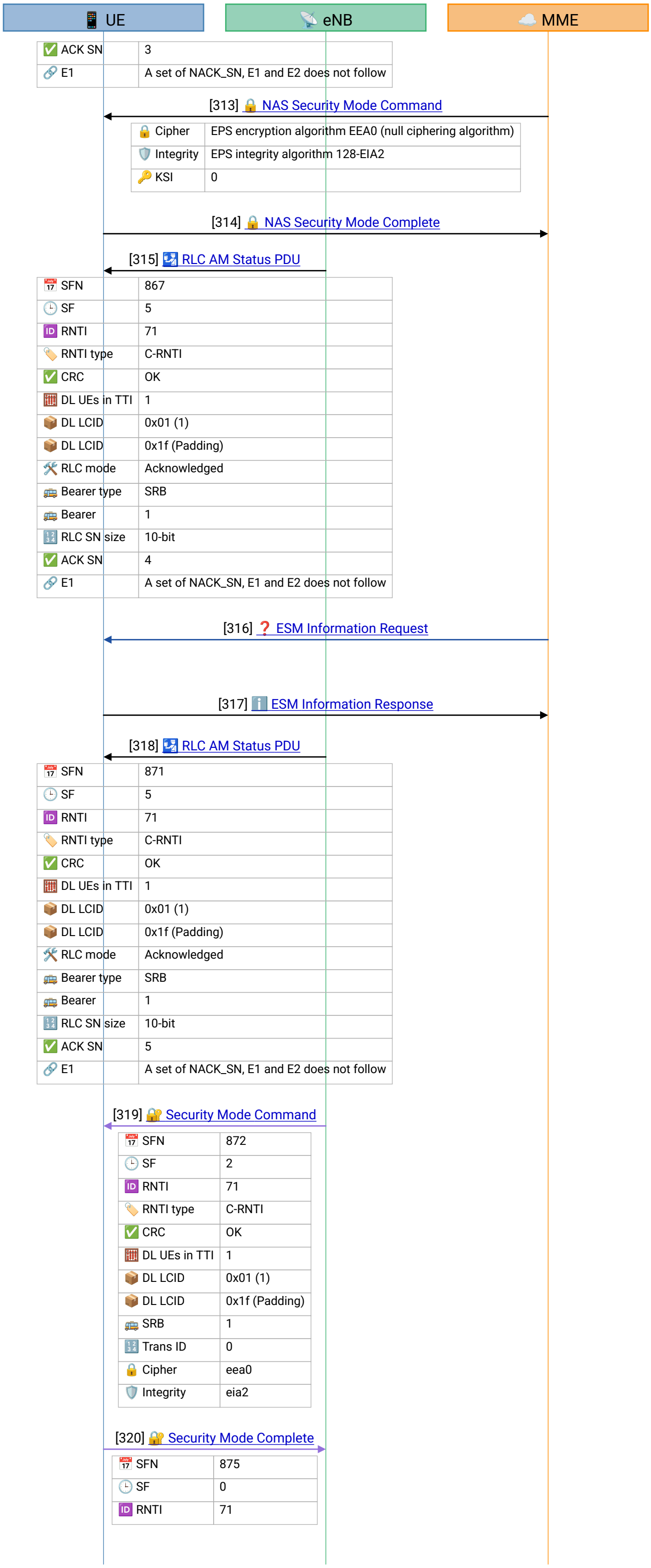
RES	7c18ebd15ded6af9

[Frame 311] Authentication Response.

[312] RLC AM Status PDU

SFN	863
SF	5
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1
RLC SN size	10-bit

[Frame 312] RLC status.



[Frame 313] NAS Security Mode Command: EEA0 / EIA2 again.

[Frame 314] NAS Security Mode Complete.

[Frame 315] RLC status.

[Frame 316] ESM Information Request: the consequence of the flag set in frame 304. Now that NAS is integrity-protected, the MME asks for the withheld PDN information.

[Frame 317] ESM Information Response, protected by NAS integrity.

[Frame 318] RLC status.

[Frame 319] AS Security Mode Command: eea0 / eia2.

[Frame 320] AS Security Mode Complete.

RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x01 (1)
UL LCID	0x01 (1)
UL LCID	0x1f (Padding)
SRB	1
Trans ID	0

[321] RLC AM Status PDU

[Frame 321] RLC status.

SFN	875
SF	5
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1
RLC SN size	10-bit
ACK SN	6
E1	A set of NACK_SN, E1 and E2 does not follow

[322] UE Capability Enquiry

[Frame 322] UE Capability Enquiry. PDCP COUNT 5 is this UE's own count. Wireshark tracks it separately only because the capture was re-tagged with per-UE identities; in the original file it read 37.

SFN	875
SF	6
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x1f (Padding)
SRB	1
Trans ID	0
RAT requested	eutra

[323] UE Capability Information

[Frame 323] UE Capability Information in one frame, multiplexed with an RLC status: release 10, category 4. This phone is older than UE 70.

SFN	879
SF	0
RNTI	71
RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x1a (Power Headroom Report)
UL LCID	0x01 (1)
UL LCID	0x01 (1)
UL LCID	0x1f (Padding)
SRB	1
Trans ID	0
AS release	rel10...
	1 more

[324] RLC AM Status PDU

[Frame 324] RLC status.

SFN	879
SF	5
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1

📦 DL LCID	0x01 (1)
📦 DL LCID	0x1f (Padding)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	1
🔢 RLC SN size	10-bit
✅ ACK SN	7
🔗 E1	A set of NACK_SN, E1 and E2 does not follow

[325] ⚙️ RRC Connection Reconfiguration

📅 SFN	879
🕒 SF	7
🆔 RNTI	71
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🚦 DL UEs in TTI	1
📦 DL LCID	0x01 (1)
📦 DL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0
📨 NAS	Attach accept
📨 ESM	Activate default EPS bearer context request
🎚️ QCI	9
🌐 APN	internet
🪪 EPS bearer	5...
	3 more

[Frame 325] Attach Accept + default bearer, identical in shape to frame 24: internet, QCI 9, EPS bearer 5, DRB 1 on LCID 3.

[326] ✅ RRC Connection Reconfiguration Complete

📅 SFN	883
🕒 SF	0
🆔 RNTI	71
🏷️ RNTI type	C-RNTI
📤 UL grant	533 B
✅ CRC	OK
🚦 UL UEs in TTI	1
📦 UL LCID	0x1d (Short BSR)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x02 (2)
📦 UL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0

[Frame 326] Reconfiguration Complete + Attach Complete.

[327.1] 🔄 RLC AM Status PDU

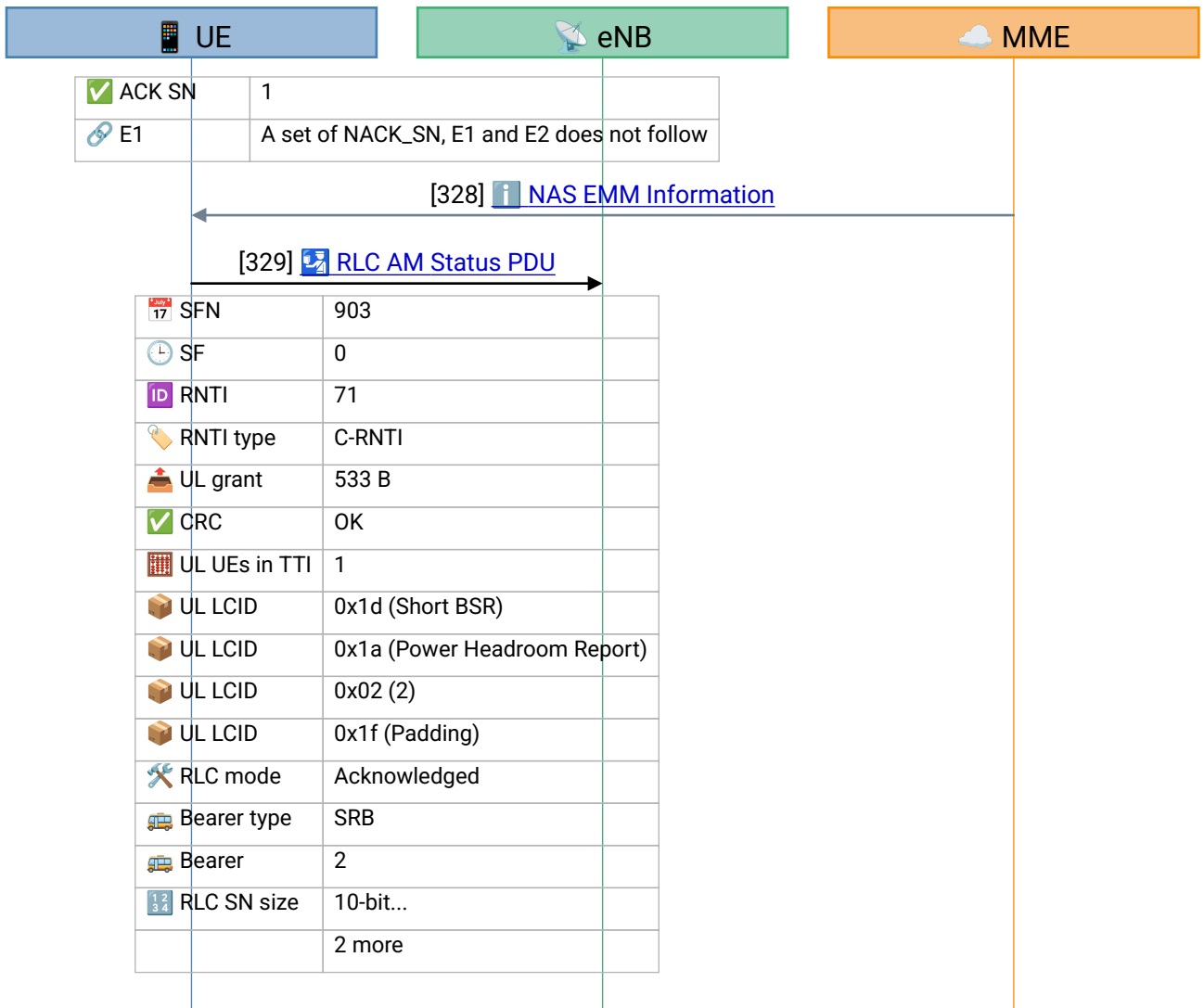
📅 SFN	883
🕒 SF	5
🆔 RNTI	71
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🚦 DL UEs in TTI	1
📦 DL LCID	0x01 (1)
📦 DL LCID	0x02 (2)
📦 DL LCID	0x1f (Padding)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	1
🔢 RLC SN size	10-bit
✅ ACK SN	8
🔗 E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 327.1] RLC status, SRB1.

[327.2] 🔄 RLC AM Status PDU

🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	2
🔢 RLC SN size	10-bit

[Frame 327.2] RLC status, SRB2.



✅ ACK SN	1
🔗 E1	A set of NACK_SN, E1 and E2 does not follow

[328] ℹ️ NAS EMM Information

[Frame 328] EMM Information.

[329] 🚽 RLC AM Status PDU

[Frame 329] UE's RLC status on SRB2.

📅 SFN	903
🕒 SF	0
🆔 RNTI	71
🏷️ RNTI type	C-RNTI
📤 UL grant	533 B
✅ CRC	OK
🔳 UL UEs in TTI	1
📦 UL LCID	0x1d (Short BSR)
📦 UL LCID	0x1a (Power Headroom Report)
📦 UL LCID	0x02 (2)
📦 UL LCID	0x1f (Padding)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	2
🔢 RLC SN size	10-bit...
	2 more

[511] 🌐 ESM PDN Connectivity Request

🔢 PTI	50
🌐 PDN type	IPv4v6
📋 Req type	Initial request

[Frame 511] UE 71 requests the `ims` PDN, 2.1 s after its Attach Complete. Its internet bearer is already busy with app traffic.

[512] 🚽 RLC AM Status PDU

[Frame 512] RLC status, SRB2.

📅 SFN	69
🕒 SF	5
🆔 RNTI	71
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🔳 DL UEs in TTI	1
📦 DL LCID	0x02 (2)
📦 DL LCID	0x1f (Padding)
🛠️ RLC mode	Acknowledged
🚌 Bearer type	SRB
🚌 Bearer	2
🔢 RLC SN size	10-bit
✅ ACK SN	2
🔗 E1	A set of NACK_SN, E1 and E2 does not follow

[513] ⚙️ RRC Connection Reconfiguration

[Frame 513] Default bearer for `ims` : QCI 5, EPS bearer 6, DRB 2 / LCID 4. The same layout as UE 70 (frame 32).

📅 SFN	69
🕒 SF	9
🆔 RNTI	71
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🔳 DL UEs in TTI	1
📦 DL LCID	0x01 (1)
📦 DL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0
✉️ ESM	Activate default EPS bearer context request
🎚️ QCI	5
🌐 APN	ims
🪪 EPS bearer	6
🧱 DRB	2...
	2 more

[514] ✅ RRC Connection Reconfiguration Complete

[Frame 514] Reconfiguration Complete.

📅 SFN	71
🕒 SF	0

UE | eNB | MME

RNTI	71
RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x1a (Power Headroom Report)
UL LCID	0x01 (1)
UL LCID	0x01 (1)
UL LCID	0x03 (3)
SRB	1
Trans ID	0

[515] RLC AM Status PDU

[Frame 515] RLC status, SRB1.

SFN	71
SF	5
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1
RLC SN size	10-bit
ACK SN	9
E1	A set of NACK_SN, E1 and E2 does not follow

[516] ESM Activate Default Bearer Accept

PTI	0

[Frame 516] Activate Default EPS Bearer Accept. UE 71 registers with IMS over this bearer 0.7 s later (not shown), mirroring frames 36-68.

[517] UL PDCP SN=124

RNTI	71
RLC Poll	Status report not requested
RLC FI	First byte does not begin a RLC SDU and last byte does not end a RLC SDU
RLC SN	53
Plane	User
DRB	1
Sec	EEA0/EIA2
PDCP COUNT	124
IP src	192.168.100.3
IP dst	216.58.207.170

[Frame 517] What the internet bearer is doing meanwhile: a 1,248-byte TLS segment to 216.58.207.170:443 on DRB 1, PDCP SN 124. This RLC PDU is a middle segment of a larger SDU.

[518] RLC AM Status PDU

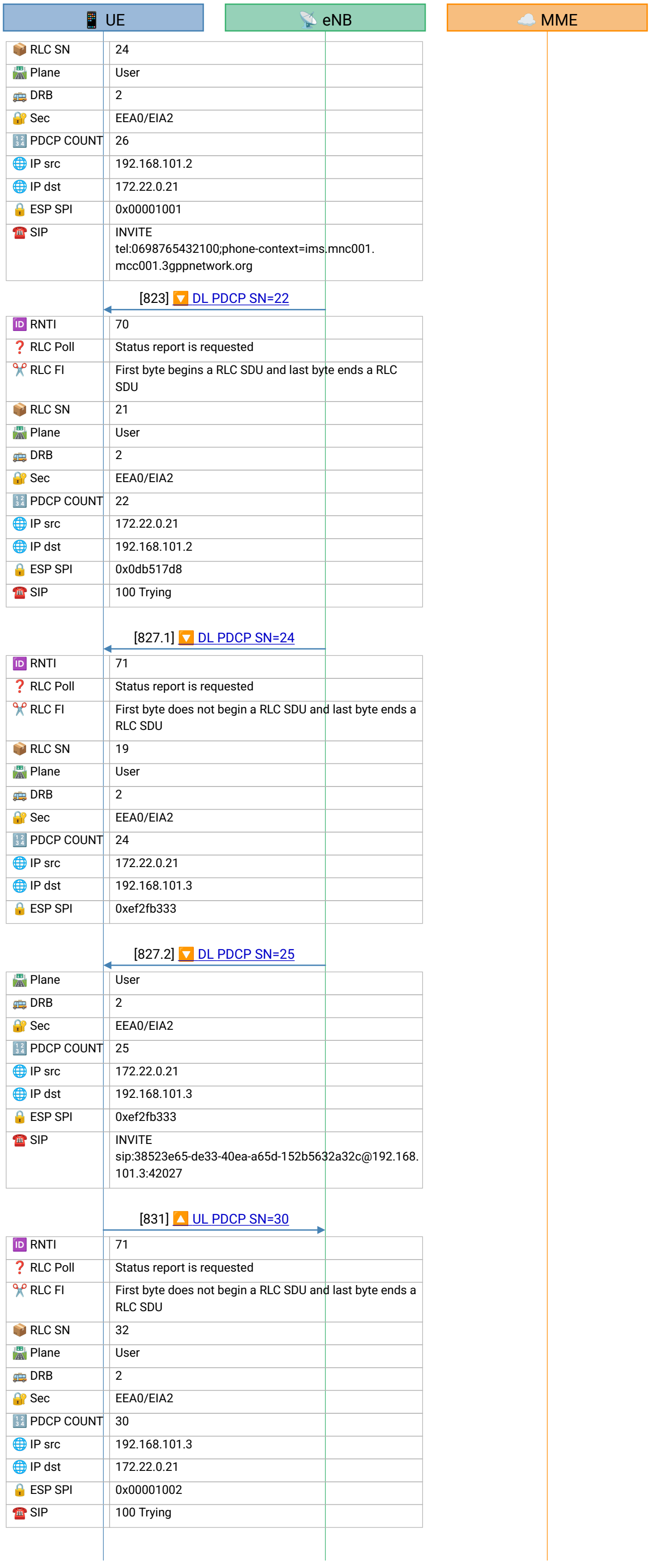
[Frame 518] RLC status, SRB2.

SFN	72
SF	4
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x02 (2)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	2
RLC SN size	10-bit
ACK SN	3
E1	A set of NACK_SN, E1 and E2 does not follow

[821] UL PDCP SN=26

RNTI	70
RLC Poll	Status report is requested
RLC FI	First byte does not begin a RLC SDU and last byte ends a RLC SDU

[Frame 821] Phase 7 - Call 1: UE 70 dials. The final segment of a **SIP INVITE** to `tel:0698765432100`, inside ESP on the IMS bearer. The SDP offer lists EVS, AMR-WB and AMR, and demands QoS preconditions (`des:qos mandatory`, `curr:qos none`): the call may not ring until both ends have a voice bearer.



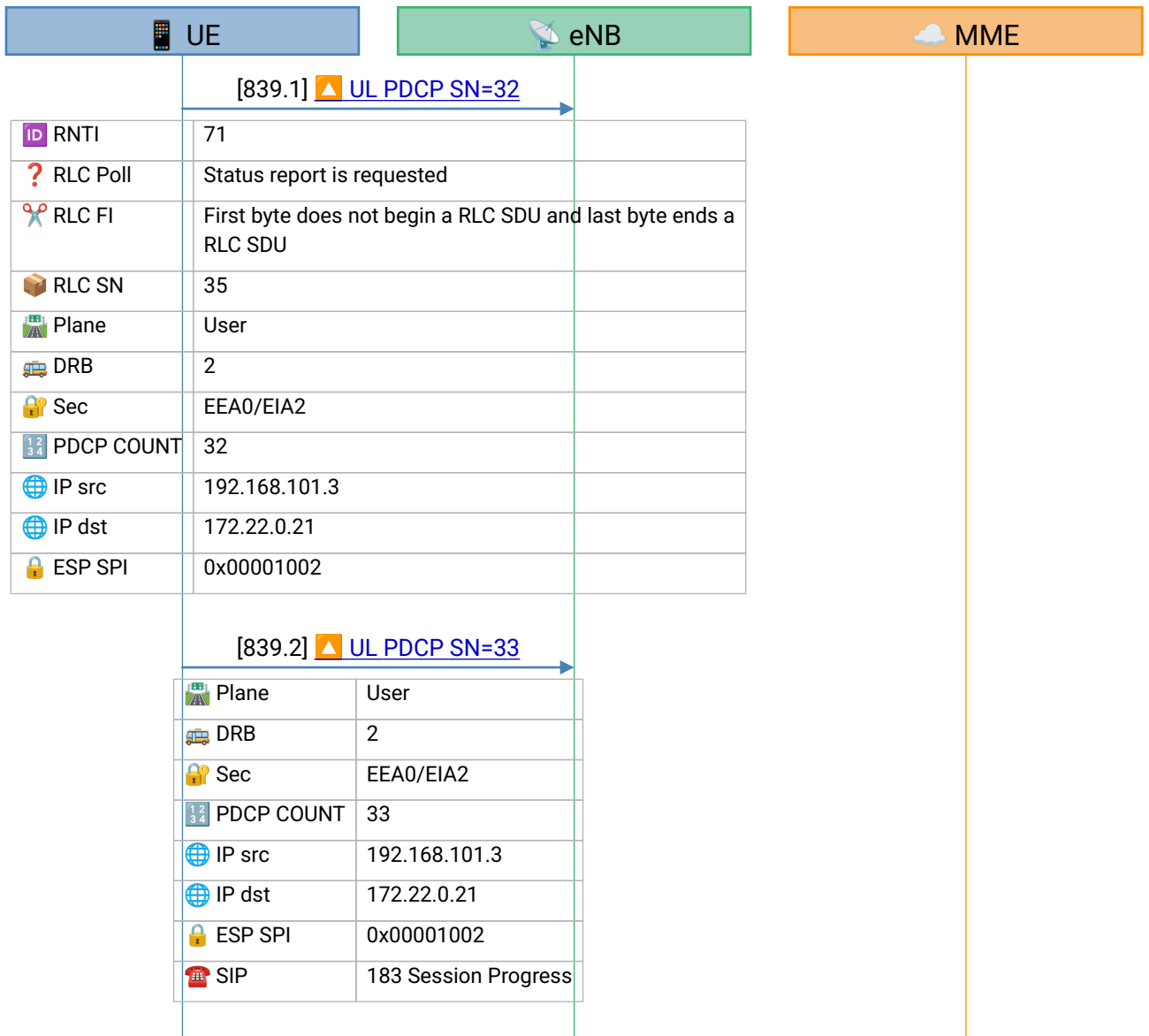
[Frame 823] 100 Trying back to UE 70 from the P-CSCF.

[Frame 827.1] First part of the INVITE on its way down to UE 71 (ESP over TCP).

[Frame 827.2] The INVITE reaches UE 71, addressed to the contact it registered.

[Frame 831] UE 71: 100 Trying.

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[Frame 839.1] ESP/TCP segment from UE 71.

[Frame 839.2] 183 Session Progress with UE 71's SDP answer: AMR-WB (payload type 99) at 16 kHz, 20 ms packets, preconditions still unmet. The answer fixes the codec and the media ports, which is the point where the IMS core can authorize the voice bearer.

[Frame 844] The voice bearer, 8 ms after the 183. RRC Reconfiguration to UE 71 carrying **Activate Dedicated EPS Bearer Context Request:** `QCI 1` (conversational voice), EPS bearer 7, guaranteed 80 kbps each way, and a TFT whose packet filters pin the RTP ports. On the radio side it builds DRB 3 on LCID 5 in **RLC UM:** no ARQ, because a late voice packet is worthless. The PDCP discard timer is 100 ms and RLC reordering 50 ms.

[Frame 845.1] ESP/TCP segment toward UE 70.

[Frame 845.2] The 183 relayed to UE 70. Its SDP now says `c=IN IP4 172.22.0.16`, port 49016: the IMS core rewrote the answer so media flows through its relay instead of directly between the phones.

📱 UE	📡 eNB	☁️ MME

[846] ⚙️ RRC Connection Reconfiguration

📅 SFN	735
🕒 SF	9
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
✅ CRC	OK
🧱 DL UEs in TTI	1
📦 DL LCID	0x01 (1)
📦 DL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0
📨 ESM	Activate dedicated EPS bearer context request
🎚️ QCI	1
🪪 EPS bearer	7
🧱 DRB	3
🛠️ DRB RLC mode	UM...
	1 more

[Frame 846] The same dedicated bearer for UE 70, 6 ms after UE 71's: QCI 1, EPS bearer 7, DRB 3 / LCID 5, RLC UM. Both legs of the call get a voice bearer at the same moment.

[847] ✅ RRC Connection Reconfiguration Complete

📅 SFN	738
🕒 SF	8
🆔 RNTI	70
🏷️ RNTI type	C-RNTI
📤 UL grant	533 B
✅ CRC	OK
🧱 UL UEs in TTI	1
📦 UL LCID	0x1d (Short BSR)
📦 UL LCID	0x1a (Power Headroom Report)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x02 (2)
📦 UL LCID	0x04 (4)
📦 UL LCID	0x04 (4)
🚌 SRB	1...
	1 more

[Frame 847] UE 70: Reconfiguration Complete, with the Activate Dedicated EPS Bearer Accept on SRB2 in the same MAC PDU.

[849] ✅ RRC Connection Reconfiguration Complete

📅 SFN	739
🕒 SF	0
🆔 RNTI	71
🏷️ RNTI type	C-RNTI
📤 UL grant	533 B
✅ CRC	OK
🧱 UL UEs in TTI	1
📦 UL LCID	0x1d (Short BSR)
📦 UL LCID	0x1a (Power Headroom Report)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x01 (1)
📦 UL LCID	0x02 (2)
📦 UL LCID	0x1f (Padding)
🚌 SRB	1
🔢 Trans ID	0

[Frame 849] UE 71: Reconfiguration Complete + Dedicated Bearer Accept.

[852] 🔼 UL PDCP SN=31

🆔 RNTI	70
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte does not begin a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	28
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	31
🌐 IP src	192.168.101.2
🌐 IP dst	172.22.0.21

[Frame 852] UE 70 sends **PRACK**, acknowledging the reliable 183 (the INVITE required `100rel`) .

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📱 UE	📡 eNB	☁️ MME

🔒 ESP SPI	0x00001001
☎️ SIP	PRACK sip:38523e65-de33-40ea-a65d-152b5632a32c@192.168.101.3:42027;alias=192.168.101.3~42027~2

[855.1] 🔽 DL PDCP SN=30

[Frame 855.1] ESP/TCP segment toward UE 71.

🆔 RNTI	71
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	23
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	30
🌐 IP src	172.22.0.21
🌐 IP dst	192.168.101.3
🔒 ESP SPI	0xef2fb333

[855.2] 🔽 DL PDCP SN=31

[Frame 855.2] PRACK delivered to UE 71.

🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	31
🌐 IP src	172.22.0.21
🌐 IP dst	192.168.101.3
🔒 ESP SPI	0xef2fb333
☎️ SIP	PRACK sip:38523e65-de33-40ea-a65d-152b5632a32c@192.168.101.3:42027;alias=192.168.101.3~42027~2

[864] 🔼 UL PDCP SN=36

[Frame 864] UE 71: 200 OK to the PRACK.

🆔 RNTI	71
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte does not begin a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	38
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	36
🌐 IP src	192.168.101.3
🌐 IP dst	172.22.0.21
🔒 ESP SPI	0x00001002
☎️ SIP	200 OK

[866] 🔽 DL PDCP SN=27

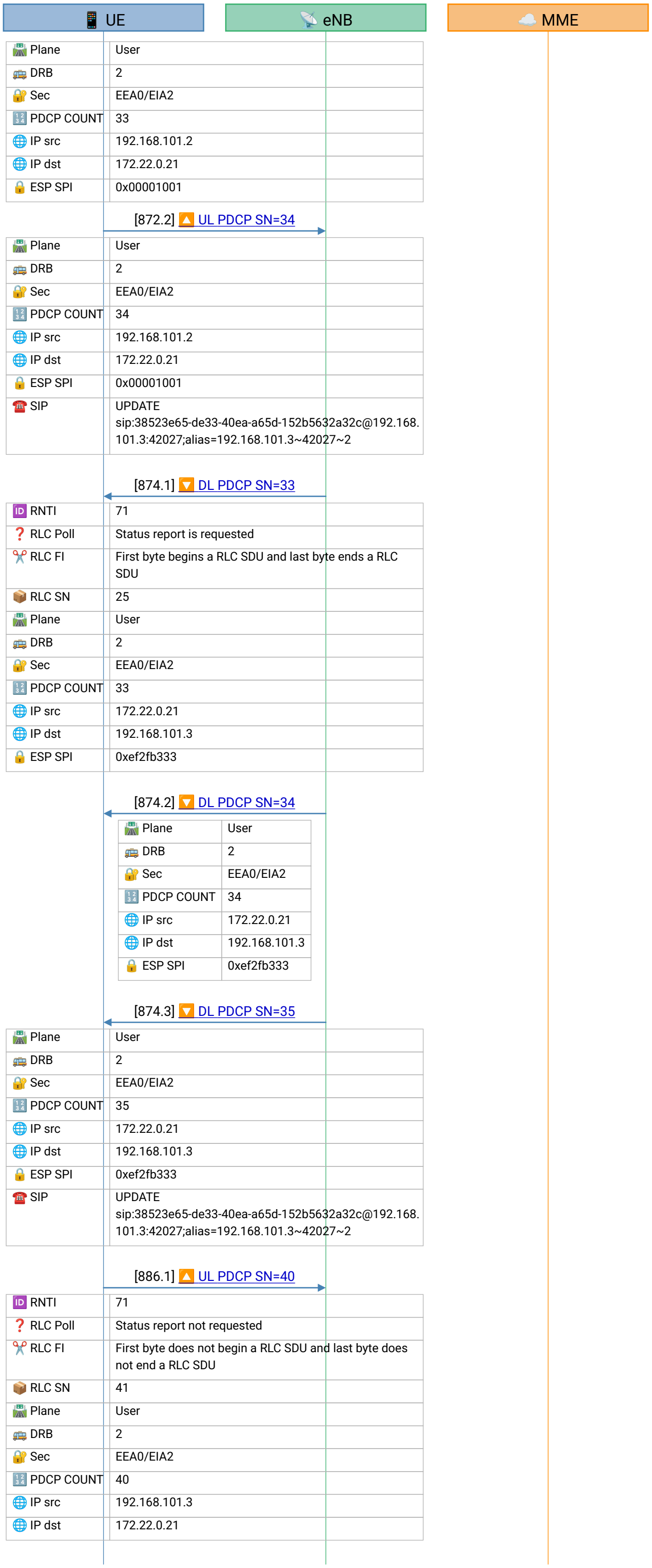
[Frame 866] 200 OK (PRACK) relayed to UE 70.

🆔 RNTI	70
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	24
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	27
🌐 IP src	172.22.0.21
🌐 IP dst	192.168.101.2
🔒 ESP SPI	0x0db517d8
☎️ SIP	200 OK

[872.1] 🔼 UL PDCP SN=33

[Frame 872.1] ESP/TCP segment from UE 70.

🆔 RNTI	70
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte does not begin a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	30



[Frame 872.2] SIP UPDATE from UE 70. With its QCI 1 bearer now in place (frame 846), it tells the far end its local QoS precondition is met.

[Frame 874.1] First of three PDCP PDUs carrying the UPDATE to UE 71.

[Frame 874.2] Second PDCP PDU of the UPDATE.

[Frame 874.3] The UPDATE arrives at UE 71.

[Frame 886.1] ESP/TCP segment from UE 71.

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ESP SPI	0x00001002

[886.2] UL PDCP SN=41

Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	41
IP src	192.168.101.3
IP dst	172.22.0.21
ESP SPI	0x00001002
SIP	200 OK

[Frame 886.2] UE 71: 200 OK to the UPDATE. Preconditions are now met at both ends.

[889] UL PDCP SN=43

RNTI	71
RLC Poll	Status report is requested
RLC FI	First byte does not begin a RLC SDU and last byte ends a RLC SDU
RLC SN	43
Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	43
IP src	192.168.101.3
IP dst	172.22.0.21
ESP SPI	0x00001002
SIP	180 Ringing

[Frame 889] 180 Ringing. UE 71 rings only now, after both voice bearers exist. That ordering is what the preconditions in frame 821 were for.

[891.1] DL PDCP SN=30

RNTI	70
RLC Poll	Status report is requested
RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
RLC SN	26
Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	30
IP src	172.22.0.21
IP dst	192.168.101.2
ESP SPI	0x0db517d8

[Frame 891.1] ESP/TCP segment toward UE 70.

[891.2] DL PDCP SN=31

Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	31
IP src	172.22.0.21
IP dst	192.168.101.2
ESP SPI	0x0db517d8
SIP	180 Ringing

[Frame 891.2] 180 Ringing relayed to UE 70: the caller hears ringback.

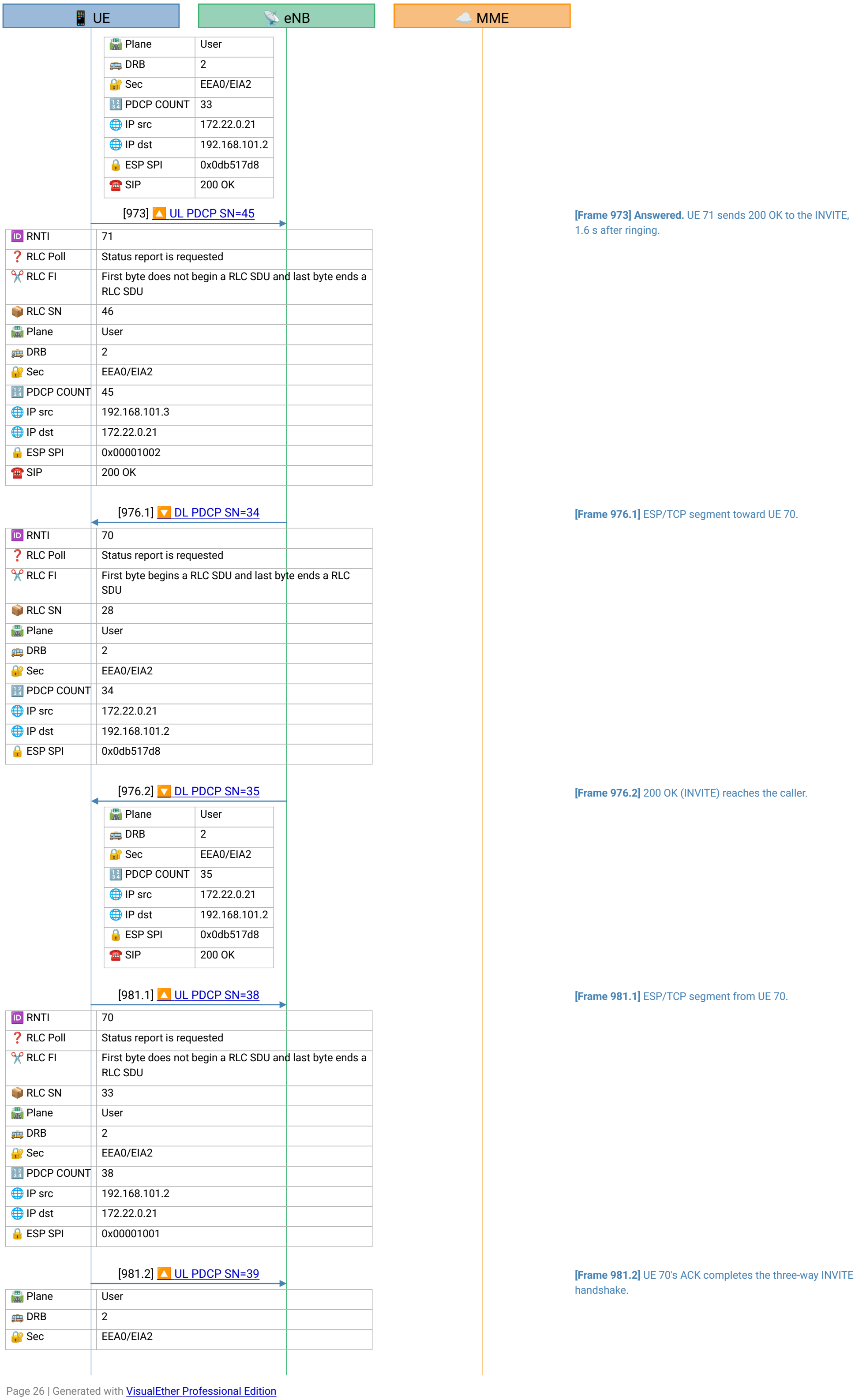
[892.1] DL PDCP SN=32

RNTI	70
RLC Poll	Status report is requested
RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
RLC SN	27
Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	32
IP src	172.22.0.21
IP dst	192.168.101.2
ESP SPI	0x0db517d8

[Frame 892.1] ESP/TCP segment toward UE 70.

[892.2] DL PDCP SN=33

[Frame 892.2] 200 OK (UPDATE) relayed to UE 70.



[Frame 973] Answered. UE 71 sends 200 OK to the INVITE, 1.6 s after ringing.

[Frame 976.1] ESP/TCP segment toward UE 70.

[Frame 976.2] 200 OK (INVITE) reaches the caller.

[Frame 981.1] ESP/TCP segment from UE 70.

[Frame 981.2] UE 70's ACK completes the three-way INVITE handshake.

📱 UE	📡 eNB	☁️ MME

🔢 PDCP COUNT	39
🌐 IP src	192.168.101.2
🌐 IP dst	172.22.0.21
🔒 ESP SPI	0x00001001
☎️ SIP	ACK sip:38523e65-de33-40ea-a65d-152b5632a32c@192.168.101.3:42027;alias=192.168.101.3~42027~2

[983.1] 🔽 DL PDCP SN=42

[Frame 983.1] ESP/TCP segment toward UE 71.

🆔 RNTI	71
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	29
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	42
🌐 IP src	172.22.0.21
🌐 IP dst	192.168.101.3
🔒 ESP SPI	0xef2fb333

[983.2] 🔽 DL PDCP SN=43

[Frame 983.2] ACK delivered to UE 71. The call is up.

🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	43
🌐 IP src	172.22.0.21
🌐 IP dst	192.168.101.3
🔒 ESP SPI	0xef2fb333
☎️ SIP	ACK sip:38523e65-de33-40ea-a65d-152b5632a32c@192.168.101.3:42027;alias=192.168.101.3~42027~2

[985] 🔼 UL PDCP SN=0

[Frame 985] Phase 8 - Voice. The first **RTP** packet, 24 ms after the ACK: AMR-WB from UE 70 to the media relay 172.22.0.16, on DRB 3 / LCID 5. PDCP SN 0 on the new bearer. Note what is missing compared with DRB 2: no RLC poll bit or RLC SN, because RLC UM has no acknowledgement machinery.

🆔 RNTI	70
🛣️ Plane	User
🚌 DRB	3
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	0
🌐 IP src	192.168.101.2
🌐 IP dst	172.22.0.16
🎙️ RTP PT	AMR-WB
🎙️ RTP seq	1

[986] 🔽 DL PDCP SN=0

[Frame 986] 0.7 ms later the relay's copy goes down to UE 71 on *its* DRB 3. The same RTP sequence number (1) arrives at the far phone.

🆔 RNTI	71
🛣️ Plane	User
🚌 DRB	3
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	0
🌐 IP src	172.22.0.16
🌐 IP dst	192.168.101.3
🎙️ RTP PT	AMR-WB
🎙️ RTP seq	1

[987.1] 🔼 UL PDCP SN=46

[Frame 987.1] Meanwhile UE 71's IMS bearer (DRB 2) carries TCP ACKs for the SIP connection, a reminder that signalling and voice run on separate bearers.

🆔 RNTI	71
❓ RLC Poll	Status report is requested
✂️ RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU
📦 RLC SN	47
🛣️ Plane	User
🚌 DRB	2
🔐 Sec	EEA0/EIA2
🔢 PDCP COUNT	46
🌐 IP src	192.168.101.3

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IP dst	172.22.0.21
ESP SPI	0x00001002

[987.2] UL PDCP SN=47

Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	47
IP src	192.168.101.3
IP dst	172.22.0.21
ESP SPI	0x00001002

[Frame 987.2] A second TCP ACK in the same MAC PDU.

[988] RLC AM Status PDU

SFN	929
SF	5
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x04 (4)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	DRB
Bearer	2
RLC SN size	10-bit
ACK SN	48
E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 988] RLC status for UE 71's DRB 2: the AM signalling bearer is still acknowledged. DRB 3 never gets one.

[989] UL PDCP SN=1

RNTI	70
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	1
IP src	192.168.101.2
IP dst	172.22.0.16
RTP PT	AMR-WB
RTP seq	2

[Frame 989] RTP seq 2 from UE 70, exactly 20 ms after seq 1: one AMR-WB frame per 20 ms, matching `ptime:20` in the SDP.

[990] DL PDCP SN=1

RNTI	71
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	1
IP src	172.22.0.16
IP dst	192.168.101.3
RTP PT	AMR-WB
RTP seq	2

[Frame 990] Relayed to UE 71.

[991] RLC AM Status PDU

SFN	932
SF	8
RNTI	70
RNTI type	C-RNTI
UL grant	549 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x05 (5)
UL LCID	0x04 (4)
UL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	DRB
Bearer	2

[Frame 991] UE 70's RLC status for DRB 2. The same MAC PDU also carries RTP seq 3 on LCID 5, so the voice packet is drawn under the status arrow.

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RLC SN size	10-bit...
	2 more

[992] DL PDCP SN=2

[Frame 992] RTP seq 3 delivered to UE 71.

RNTI	71
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	2
IP src	172.22.0.16
IP dst	192.168.101.3
RTP PT	AMR-WB
RTP seq	3

[993] RLC AM Status PDU

[Frame 993] UE 71's RLC status for DRB 2.

SFN	933
SF	0
RNTI	71
RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x04 (4)
UL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	DRB
Bearer	2
RLC SN size	10-bit
ACK SN	30...
	1 more

[994] UL PDCP SN=3

[Frame 994] RTP seq 4, UE 70 -> relay.

RNTI	70
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	3
IP src	192.168.101.2
IP dst	172.22.0.16
RTP PT	AMR-WB
RTP seq	4

[995] DL PDCP SN=3

[Frame 995] RTP seq 4, relay -> UE 71.

RNTI	71
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	3
IP src	172.22.0.16
IP dst	192.168.101.3
RTP PT	AMR-WB
RTP seq	4

[996] UL PDCP SN=4

[Frame 996] RTP seq 5, uplink.

RNTI	70
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	4
IP src	192.168.101.2
IP dst	172.22.0.16
RTP PT	AMR-WB
RTP seq	5

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[997] DL PDCP SN=4

RNTI	71
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	4
IP src	172.22.0.16
IP dst	192.168.101.3
RTP PT	AMR-WB
RTP seq	5

[Frame 997] RTP seq 5, downlink.

[998] UL PDCP SN=5

RNTI	70
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	5
IP src	192.168.101.2
IP dst	172.22.0.16
RTP PT	AMR-WB
RTP seq	6

[Frame 998] RTP seq 6, uplink.

[999] DL PDCP SN=5

RNTI	71
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	5
IP src	172.22.0.16
IP dst	192.168.101.3
RTP PT	AMR-WB
RTP seq	6

[Frame 999] RTP seq 6, downlink.

[1000] UL PDCP SN=6

RNTI	70
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	6
IP src	192.168.101.2
IP dst	172.22.0.16
RTP PT	AMR-WB
RTP seq	7

[Frame 1000] RTP seq 7, uplink.

[1001] DL PDCP SN=6

RNTI	71
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	6
IP src	172.22.0.16
IP dst	192.168.101.3
RTP PT	AMR-WB
RTP seq	7

[Frame 1001] RTP seq 7, downlink.

[1002] UL PDCP SN=0

RNTI	71
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	0
IP src	192.168.101.3
IP dst	172.22.0.16
RTP PT	AMR-WB

[Frame 1002] The other direction starts. UE 71's first RTP packet (seq 0) on its own DRB 3, PDCP SN 0, toward the relay.

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RTP seq	0

[1003] DL PDCP SN=0

RNTI	70
Plane	User
DRB	3
Sec	EEA0/EIA2
PDCP COUNT	0
IP src	172.22.0.16
IP dst	192.168.101.2
RTP PT	AMR-WB
RTP seq	0

[Frame 1003] ...and down to UE 70. Voice now flows both ways. The 20 ms pace lasts only while someone speaks: after seven speech packets UE 70 drops to a small comfort-noise packet every 160 ms (AMR-WB silence suppression) until the BYE 4.5 s later.

[1143.1] UL PDCP SN=48

RNTI	71
RLC Poll	Status report is requested
RLC FI	First byte does not begin a RLC SDU and last byte ends a RLC SDU
RLC SN	49
Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	48
IP src	192.168.101.3
IP dst	172.22.0.21
ESP SPI	0x00001003

[Frame 1143.1] Phase 9 - Hang-up. ESP/TCP segment from UE 71.

[1143.2] UL PDCP SN=49

Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	49
IP src	192.168.101.3
IP dst	172.22.0.21
ESP SPI	0x00001003
SIP	BYE sip:192.168.101.2:55092;alias=192.168.101.2~53360~2

[Frame 1143.2] UE 71 hangs up: **SIP BYE.** It travels under SPI `0x00001003`, one of UE 71's own security associations.

[1146] RRC Connection Reconfiguration

SFN	353
SF	2
RNTI	70
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x1f (Padding)
SRB	1
Trans ID	0
ESM	Deactivate EPS bearer context request
DRB release	1 item(s)

[Frame 1146] 9 ms after the BYE, UE 70's voice bearer is torn down: Deactivate EPS Bearer Context Request (EPS bearer 7, cause "regular deactivation"), and the RRC side lists DRB 3 in `drb-ToReleaseList`.

[1147] RRC Connection Reconfiguration

SFN	353
SF	4
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x1f (Padding)
SRB	1
Trans ID	0
ESM	Deactivate EPS bearer context request
DRB release	1 item(s)

[Frame 1147] The same teardown for UE 71, 1.6 ms later.

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[1148] ✅ RRC Connection Reconfiguration Complete

SFN	354
SF	8
RNTI	70
RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x1a (Power Headroom Report)
UL LCID	0x01 (1)
UL LCID	0x01 (1)
UL LCID	0x1f (Padding)
SRB	1
Trans ID	0

[Frame 1148] UE 70: Reconfiguration Complete. DRB 3 is gone.

[1149] RLC AM Status PDU

SFN	355
SF	3
RNTI	70
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x04 (4)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1
RLC SN size	10-bit
ACK SN	12
E1	A set of NACK_SN, E1 and E2 does not follow

[Frame 1149] RLC status for UE 70's SRB1. The same MAC PDU also delivers the BYE to UE 70 on DRB 2, hidden under the status arrow.

[1150] ✅ RRC Connection Reconfiguration Complete

SFN	355
SF	0
RNTI	71
RNTI type	C-RNTI
UL grant	533 B
CRC	OK
UL UEs in TTI	1
UL LCID	0x1d (Short BSR)
UL LCID	0x01 (1)
UL LCID	0x01 (1)
UL LCID	0x02 (2)
UL LCID	0x04 (4)
UL LCID	0x1f (Padding)
SRB	1
Trans ID	0

[Frame 1150] UE 71: Reconfiguration Complete + Deactivate EPS Bearer Accept.

[1151.1] RLC AM Status PDU

SFN	355
SF	5
RNTI	71
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x01 (1)
DL LCID	0x02 (2)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	1
RLC SN size	10-bit
ACK SN	11

[Frame 1151.1] RLC status, UE 71 SRB1.

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

[1151.2] RLC AM Status PDU

[Frame 1151.2] RLC status, UE 71 SRB2.

RLC mode	Acknowledged
Bearer type	SRB
Bearer	2
RLC SN size	10-bit
ACK SN	5
E1	A set of NACK_SN, E1 and E2 does not follow

[1152] ESM Deactivate Bearer Accept

[Frame 1152] UE 70: Deactivate EPS Bearer Accept.

PTI	0

[1153] RLC AM Status PDU

[Frame 1153] RLC status, UE 70 SRB2.

SFN	357
SF	3
RNTI	70
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x02 (2)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	SRB
Bearer	2
RLC SN size	10-bit
ACK SN	5
E1	A set of NACK_SN, E1 and E2 does not follow

[1154] UL PDCP SN=41

[Frame 1154] UE 70 answers the BYE: 200 OK.

RNTI	70
RLC Poll	Status report is requested
RLC FI	First byte does not begin a RLC SDU and last byte ends a RLC SDU
RLC SN	35
Plane	User
DRB	2
Sec	EEA0/EIA2
PDCP COUNT	41
IP src	192.168.101.2
IP dst	172.22.0.21
ESP SPI	0x00001001
SIP	200 OK

[1155] RLC AM Status PDU

[Frame 1155] RLC status, UE 70 DRB 2.

SFN	358
SF	2
RNTI	70
RNTI type	C-RNTI
CRC	OK
DL UEs in TTI	1
DL LCID	0x04 (4)
DL LCID	0x1f (Padding)
RLC mode	Acknowledged
Bearer type	DRB
Bearer	2
RLC SN size	10-bit
ACK SN	36
E1	A set of NACK_SN, E1 and E2 does not follow

[1156] DL PDCP SN=46

[Frame 1156] 200 OK relayed to UE 71. Call 1 is over. Both phones stay RRC_CONNECTED with their default bearers, and the same cycle repeats for five more calls until the capture ends 113 s in, with no RRC release.

RNTI	71
RLC Poll	Status report is requested
RLC FI	First byte begins a RLC SDU and last byte ends a RLC SDU

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📱 UE	eNB	☁️ MME
📦 RLC SN	31	
🛣️ Plane	User	
🚌 DRB	2	
🔐 Sec	EEA0/EIA2	
🔢 PDCP COUNT	46	
🌐 IP src	172.22.0.21	
🌐 IP dst	192.168.101.3	
🔒 ESP SPI	0xf0e55787	
☎️ SIP	200 OK	