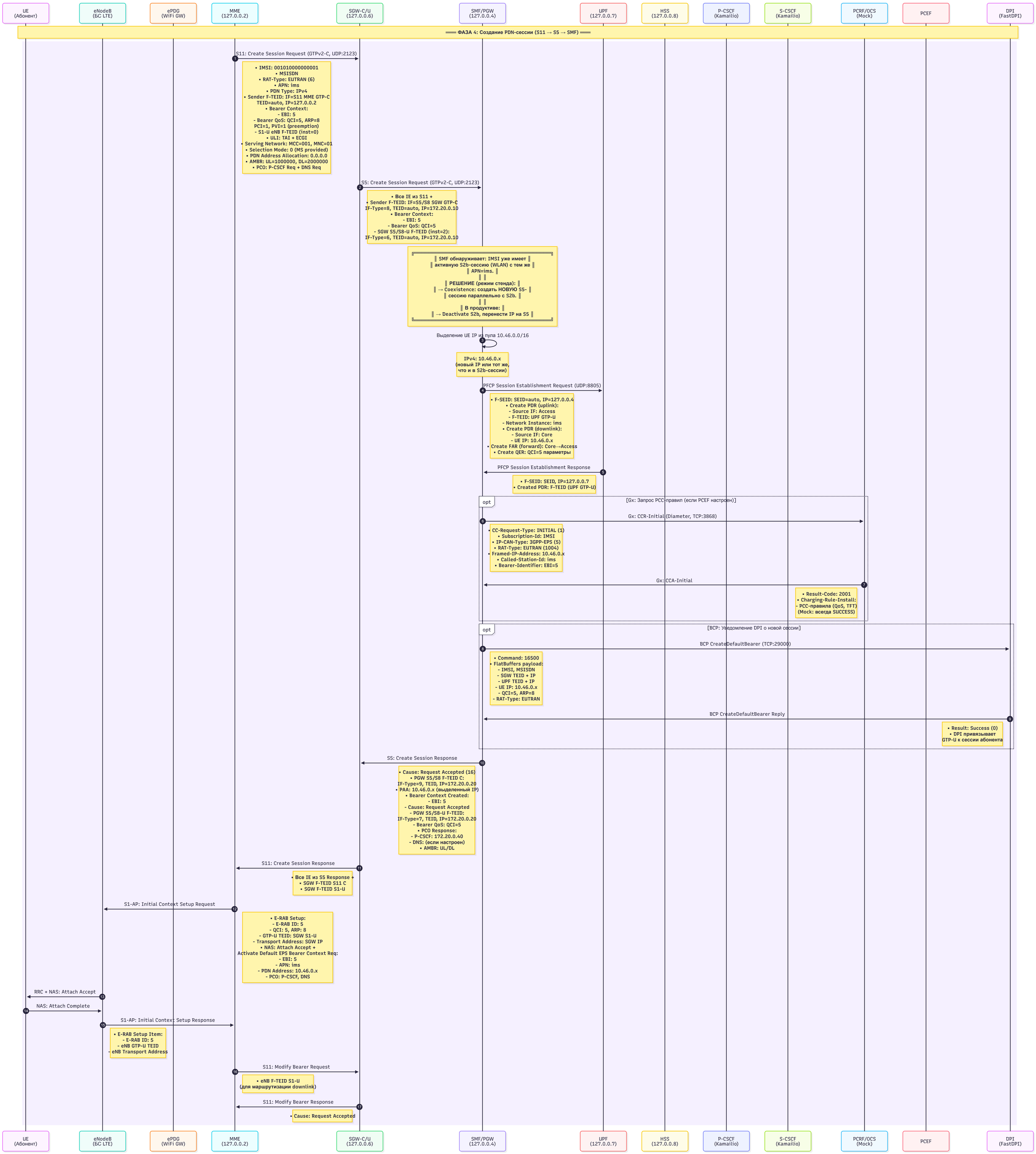
UE (Абонент)
eNodeB (БС LTE)
ePDG (WiFi GW)
MME (127.0.0.2)
SGW-C/U (127.0.0.6)
SMF/PGW (127.0.0.4)
UPF (127.0.0.7)
HSS (127.0.0.8)
P-CSCF (Kamailio)
S-CSCF (Kamailio)
PCRF/OCS (Mock)
PCEF
DPI (FastDPI)
═══ ФАЗА 4: Создание PDN-сессии (S11 → S5 → SMF) ═══
S11: Create Session Request (GTPv2-C, UDP:2123)
▪ IMSI: 001010000000001
▪ MSISDN
▪ RAT-Type: EUTRAN (6)
▪ APN: ims
▪ PDN Type: IPv4
▪ Sender F-TEID: IF=S11 MME GTP-C
TEID=auto, IP=127.0.0.2
▪ Bearer Context:
- EBI: 5
- Bearer QoS: QCI=5, ARP=8
PCI=1, PVI=1 (preemption)
- S1-U eNB F-TEID (inst=0)
▪ ULI: TAI + ECGI
▪ Serving Network: MCC=001, MNC=01
▪ Selection Mode: 0 (MS provided)
▪ PDN Address Allocation: 0.0.0.0
▪ AMBR: UL=1000000, DL=2000000
▪ PCO: P-CSCF Req + DNS Req
S5: Create Session Request (GTPv2-C, UDP:2123)
▪ Все IE из S11 +
▪ Sender F-TEID: IF=S5/S8 SGW GTP-C
IF-Type=8, TEID=auto, IP=172.20.0.10
▪ Bearer Context:
- EBI: 5
- Bearer QoS: QCI=5
- SGW S5/S8-U F-TEID (inst=2):
IF-Type=6, TEID=auto, IP=172.20.0.10
╔═══ SMF обнаруживает: IMSI уже имеет ═══
═ активную S2b-сессию (WLAN) с тем же ═
═ APN=ims. ═
═ ═
═ РЕШЕНИЕ (режим стенда): ═
═ → Coexistence: создать НОВУЮ S5- ═
═ сессию параллельно с S2b. ═
═ ═
═ В продуктиве: ═
═ → Deactivate S2b, перенести IP на S5 ═
Выделение UE IP из пула 10.46.0.0/16
IPv4: 10.46.0.x
(новый IP или тот же,
что и в S2b-сессии)
PFCP Session Establishment Request (UDP:8805)
▪ F-SEID: SEID=auto, IP=127.0.0.4
▪ Create PDR (uplink):
- Source IF: Access
- F-TEID: UPF GTP-U
- Network Instance: ims
▪ Create PDR (downlink):
- Source IF: Core
- UE IP: 10.46.0.x
▪ Create FAR (forward): Core→Access
▪ Create QER: QCI=5 параметры
PFCP Session Establishment Response
▪ F-SEID: SEID, IP=127.0.0.7
▪ Created PDR: F-TEID (UPF GTP-U)
opt
[Gx: Запрос PCC-правил (если PCEF настроен)]
Gx: CCR-Initial (Diameter, TCP:3868)
▪ CC-Request-Type: INITIAL (1)
▪ Subscription-Id: IMSI
▪ IP-CAN-Type: 3GPP-EPS (5)
▪ RAT-Type: EUTRAN (1004)
▪ Framed-IP-Address: 10.46.0.x
▪ Called-Station-Id: ims
▪ Bearer-Identifier: EBI=5
Gx: CCA-Initial
▪ Result-Code: 2001
▪ Charging-Rule-Install:
- PCC-правила (QoS, TFT)
(Mock: всегда SUCCESS)
opt
[BCP: Уведомление DPI о новой сессии]
BCP CreateDefaultBearer (TCP:29000)
▪ Command: 16500
▪ FlatBuffers payload:
- IMSI, MSISDN
- SGW TEID + IP
- UPF TEID + IP
- UE IP: 10.46.0.x
- QCI=5, ARP=8
- RAT-Type: EUTRAN
BCP CreateDefaultBearer Reply
▪ Result: Success (0)
▪ DPI привязывает
GTP-U к сессии абонента
S5: Create Session Response
▪ Cause: Request Accepted (16)
▪ PGW S5/S8 F-TEID C:
IF-Type=9, TEID, IP=172.20.0.20
▪ PAA: 10.46.0.x (выделенный IP)
▪ Bearer Context Created:
- EBI: 5
- Cause: Request Accepted
- PGW S5/S8-U F-TEID:
IF-Type=7, TEID, IP=172.20.0.20
- Bearer QoS: QCI=5
▪ PCO Response:
- P-CSCF: 172.20.0.40
- DNS: (если настроен)
▪ AMBR: UL/DL
S11: Create Session Response
▪ Все IE из S5 Response +
▪ SGW F-TEID S11 C
▪ SGW F-TEID S1-U
S1-AP: Initial Context Setup Request
▪ E-RAB Setup:
- E-RAB ID: 5
- QCI: 5, ARP: 8
- GTP-U TEID: SGW S1-U
- Transport Address: SGW IP
▪ NAS: Attach Accept +
Activate Default EPS Bearer Context Req:
- EBI: 5
- APN: ims
- PDN Address: 10.46.0.x
- PCO: P-CSCF, DNS
RRC + NAS: Attach Accept
NAS: Attach Complete
S1-AP: Initial Context Setup Response
▪ E-RAB Setup Item:
- E-RAB ID: 5
- eNB GTP-U TEID
- eNB Transport Address
S11: Modify Bearer Request
▪ eNB F-TEID S1-U
(для маршрутизации downlink)
S11: Modify Bearer Response
▪ Cause: Request Accepted