VOICE IN LTE

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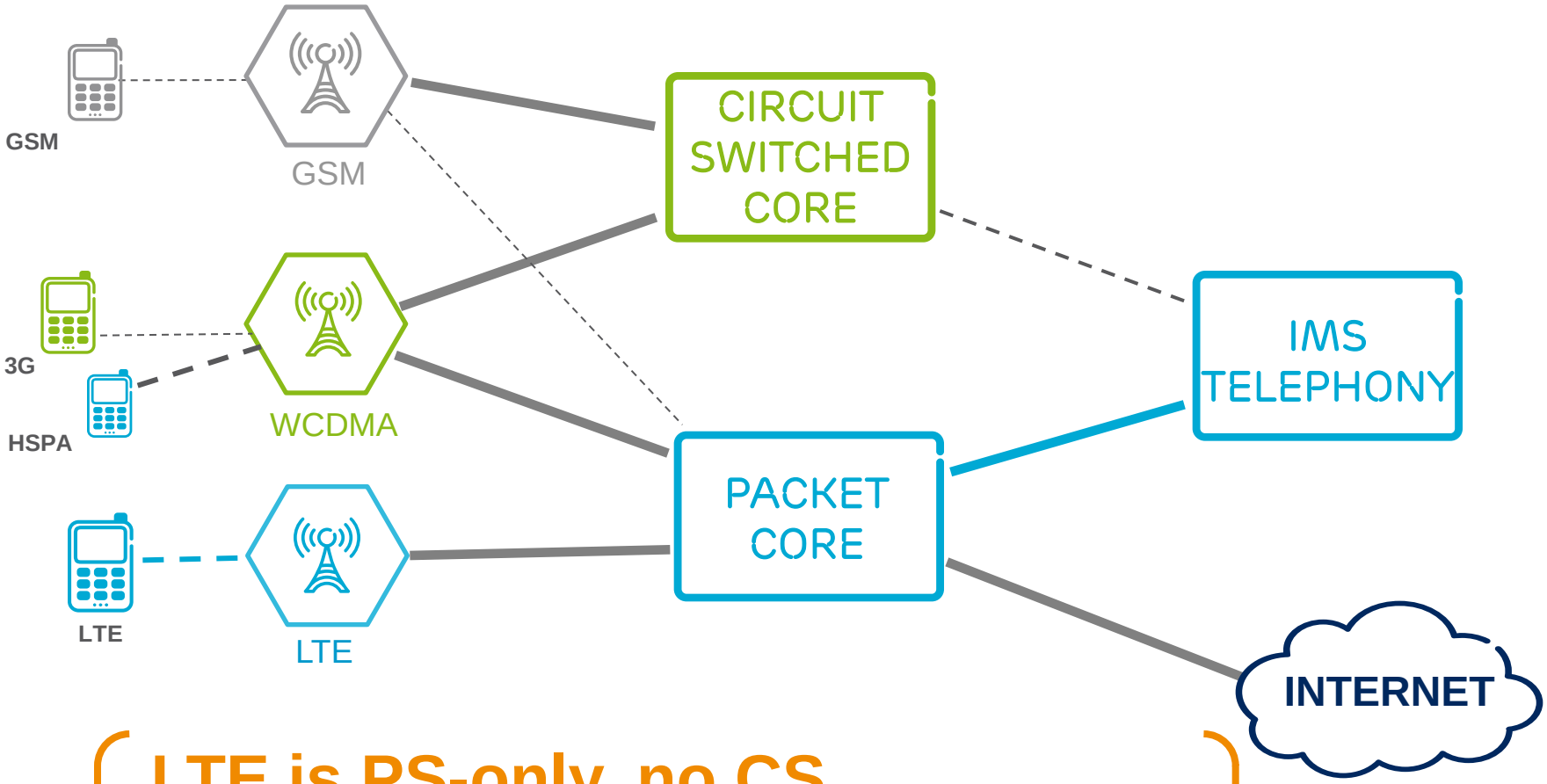
WHY TELEPHONY IN LTE ?
IMAGINE LTE WITHOUT IT ...

[People want to make phone calls.]

[If operators do not offer it, subscribers will seek alternatives!]

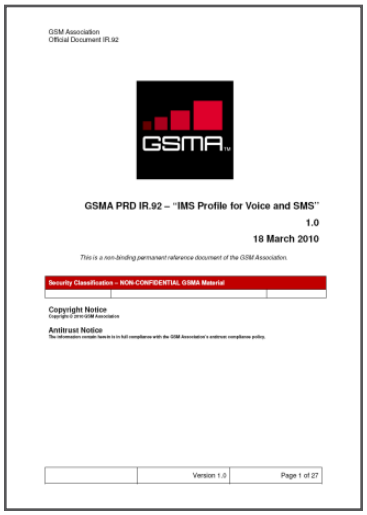
TELEPHONY IN LTE



LTE is PS-only, no CS.

Telephony over LTE is VoIP!

EVOLUTION INTO VOICE OVER LTE
GSMA VOLTE FAMILY



PRD IR.92

UNI

Version 6.0

PRD IR.58

IMS voice on HSPA

Version 3.0

PRD IR.94

Video call additions

Version 3.0

PRD IR.64

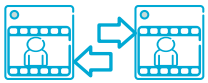
SR-VCC & ICS

Version 4.0

PRD IR.65

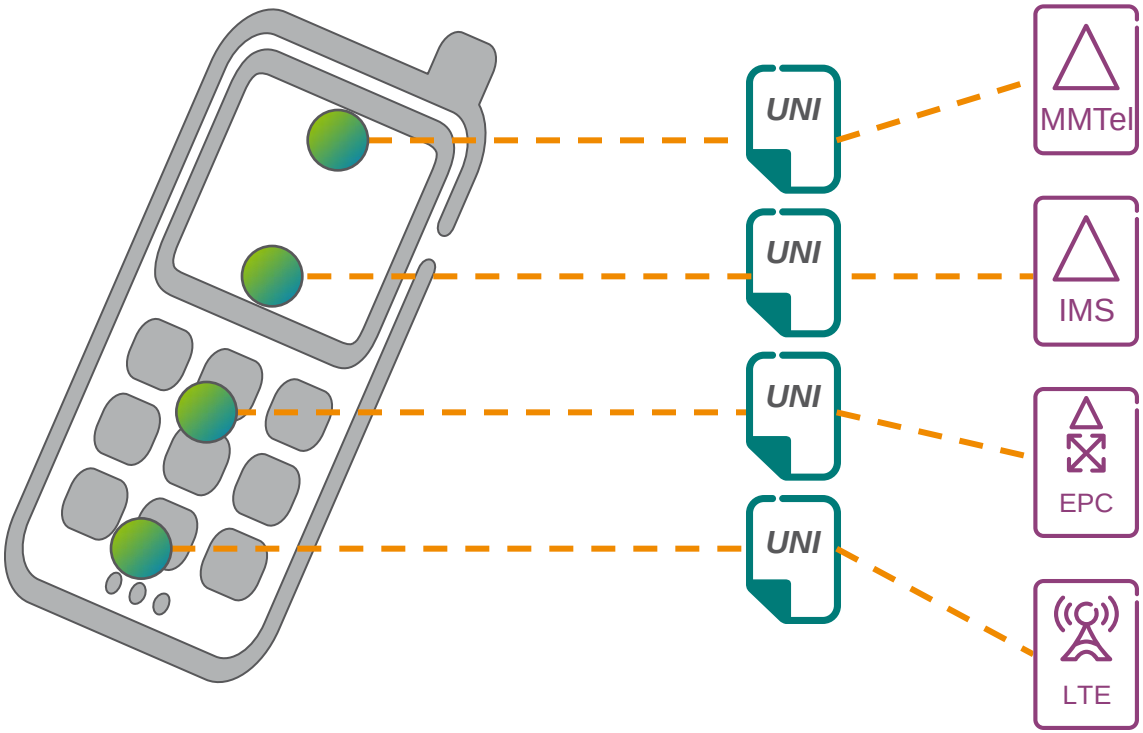
IMS Roaming & interconnect

Version 10.0



Note: version numbers as of Sept 15, 2012

GSMA VOLTE IR.92 UNI PROFILE



Telephony Service

- MMTel Supplementary Services
  - OIP, OIR,TIP, TIR
  - CDIV (CFU, CFNL, CFB, CFNRc, CFNR)
  - CB (ICB, OCB, ICB-R, OCB-IC)
  - HOLD
  - MWI
  - Comm. Waiting
  - Conf
- Supplementary service management using Ut with XCAP procedures

IMS feature part

- ISIM based authentication (USIM fallback).
- IPSec protection of signaling.
- Both Tel-URI and SIP URI
- GBA (recommended) or http digest authentication for Ut
- Early dialogues
- IMS Emergency

LTE radio capabilities

- GBR EPS bearer (QCI1) for voice
- Non-GBR EPS bearers for SIP and XCAP
- RoHC in PDCP

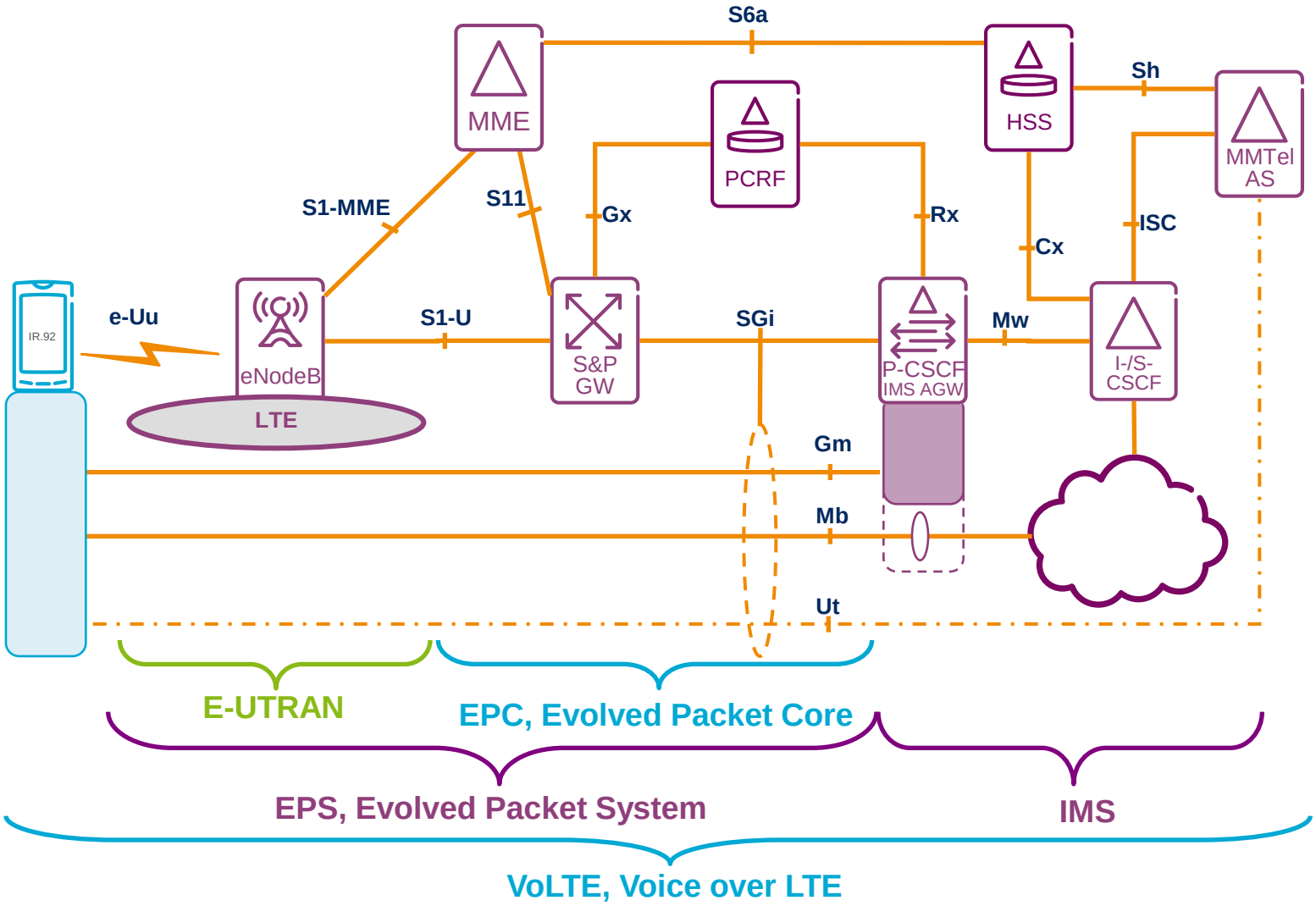
Bearer management

- Well known “IMS APN” with local PDN GW
- The IMS APN with signaling bearer (QCI=5) established at initial attach
- P-CSCF Discovery

IMS media

- AMR NB and WB Codec & payload format
- RTP profile / Data transport
- RTCP usage
- Jitter buffer management

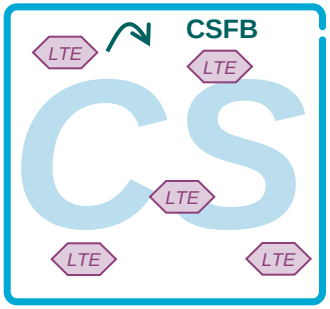
VOLTE ARCHITECTURE 3GPP R10

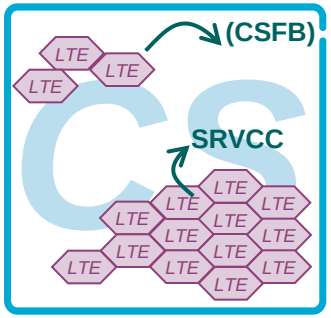


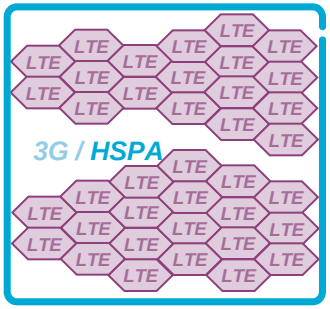
WHAT TO DO WHEN?
CS VOICE => VOLTE EVOLUTION

MSC or MSS		IMS-MMTel, SR-VCC, ICS	
CS	CS	VoLTE	VoLTE
CS Voice	CS Voice	PS VoIP	PS VoIP
	CSFB	SRVCC	(SRVCC)
		(CSFB)	(CSFB)

Circuit Switched Voice Service







CS = Circuit Switched; PS = Packet Switched

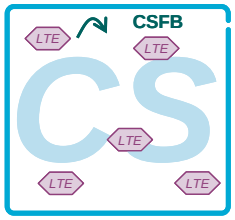
CSFB = Circuit Switched Fallback

SRVCC = Single Radio Voice Call Continuity

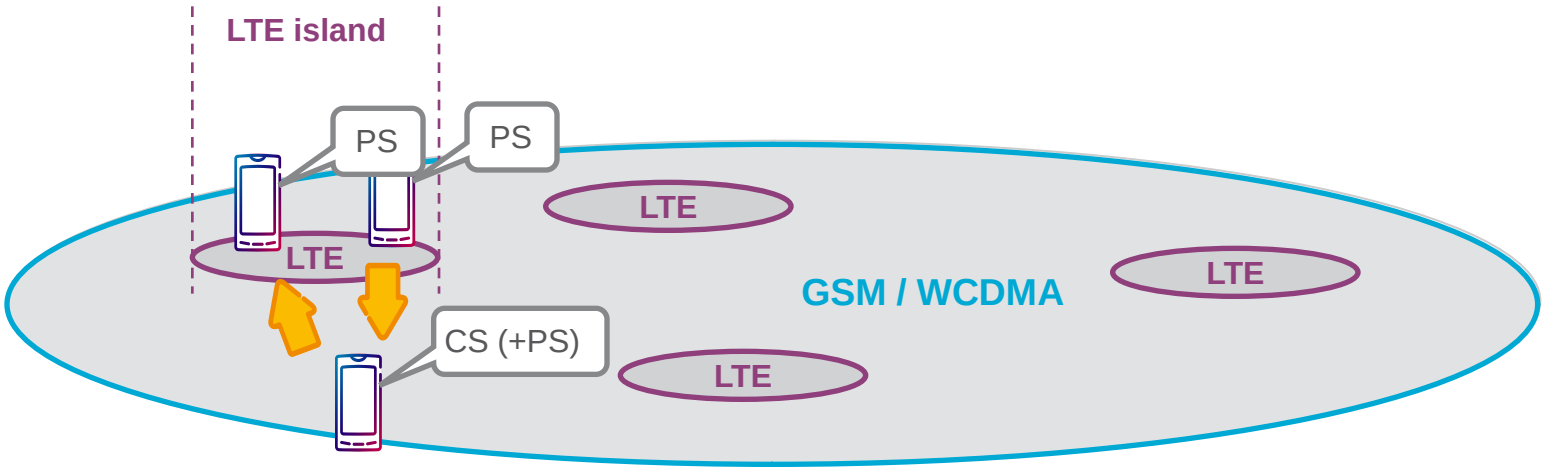
VoLTE = Voice over LTE (VoIP)

ICS = IMS Centralized Services

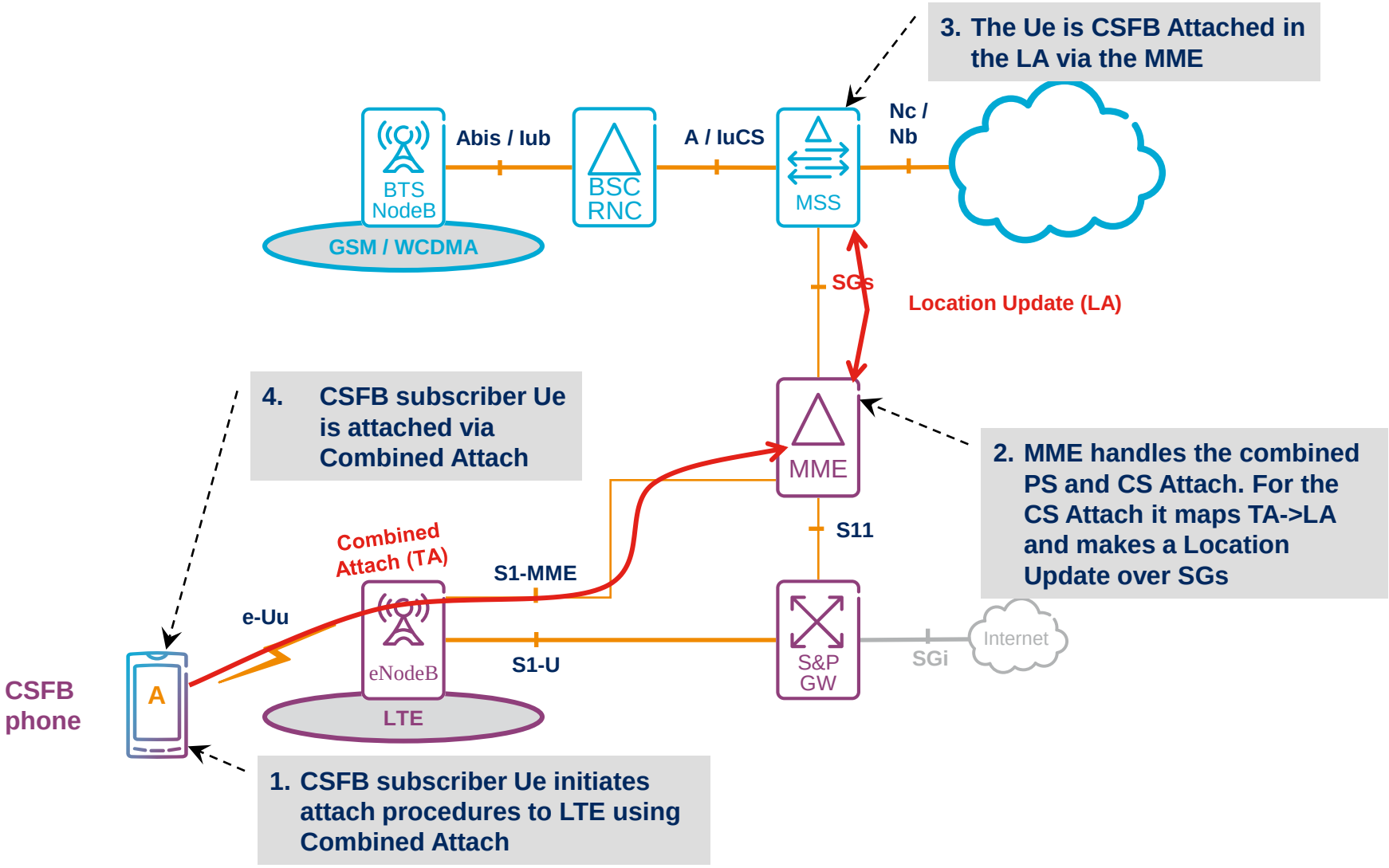
CIRCUIT SWITCH FALLBACK



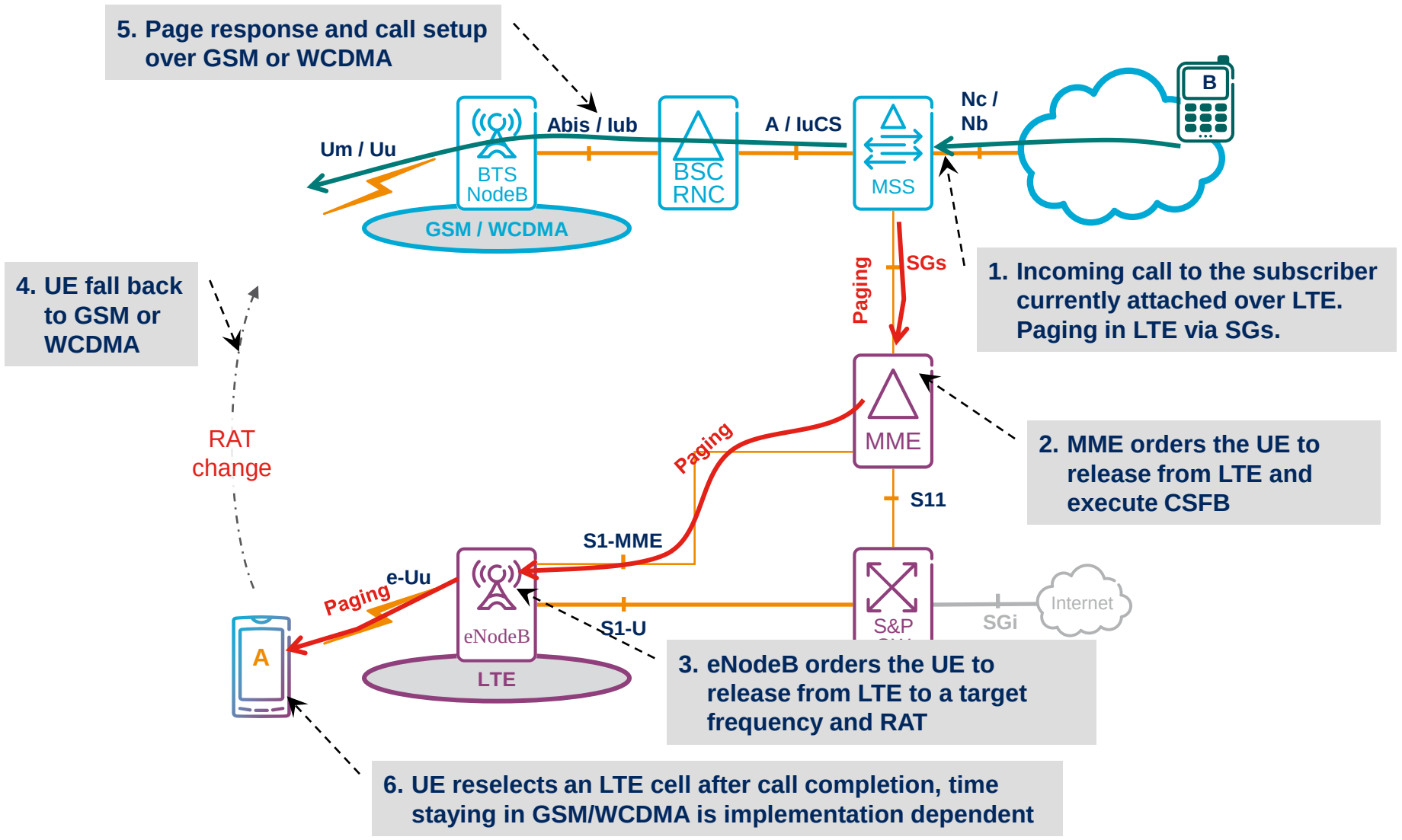
- CSFB subscribers attach with preference on LTE access, and also registers in CS core
- Fallback triggered to overlapping CS domain (GSM / WCDMA) whenever voice services are requested
- Resumed LTE access for PS services after call completion



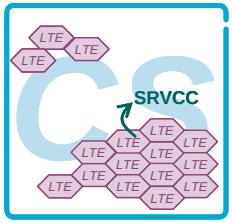
CSFB LTE ATTACH

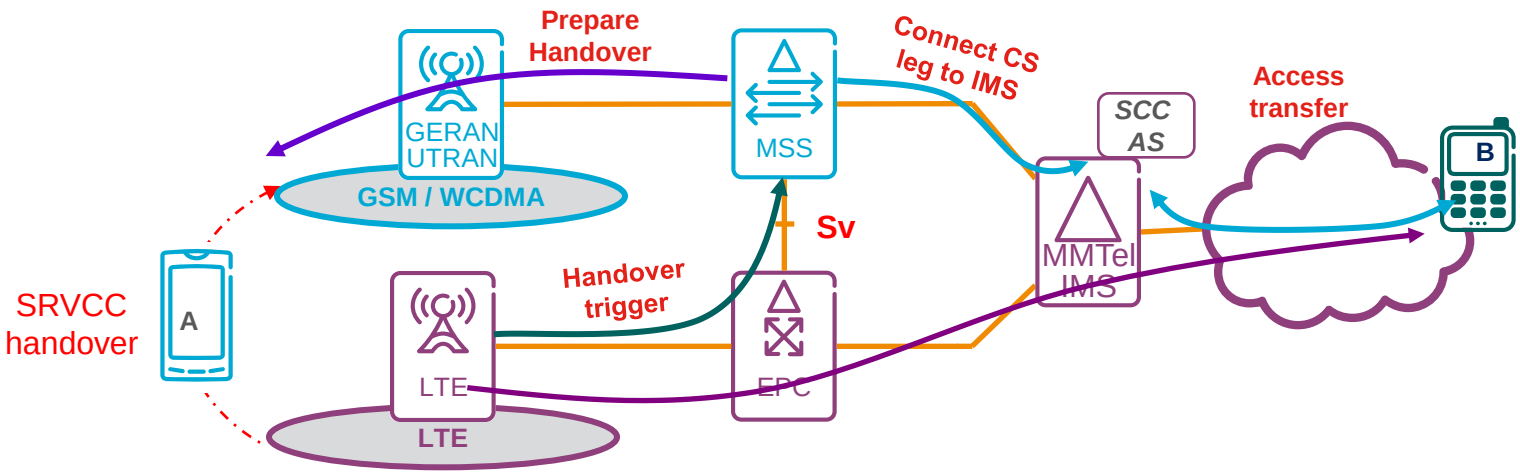


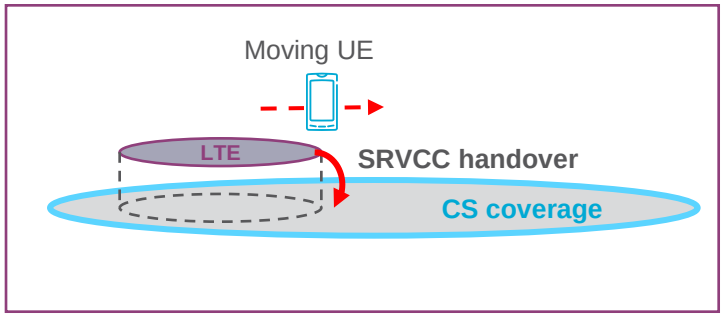
CSFB MT CALL


5. Page response and call setup over GSM or WCDMA
Um / Uu
Abis / Iub
A / IuCS
Nc / Nb
B
BTS NodeB
BSC RNC
MSS
GSM / WCDMA
Paging
SGs
1. Incoming call to the subscriber currently attached over LTE. Paging in LTE via SGs.
4. UE fall back to GSM or WCDMA
RAT change
MME
2. MME orders the UE to release from LTE and execute CSFB
S11
S1-MME
Paging
e-Uu
Paging
S&P
SGi
Internet
A
eNodeB
S1-U
LTE
3. eNodeB orders the UE to release from LTE to a target frequency and RAT
6. UE reselects an LTE cell after call completion, time staying in GSM/WCDMA is implementation dependent

SINGLE RADIO VOICE CALL CONTINUITY

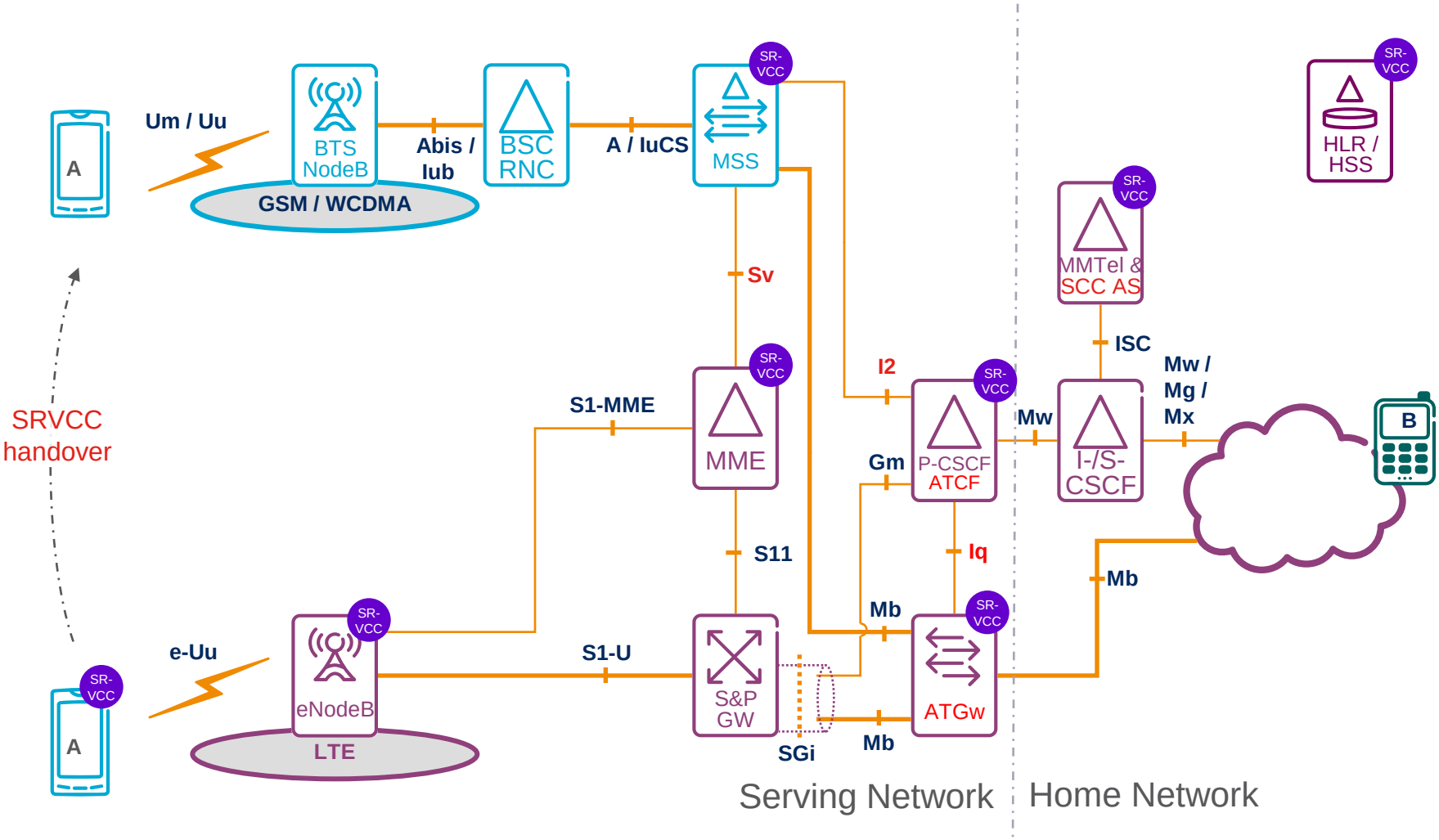






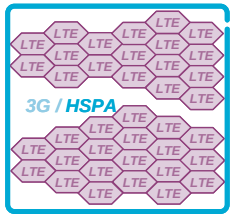
- IMS Telephony Voice to CS handover
  - Handover triggered by LTE RAN
  - Handover signaling from MME to MSC (via Sv interface)
  - MSC prepares handover and connects CS leg to IMS
  - SCC AS executes access transfer

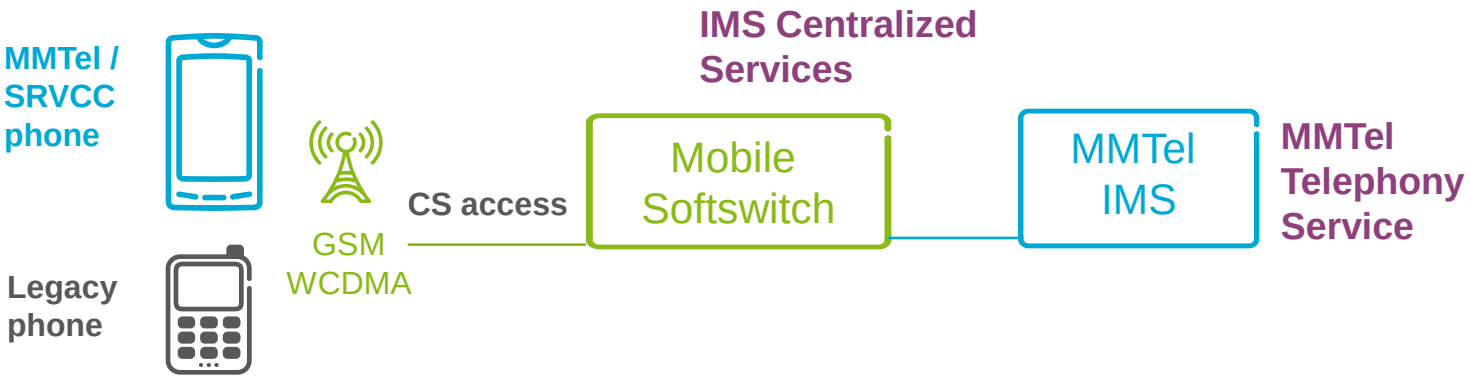
SR-VCC ARCHITECTURE – 3GPP R10



SR-VCC New functionality

IMS CENTRALIZED SERVICES (ICS) RATIONALE AND USE CASES

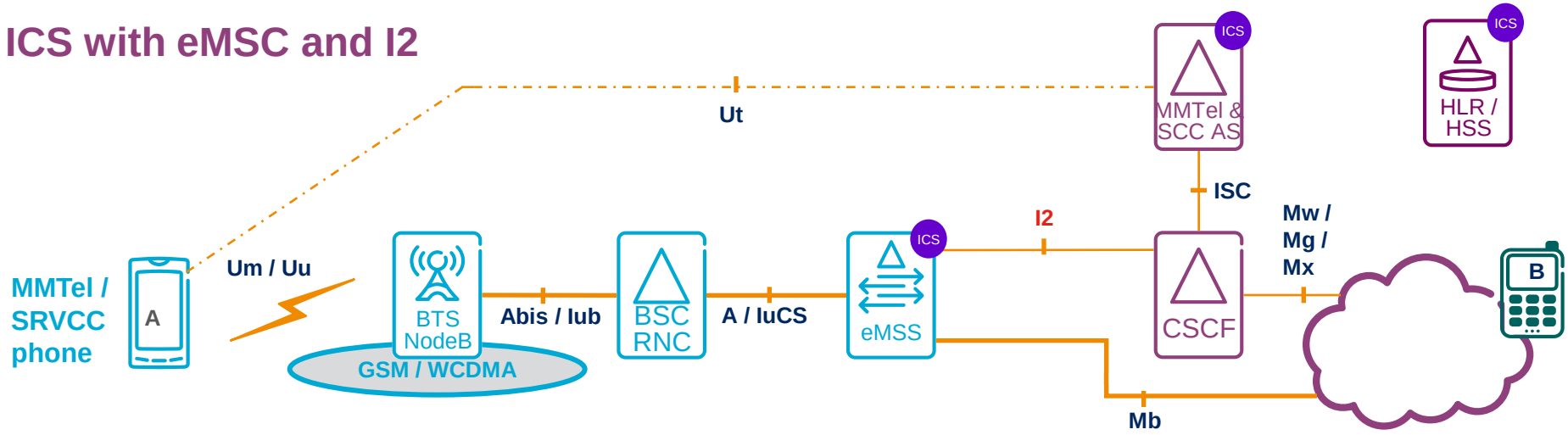




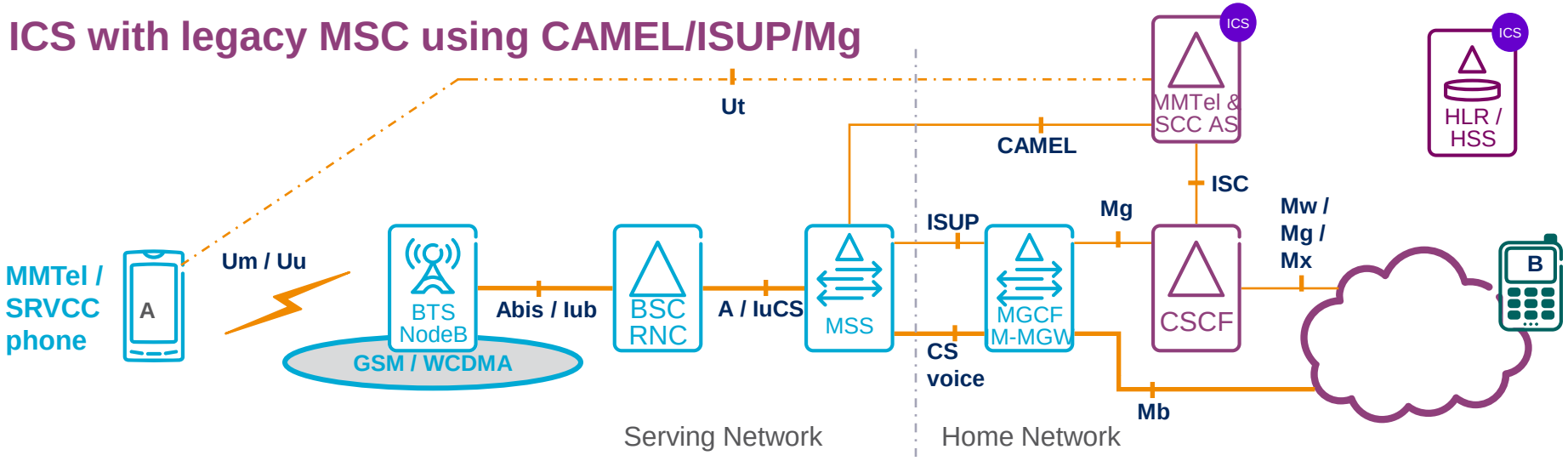
- ICS enables IMS services also when an IMS user is accessing via CS
- Single Service Engine
  - All service execution in IMS and MMTel, no service execution in CS domain
  - Enables consistent service experience
- No synchronization needed between service data in CS and IMS domain
- Relevant use cases
  - LTE/IMS user when out of LTE coverage or during SR-VCC
  - LTE/IMS user roaming abroad via CS (LTE + CSFB or only CS service offered)
  - Service to a user with an advanced new service e.g. IP Centrex (also in a CS only network)

ICS - MAIN SOLUTION ALTERNATIVES

ICS with eMSC and I2



ICS with legacy MSC using CAMEL/ISUP/Mg



ERICSSON