

# LTE - CDMA Interworking

## eHRPD - Use of a Common Core and a Stepping Stone to LTE



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# Overview

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## eHRPD (evolved High Rate Packet Data\*)

- eHRPD involves changes needed to attach the 3GPP2 HRPD access network to the 3GPP Evolved Packet Core (EPC) IP environment via Proxy Mobile IP (PMIP).

## LTE Interworking

- LTE to eHRPD – optimized and non-optimized handover
- LTE to cdma2000® 1x Circuit-Switched Fall Back (1xCSFB)
- LTE to cdma2000 1x Single Radio Voice Call Continuity (1x SRVCC)

## Future work

\* HRPD is the standards name for what is commercially known as EV-DO.

cdma2000® is the trademark for the technical nomenclature for certain specifications and standards of the Organizational Partners (OPs) of 3GPP2. Geographically (and as of the date of publication), cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA) in the United States.

# eHRPD Connectivity to EPC Architecture

## Legend

3GPP EPC entity

3GPP2 entity

Signaling

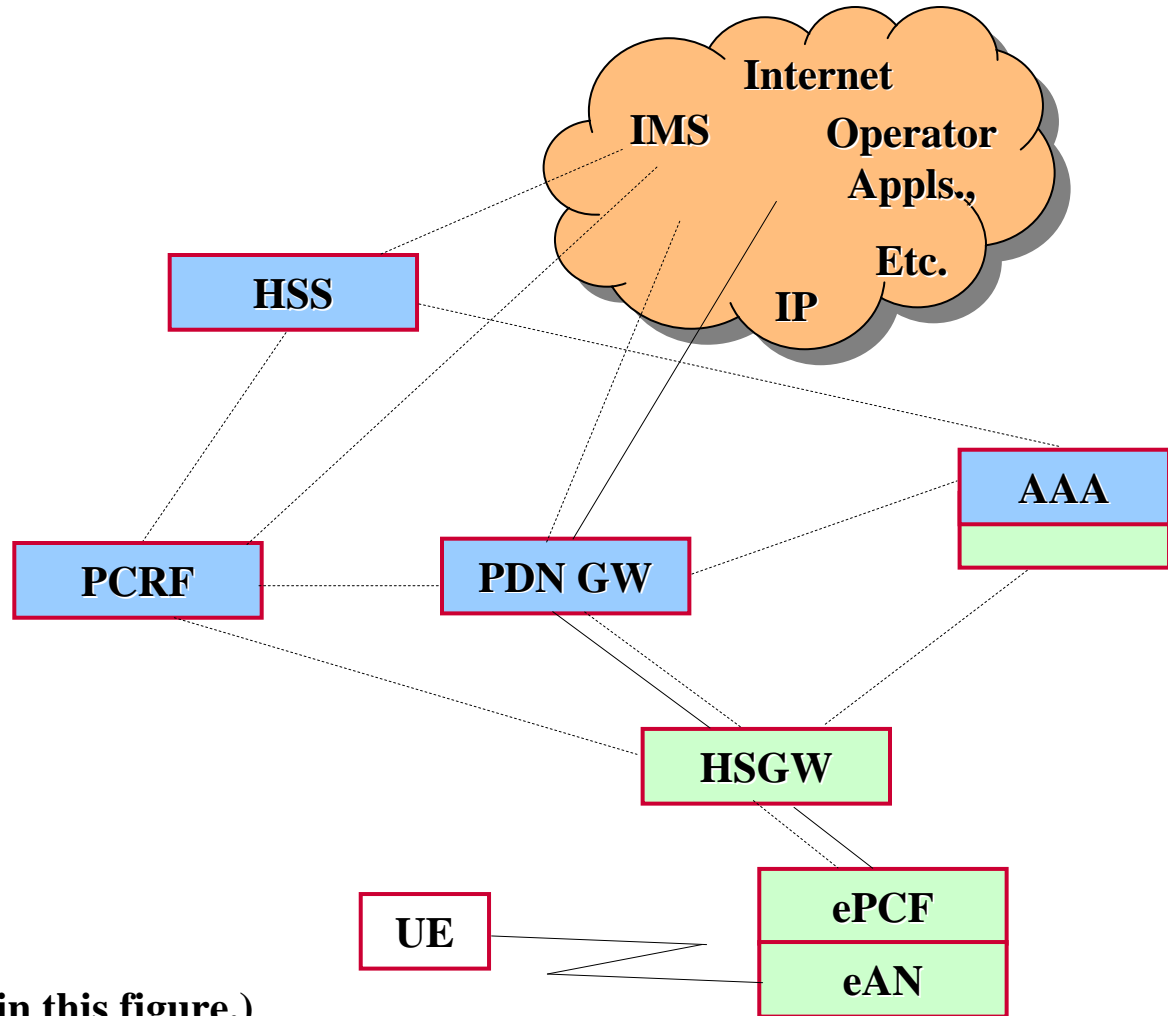
Bearer

HSGW: HRPD Serving Gateway

ePCF: evolved Packet Control Function

eAN: evolved Access Network

(Not all interfaces are shown in this figure.)



# eHRPD Interworking with LTE

## Legend

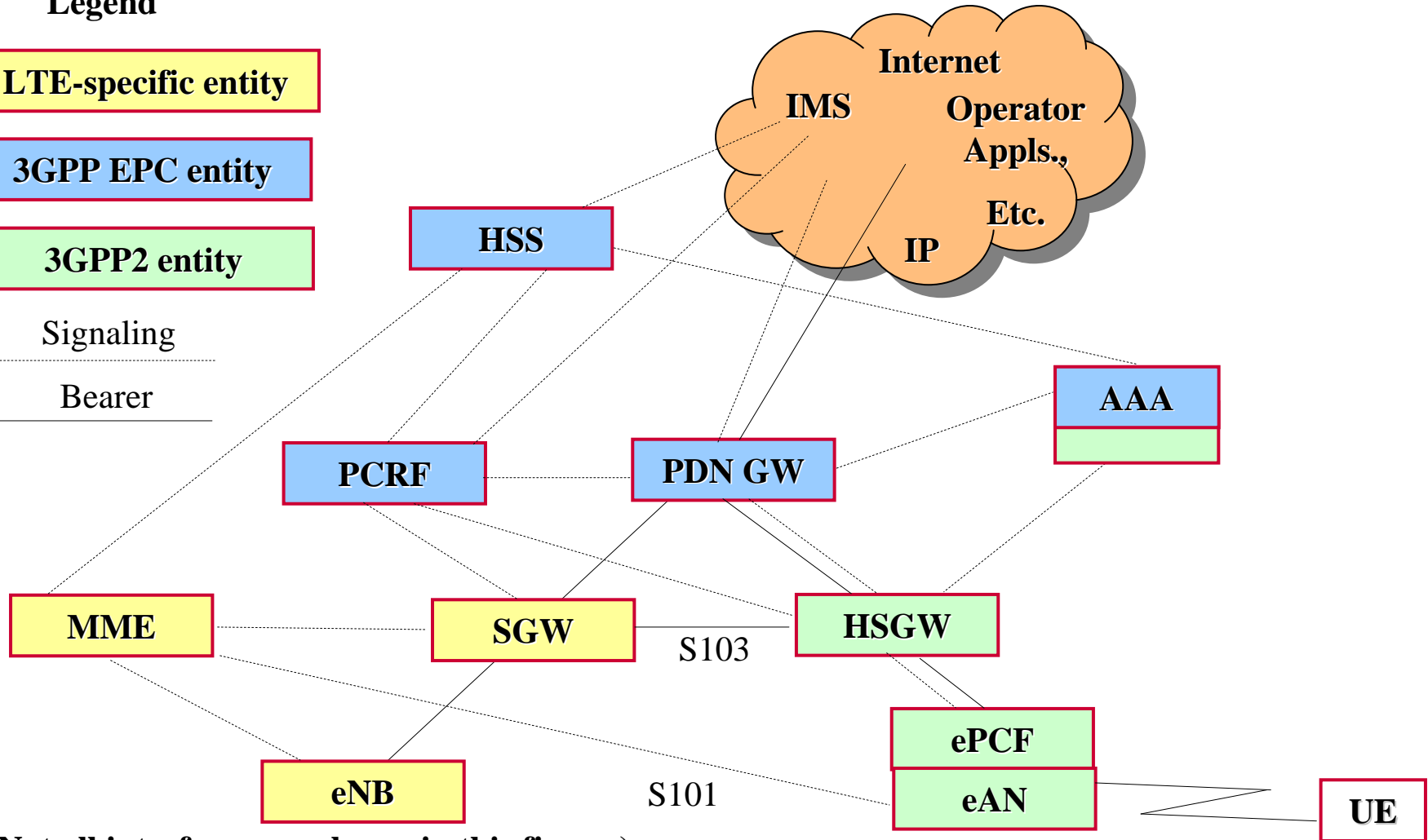
LTE-specific entity

3GPP EPC entity

3GPP2 entity

Signaling

Bearer



(Not all interfaces are shown in this figure.)

# LTE → eHRPD Handover

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## Optimized Handover

- Involves the use of S101 and S103 interfaces to minimize the gap in packet flow to reach the goal of < 300 ms.
- Signaling changes on the air interface to support S101 based tunneling.
- The UE establishes context on the eHRPD access network by signaling over the S101 tunnel.
- The eNodeB (via the MME) and eAN coordinate the handover.

## Non-Optimized Handover

- The UE leaves LTE coverage, attaches to the eHRPD access network, builds context, and resumes packet flow.
- Support in LTE to direct the handover and provide eHRPD parameters.
- Latency (gap in packet flow) can be several seconds.

# eHRPD/1x → LTE Idle Hand-Up

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LTE neighbor information is broadcast by the eHRPD/1x network.

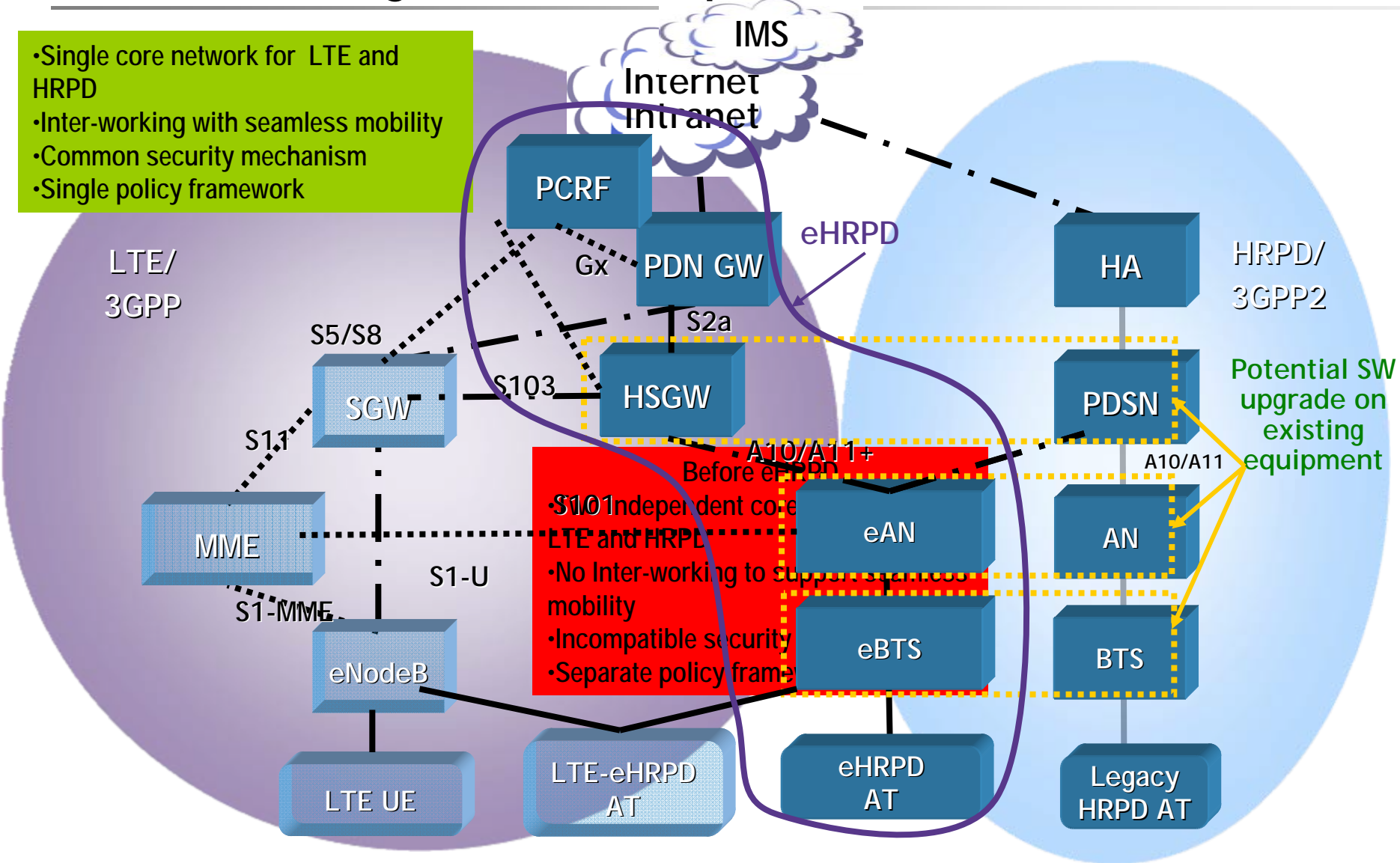
- Reduce search time for LTE pilots.
- Minimize the device battery power consumption.

Uses reselection (idle handover) parameters and procedures.

Similar parameters and procedures are used for idle hand-up from 1x to LTE.

# eHRPD - Project Description

- Single core network for LTE and HRPD
- Inter-working with seamless mobility
- Common security mechanism
- Single policy framework



# LTE - cdma2000 1x CSFB/SRVCC Architecture

## Legend

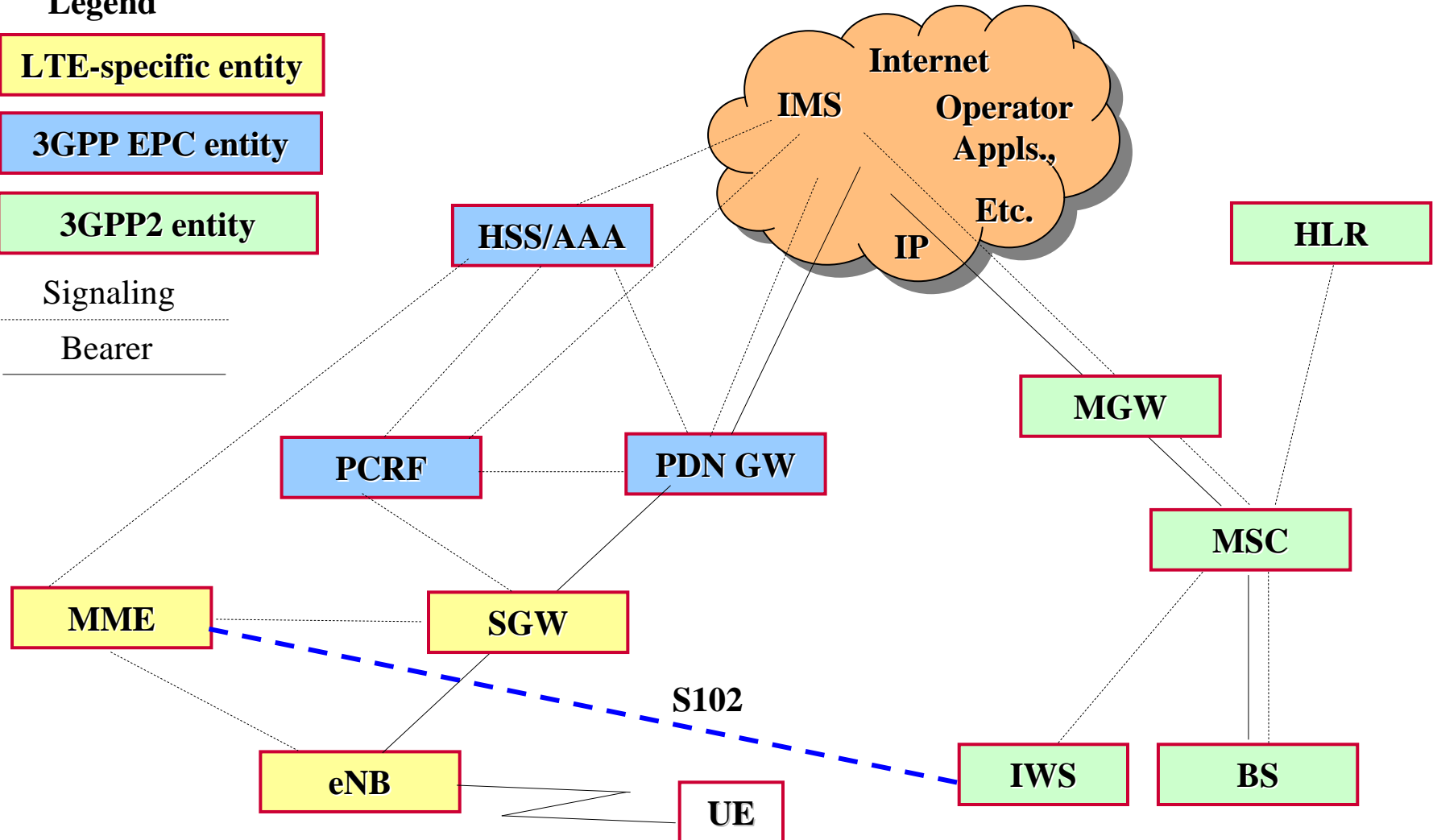
LTE-specific entity

3GPP EPC entity

3GPP2 entity

Signaling

Bearer



# LTE - cdma2000 1x CSFB

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LTE can provide Data services, while Voice services are provided on cdma2000 1x.

Voice and Data services are not simultaneous. The mobile device camps on LTE for Data services, and “falls back” to the circuit switched 1x system to make/receive voice calls.

LTE uses the S102 interface to transparently pass cdma2000 1x signaling between the mobile device and the cdma2000 1x system.

1xCSFB includes support for:

- Registration
- Paging for cdma2000 1x Mobile Terminated Calls
- SMS

Mobile originated calls are made directly on cdma2000 1x.

# LTE - 1x SRVCC

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- Single Radio Voice Call Continuity anchors a voice call in IMS.
- Call is transferred from the packet environment to the MSC-based circuit environment.
- Control is maintained in IMS.
- May reduce latency in voice call handoff from packet to circuit.
- May not be implemented immediately or completely.
- Some signaling elements of SRVCC may be used to reduce the call setup time for 1x CSFB.

# Future Work

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3GPP2 will continue to support operators that choose to deploy LTE technologies.

3GPP2 will continue to cooperate with 3GPP to enhance:

- LTE - eHRPD interworking
- LTE - cdma2000 1x CSFB / SRVCC interworking
- Features made possible by LTE interworking.
- Features made possible by attachment to the EPC.

# List of Acronyms

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AAA -  
Authentication/Authorization/Accounting

BTS - Base Transceiver Station

CSFB - Circuit-Switched Fall Back

eAN/ePCF - evolved Access Network/evolved  
Packet Control Function

eHRPD - evolved High Rate Packet Data

eNB - eNodeB - evolved NodeB

EPC - Evolved Packet Core

HLR - Home Location Register

HRPD - High Rate Packet Data

HSGW - HRPD Serving Gateway

HSS - Home Subscriber Server

IMS - IP Multimedia Subsystem

IWS - Interworking Server

LTE - Long Term Evolution

MME - Mobility Management Entity

MGW - Media Gateway

MSC - Mobile Switching Center

PCRF - Policy Control Rules Function

PDN GW - Packet Data Network Gateway

PMIP - Proxy Mobile IP

S-GW - Serving Gateway

SMS - Short Message Service

SRVCC - Single Radio Voice Call Continuity

UE - User Equipment

# Thank You!

For more information, please visit

<http://www.3gpp.org> and

<http://www.3gpp2.org>

