

# 3GPP2 Systems

**Submitted To:** Service Deployment in Evolved Mobile all-IP  
Systems Workshop

**Date:** 4 February 2010

**Availability:**  Public  OMA Confidential

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**Source:** Qualcomm Incorporated

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# Agenda

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- **Introduction to 3GPP2**
- **Market**
- **Radio capabilities**
- **Services**
- **IP architecture and data protocols**
- **IMS**
- **Interworking with 3GPP**
- **Femto cells**

# 3GPP2 is ...

The Third Generation Partnership Project 2 (3GPP2) is the Partnership Project for Global cdma2000® Specifications including:

- cdma2000 air interface specifications
- MAP (Mobile Application Part) core network specifications
- All IP core network specifications
- RAN specifications
- Other ancillary specifications

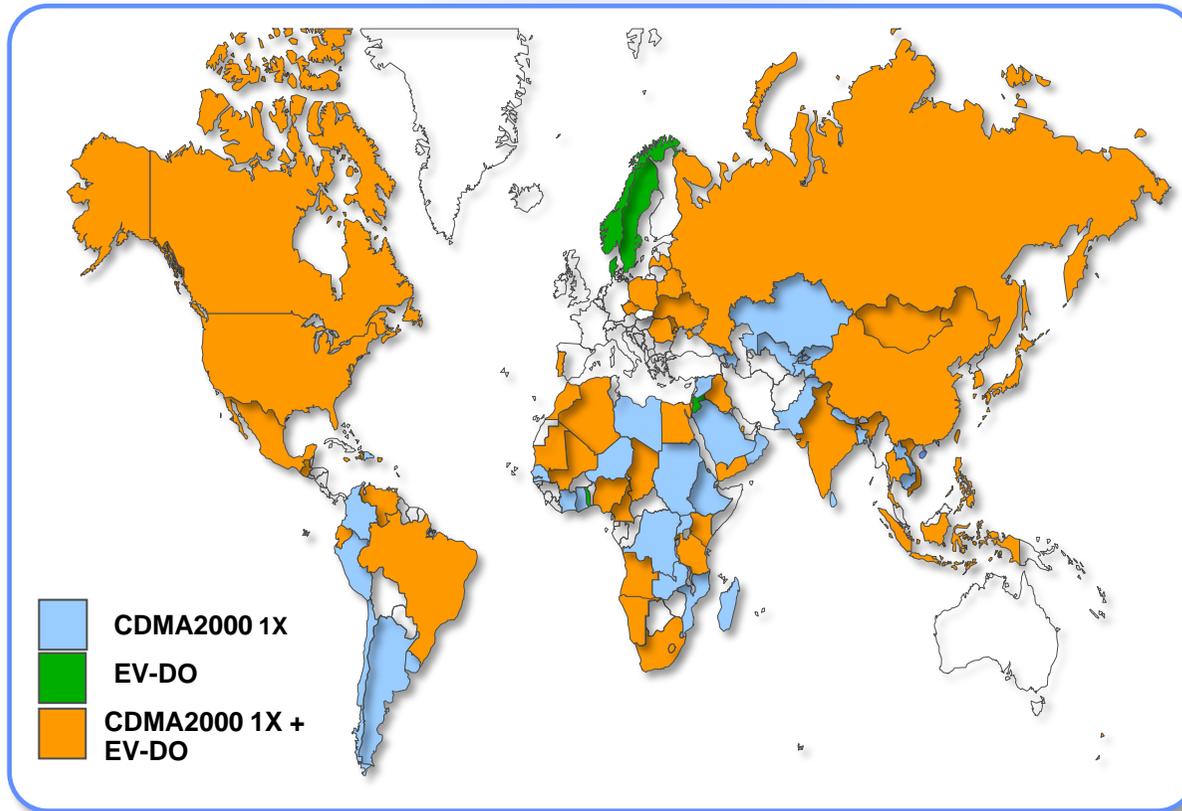
cdma2000® is the trademark for the technical nomenclature for certain specifications and standards of the Organizational Partners (OPs) of 3GPP2. Geographically (and as of the date of publication), cdma2000® is a registered trademark of the Telecommunications Industry Association (TIA-USA) in the United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



Organizational  
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# CDMA2000 and EV-DO Market Size



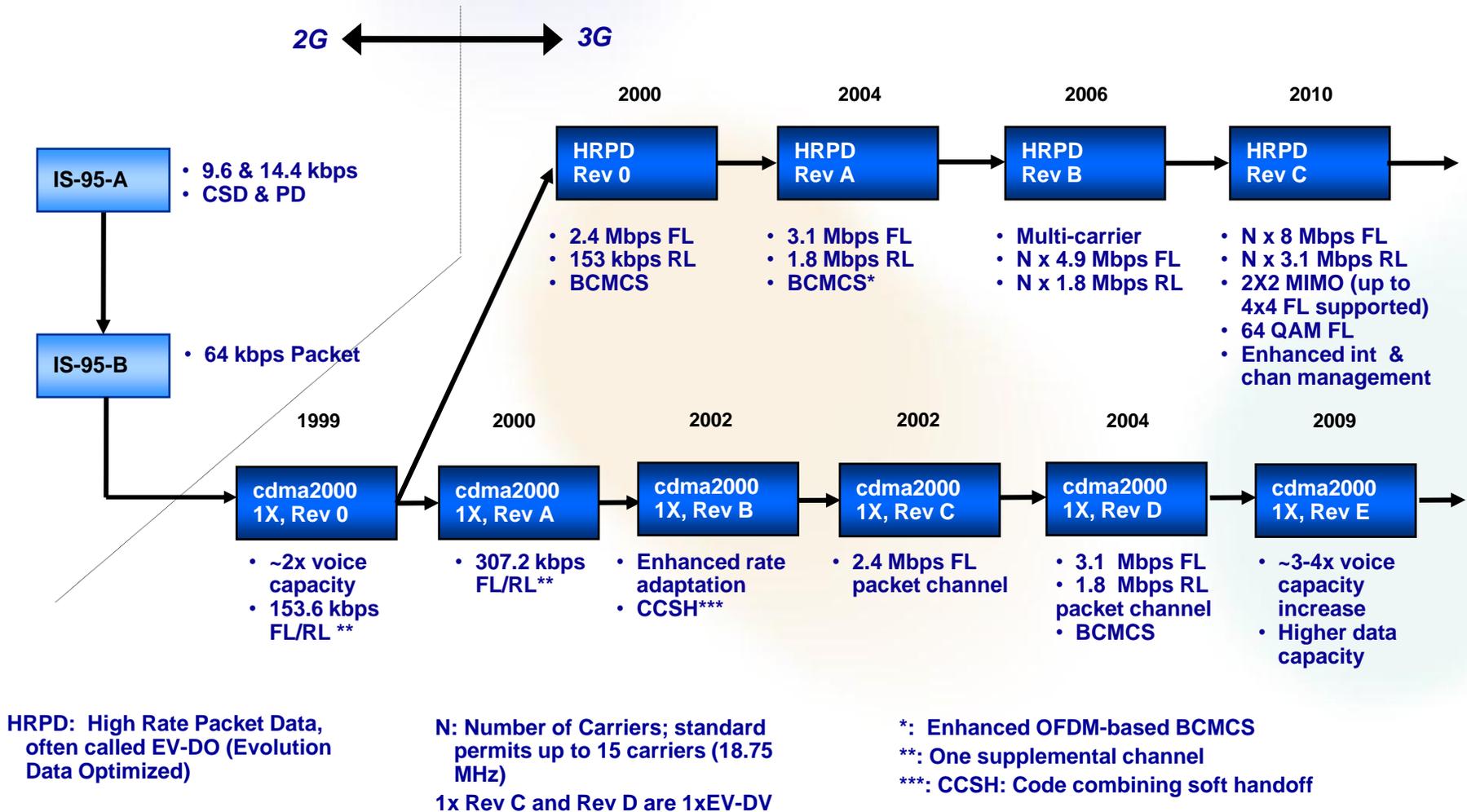
**Subscribers<sup>1</sup>**  
**~ 512 Million**  
**CDMA2000**  
**~ 138 Million**  
**EV-DO**

**Operators<sup>2</sup>**  
**308** CDMA  
**116** EV-DO Rev A.

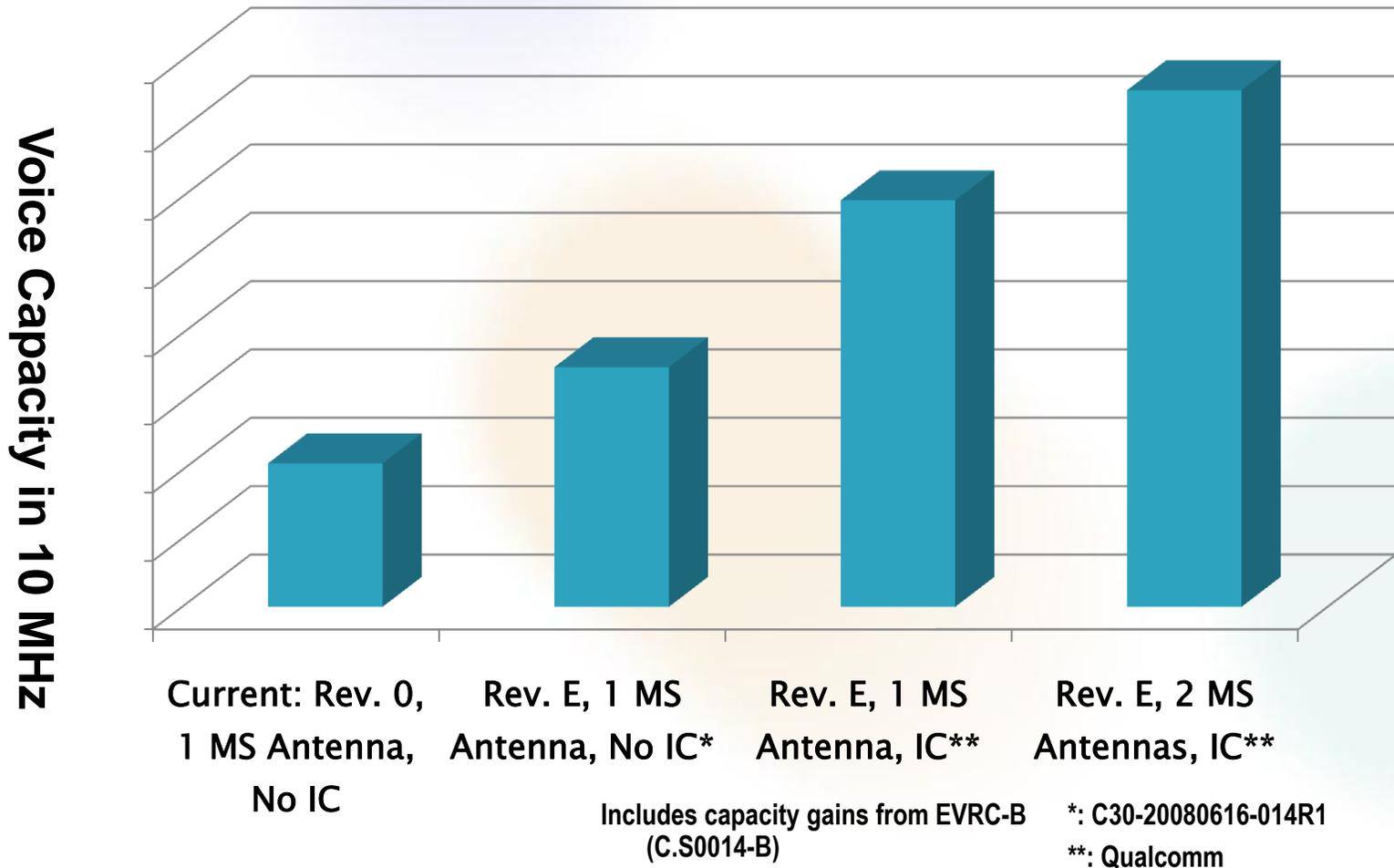
Sources: CDG estimates <sup>1</sup> As of Q3 2009, <sup>2</sup> As of Dec 2009;

# 3GPP2 Air Interface Evolution

## IMT-2000 Technologies: MC-CDMA



# cdma2000 1x Rev. E Voice Capacity



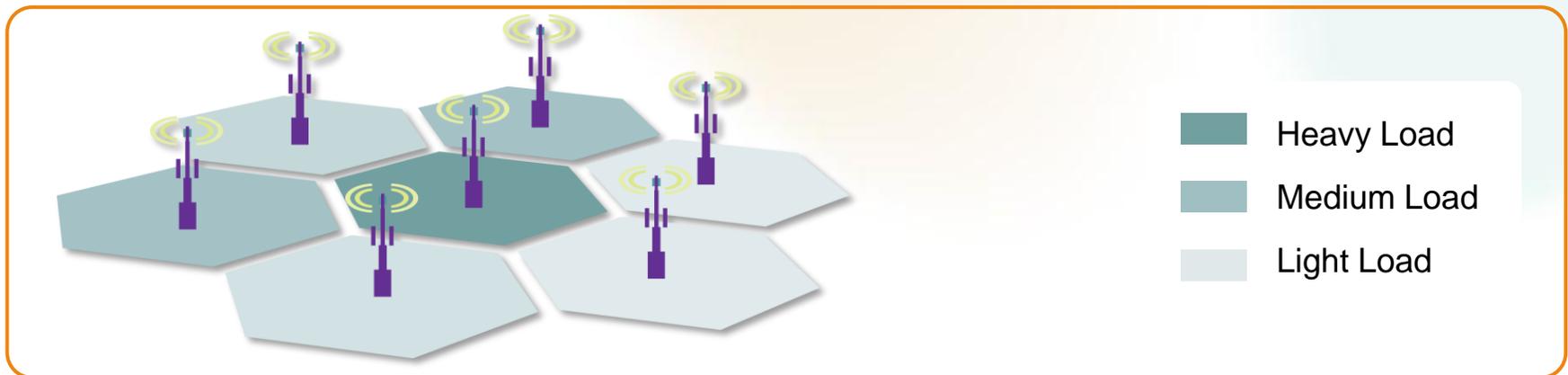
**~3X (1-ant) to ~4X (2-ant) capacity enhancement with same voice quality**

# Smart Networks Exploit Typically Unevenly Load

Network loading continuously changes with time and location



Fully loaded sectors are usually surrounded by lightly loaded neighbors



# Smart Networks Offer Substantial Increase in Network Capacity and User Experience

## Network Load Balancing

Utilizes unused capacity of lightly loaded neighbors

## Demand Matched Configuration

Reduces interference by adjusting sector-carrier transmit power to match load

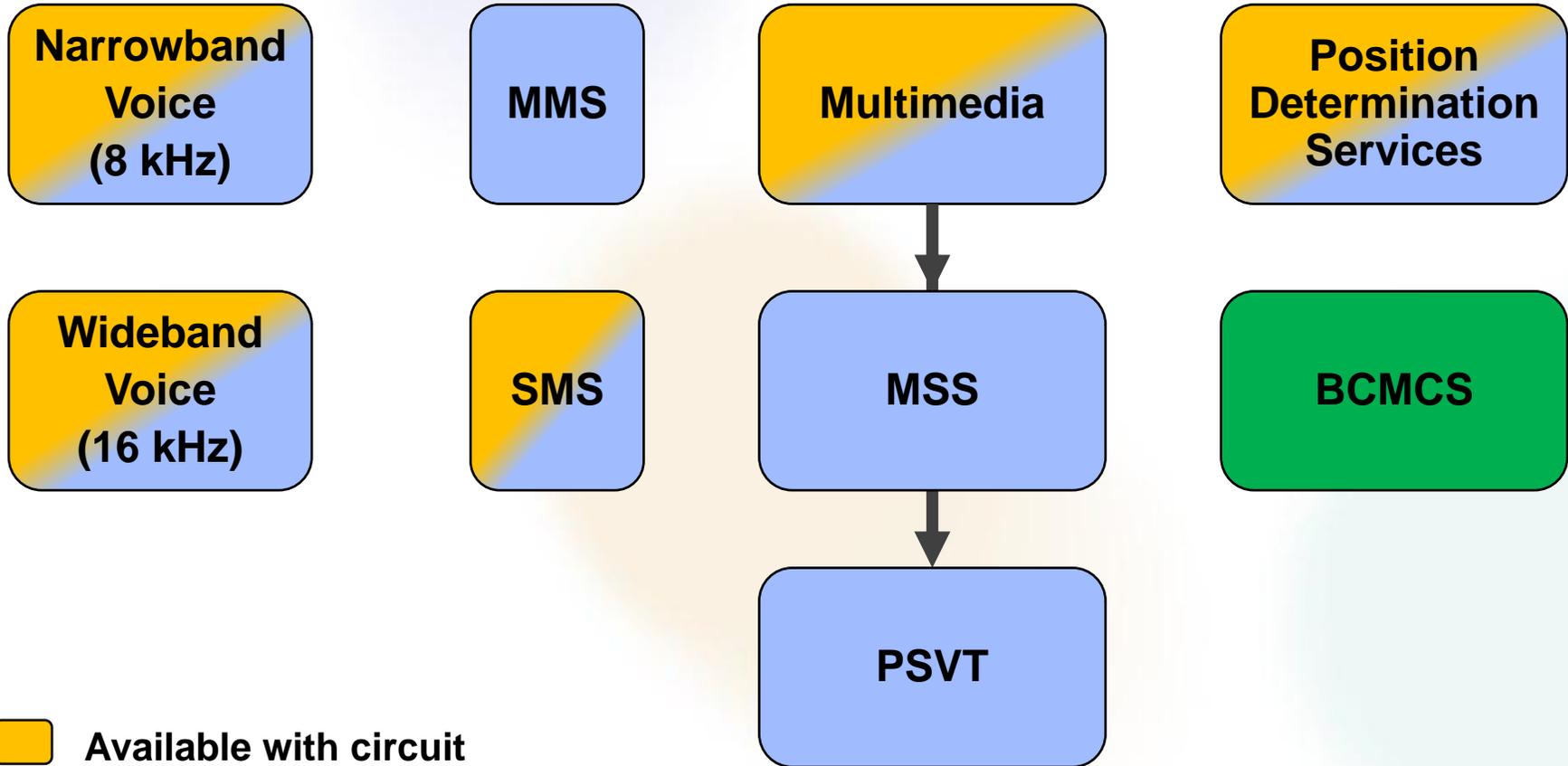
## Distributed Network Scheduler

Users preferentially served by carriers that maximize capacity

*Improved performance where needed, utilizing existing resources*

***Can Double Network Capacity and cell-edge data rates***

# Services



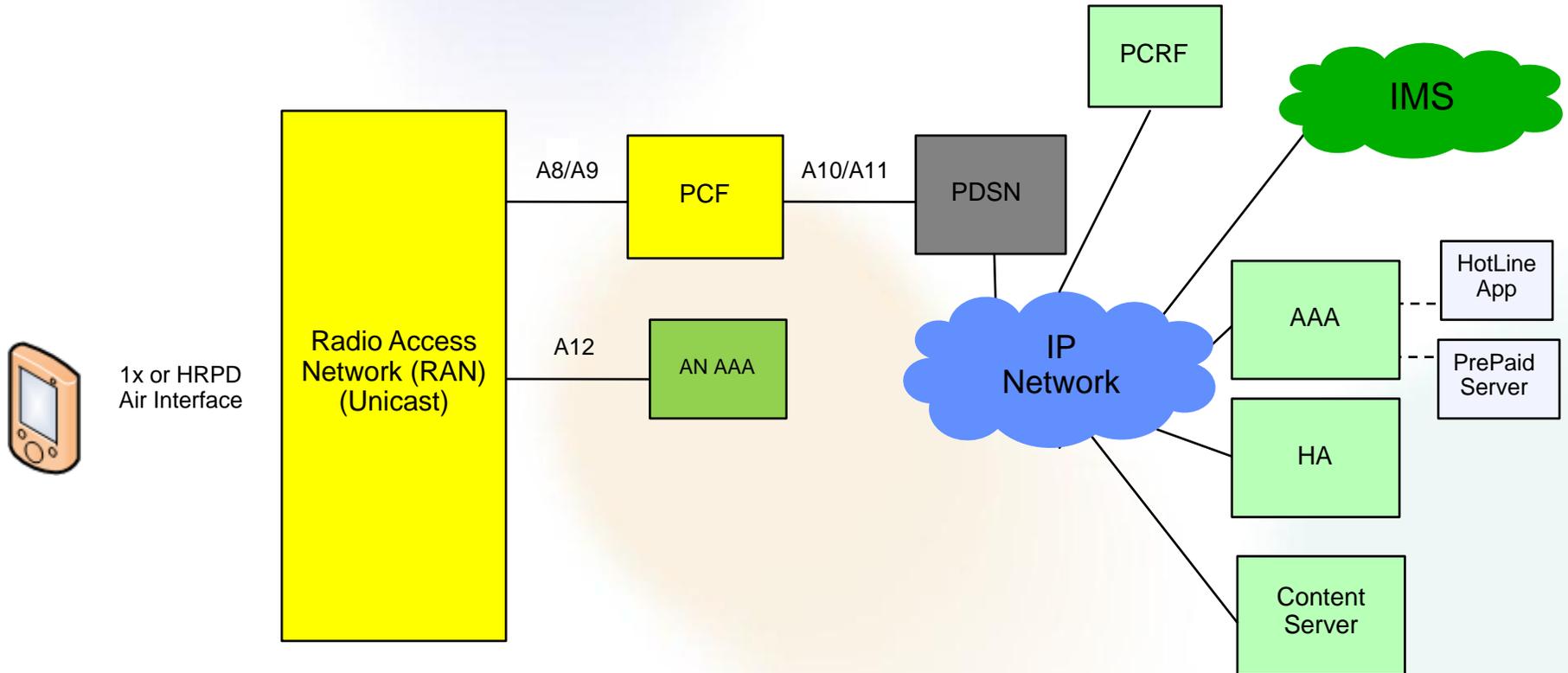
 Available with circuit

 Available on packet bearer

 Other

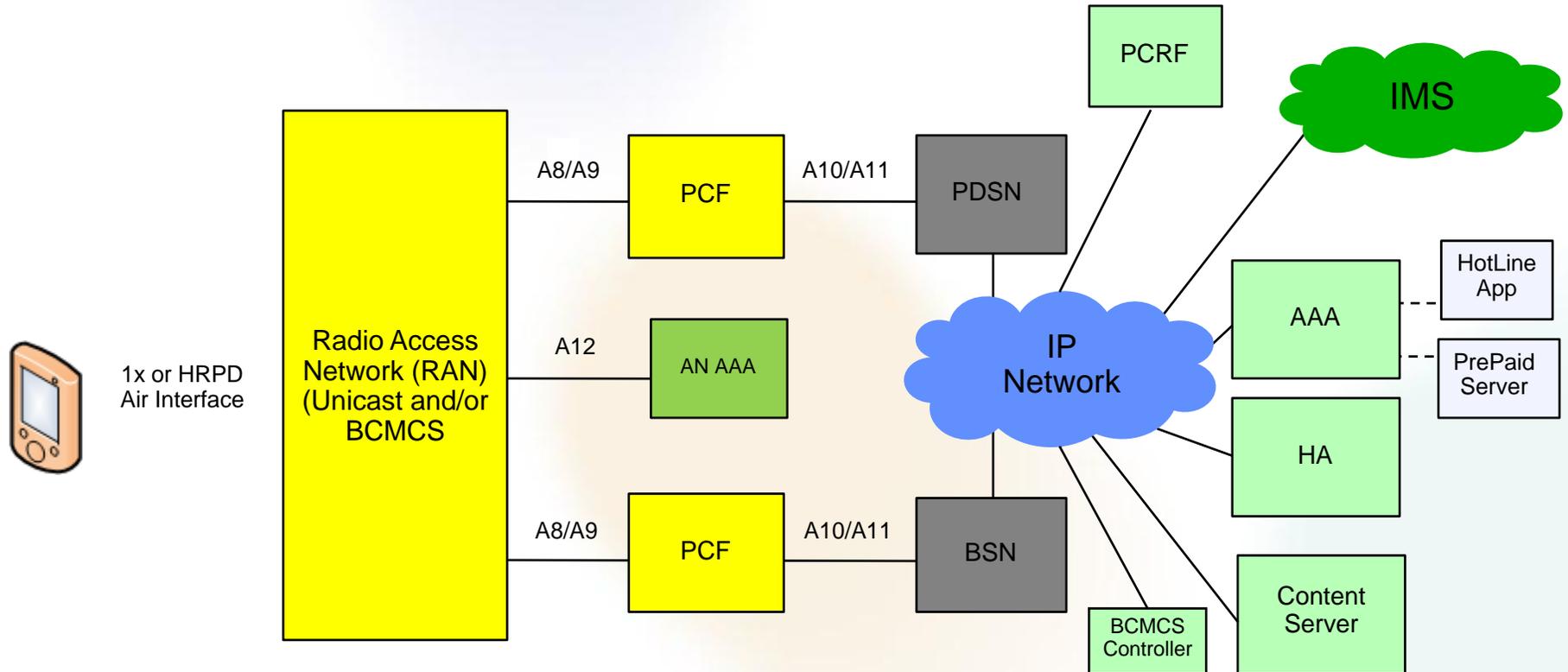
SMS – Short Message Service  
MMS – Multimedia Messaging Service  
PSVT – Packet Switched Video Telephony  
MSS – Multimedia Streaming Services  
BCMCS – Broadcast and Multicast Service

# cdma2000 IP Network Architecture



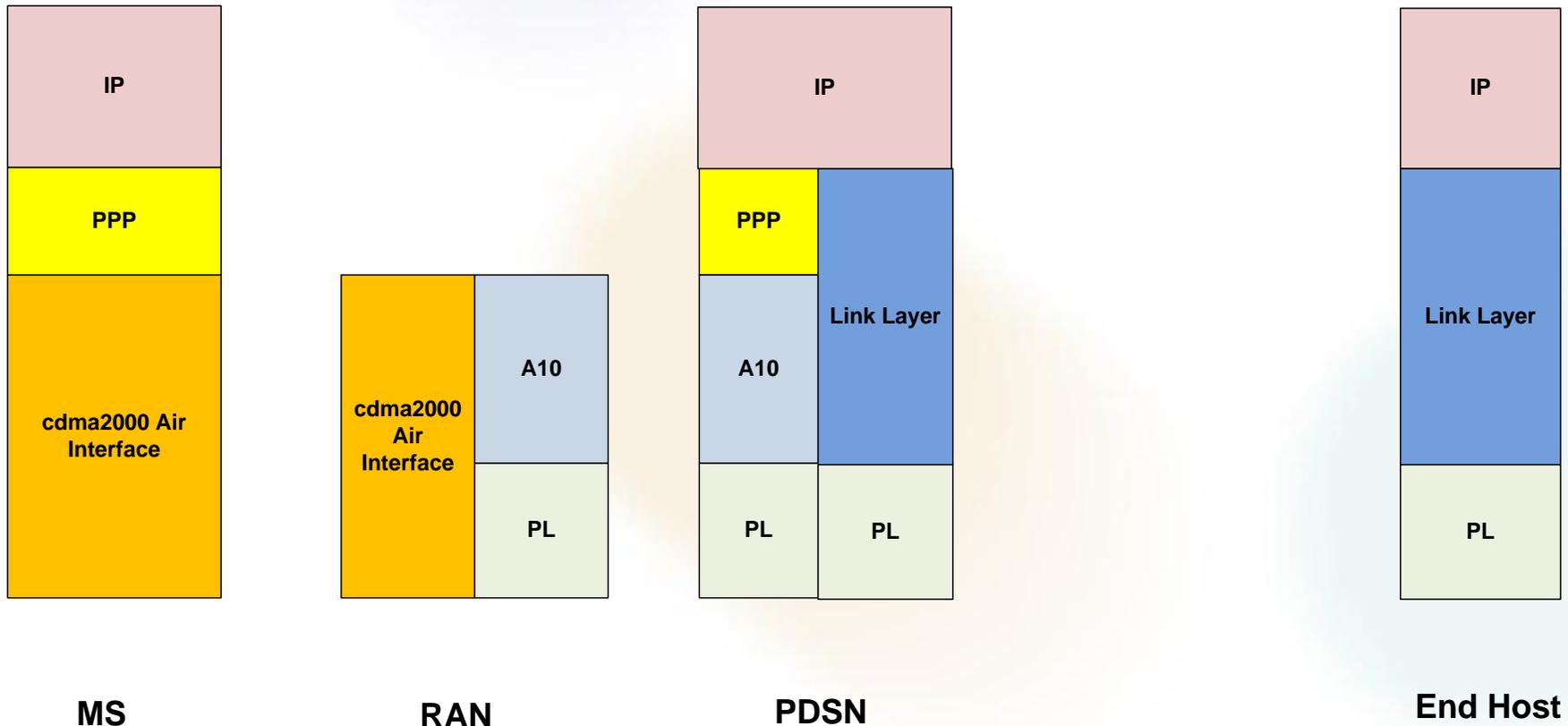
- PCF – Packet Control Function
- PCRF – Policy and Charging Rules Function
- PDSN – Packet Data Serving Node
- AAA – Authentication, Authorization, and Accounting
- HA – Home Agent

# cdma2000 IP Network Architecture



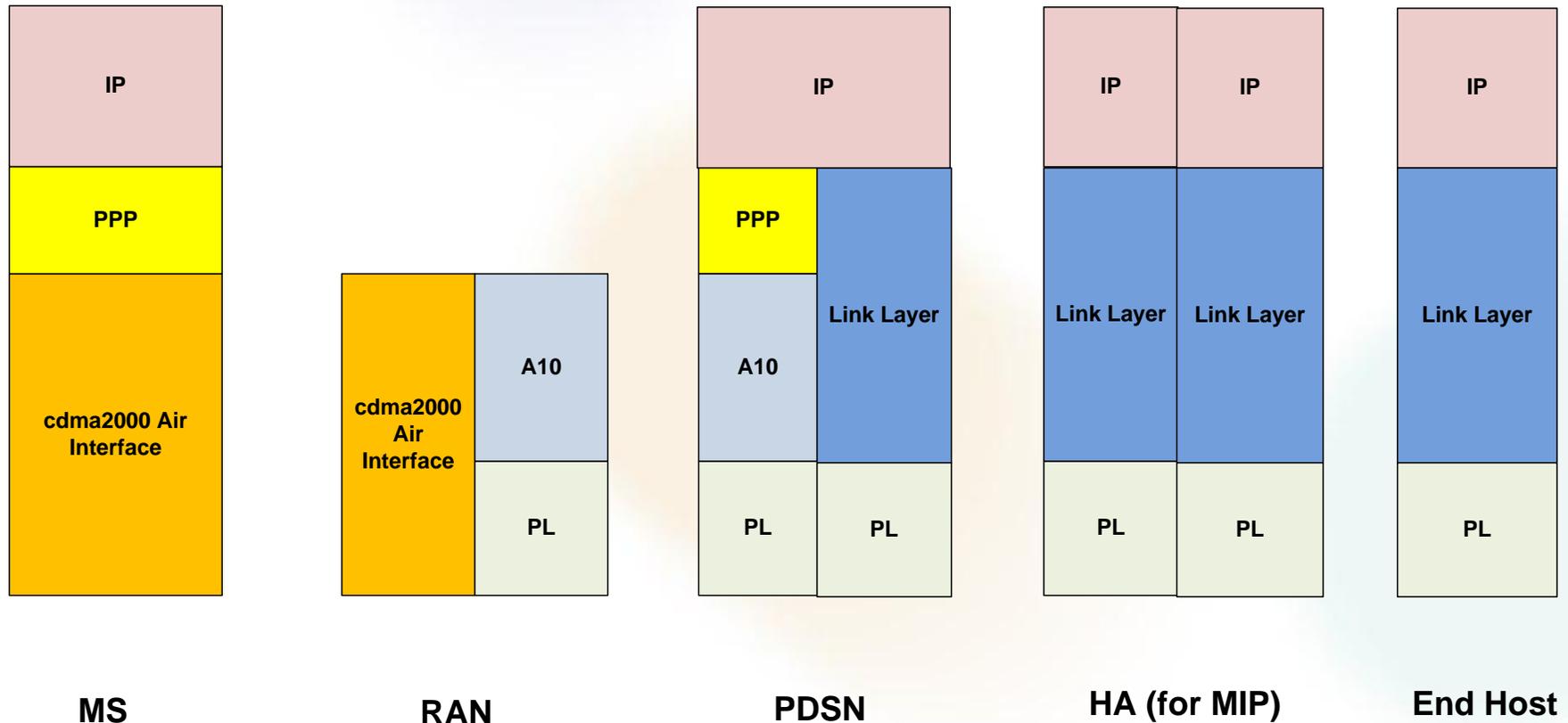
- PCF – Packet Control Function
- PCRF – Policy and Charging Rules Function
- PDSN – Packet Data Serving Node
- AAA – Authentication, Authorization, and Accounting
- HA – Home Agent
- BCMCS – Broadcast and Multicast Service
- BSN – Broadcast Serving Node

# IP Service User Data Protocol – Simple IP



- **PPP – Point-to-Point Protocol**

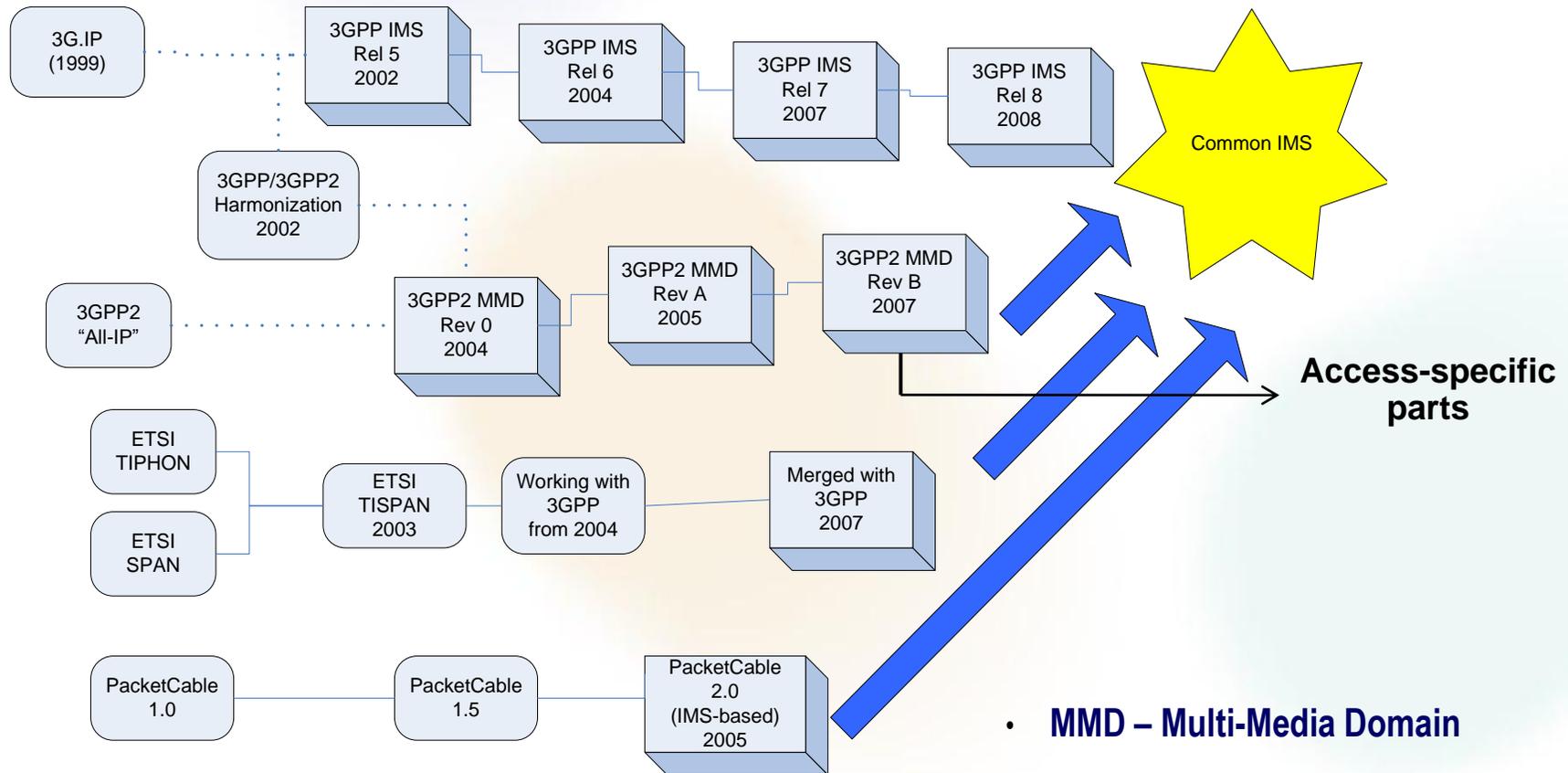
# IP Service User Data Protocol – Mobile IP



- For MIPv4, use FA (Foreign Agent) mode (FA in PDSN)

# Common IMS

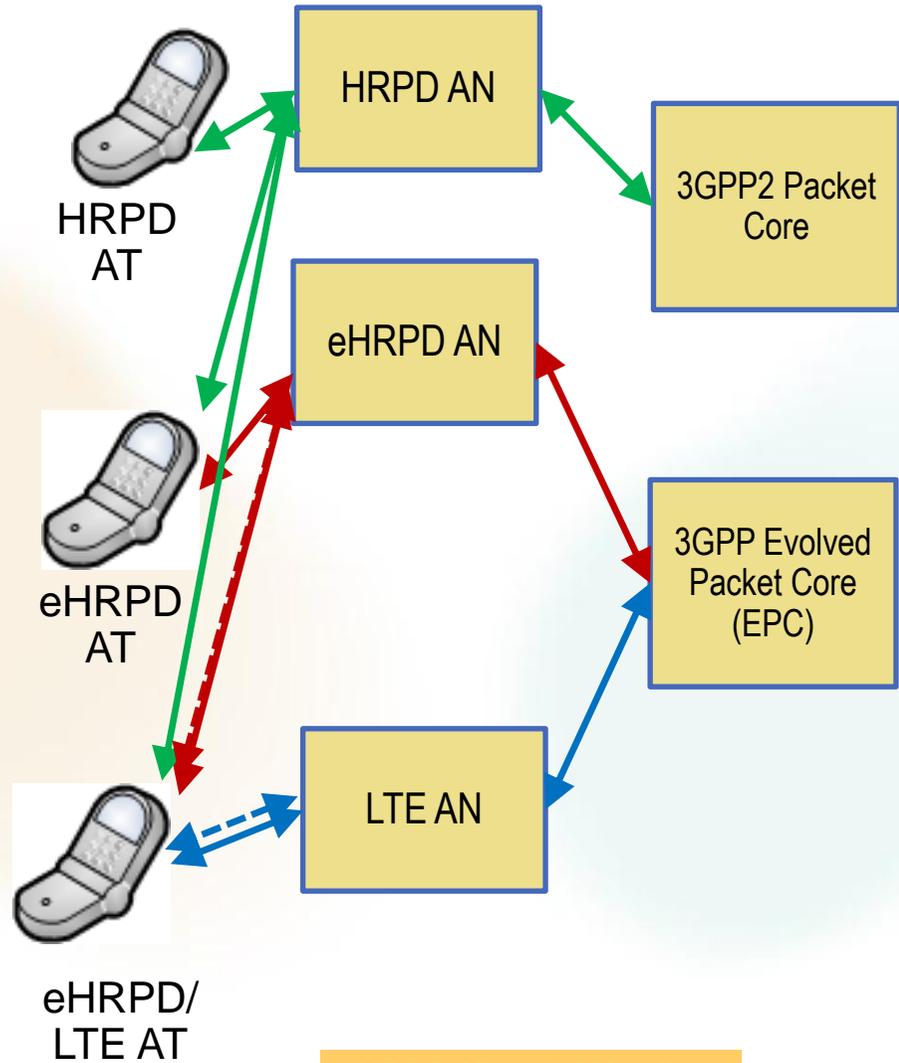
IMS no longer fragmented



# Interworking

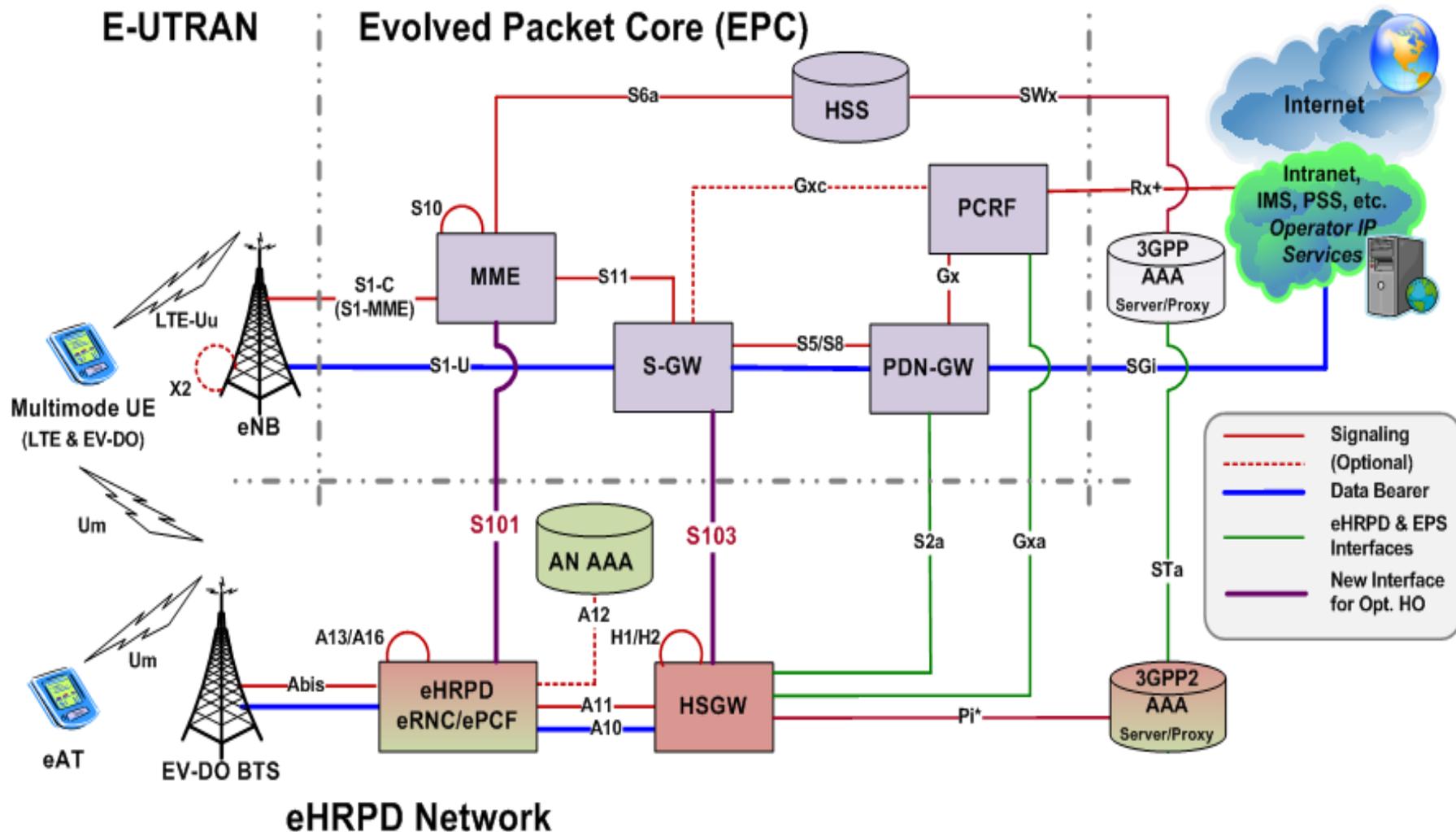
- **eHRPD (evolved HRPD)**
  - **Allows interconnection to 3GPP EPC**
- **LTE Interworking**
  - **LTE to eHRPD Handoff (Active and Idle)**
  - **eHRPD to LTE (Idle State)**
  - **Circuit-switch Fall Back (CSFB)**
  - **LTE to 1x**
  - **1x to LTE (Idle State)**

- ▶ **WiMAX Interworking**
  - **WiMAX to HRPD Handoff (Active and Idle)**



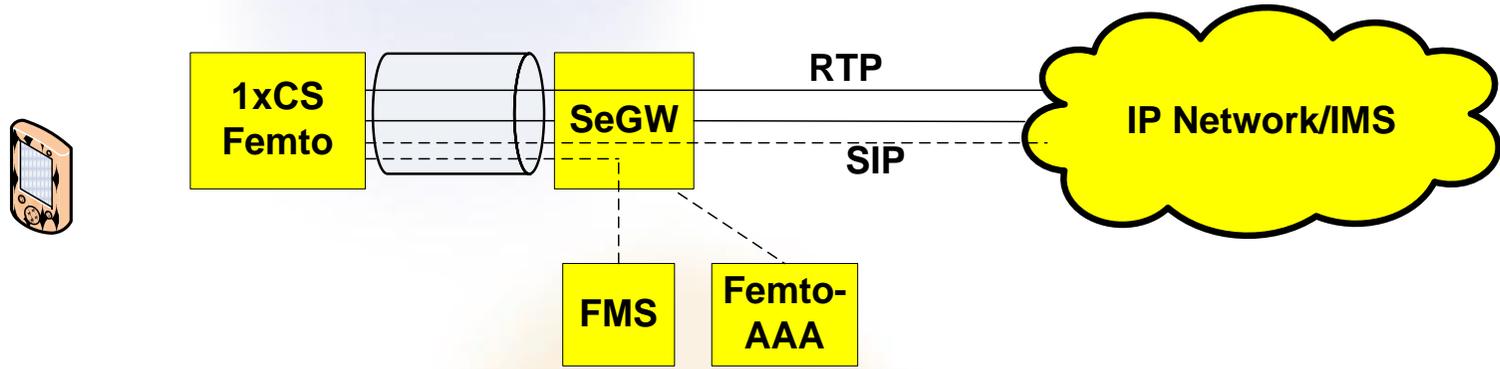
eHRPD AT and AN will typically support HRPD

# eHRPD and eHRPD-LTE Interworking Architecture

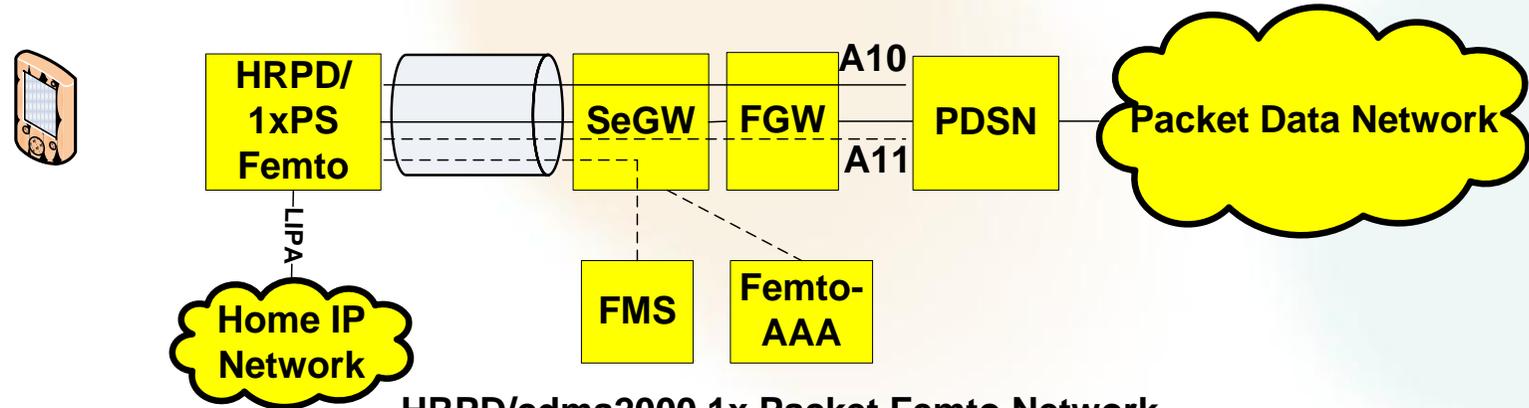


- Utilize the 3GPP EPC framework for interworking as a trusted non-3GPP Access Network
- The optional S101 and S103 interfaces provide optimized handoff mechanism by tunneling signaling and data between the UE and target AN

# cdma2000 Femtocell Network Architecture



SIP Based cdma2000 1x Circuit Service Femto Network Architecture



HRPD/cdma2000 1x Packet Femto Network Architecture

AAA: Authentication, Authorization, and Accounting  
 FGW: Femto Gateway  
 FMS: Femto Management System  
 SeGW: Security Gateway  
 LIPA: Local IP Access

# Summary

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- **Capacity and performance of 3GPP2 systems continues to increase**
- **Native services are similar to 3GPP systems, but have some differences**
  - **Codecs, SMS, Broadcast**
- **MIP is the data mobility protocol**
- **Capabilities that are based upon IETF protocols and Common IMS work fine with 3GPP2 systems**
- **Some things to take into account**
  - **Has both SIM (R-UIM, UICC (CSIM, ISIM)) and SIM-less devices**
  - **IDs are different**
  - **Details of QoS management are different**