

**THESIS:
EVOLUTION OF THE MEDIA GATEWAY
IN CDMA2000 BASED LAYERED
ARCHITECTURE CORE NETWORK**

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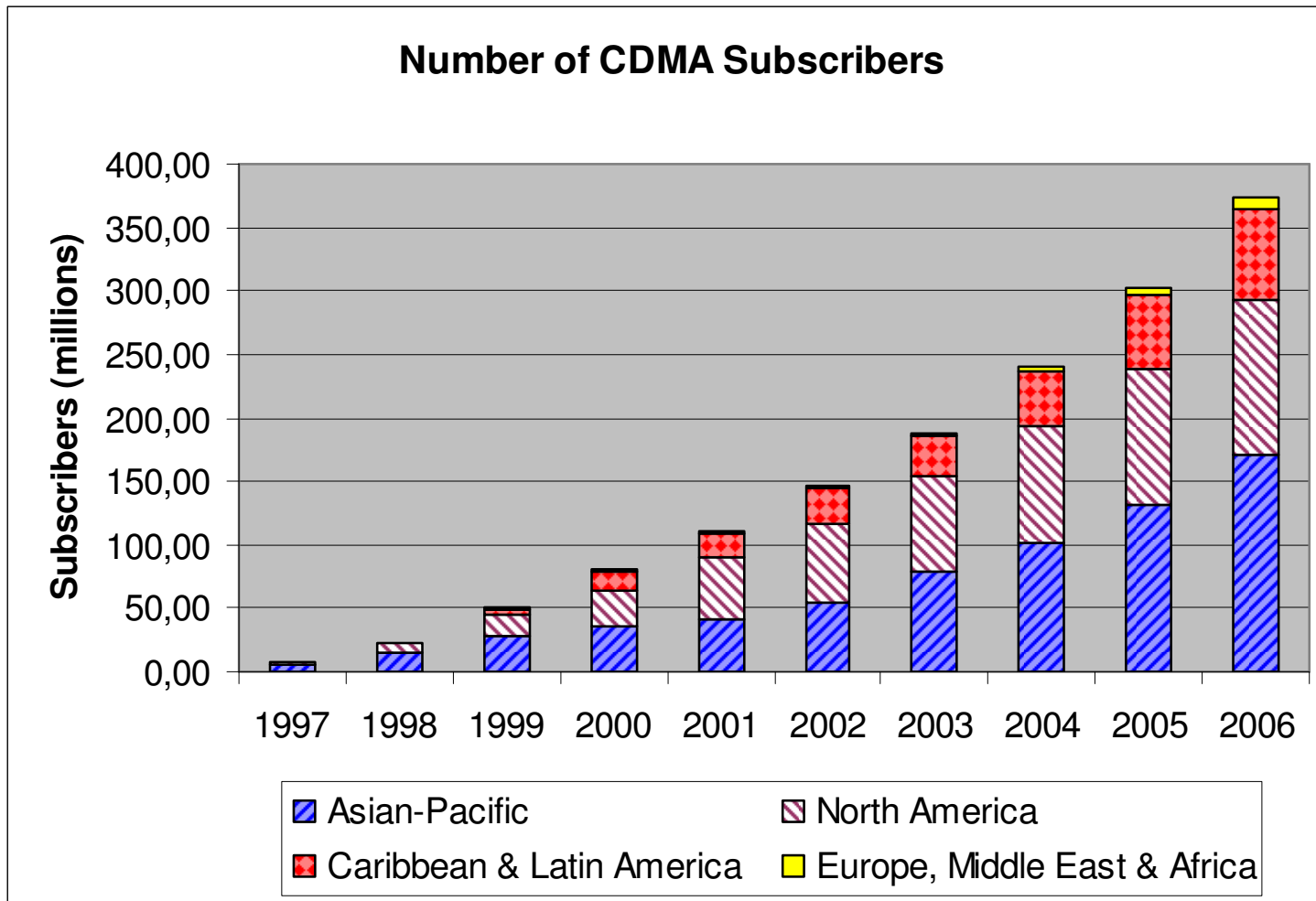
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Background

- The Code Division Multiple Access (CDMA) networks are specified in the 3GPP2 organization, whereas the GSM and WCDMA are specified in the 3GPP organization
- Both 3GPP and 3GPP2 have defined the Core Network architecture to be Layered Architecture based, which includes a network element called Media Gateway (MGW)
- Problem was that requirements from the 3GPP and 3GPP2 are not the same, which might hinder building a Media Gateway supporting both standards
- The goal of the thesis was to analyze these differences and propose requirements for a common Media Gateway supporting both 3GPP and 3GPP2 specifications

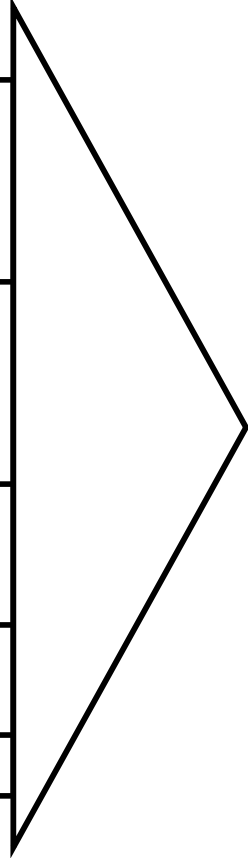
CDMA Market Overview



- The CDMA Subscriber growth in 2006 was 24% (71.6 million)
- 87% of the subscribers are using CDMA2000 3G networks

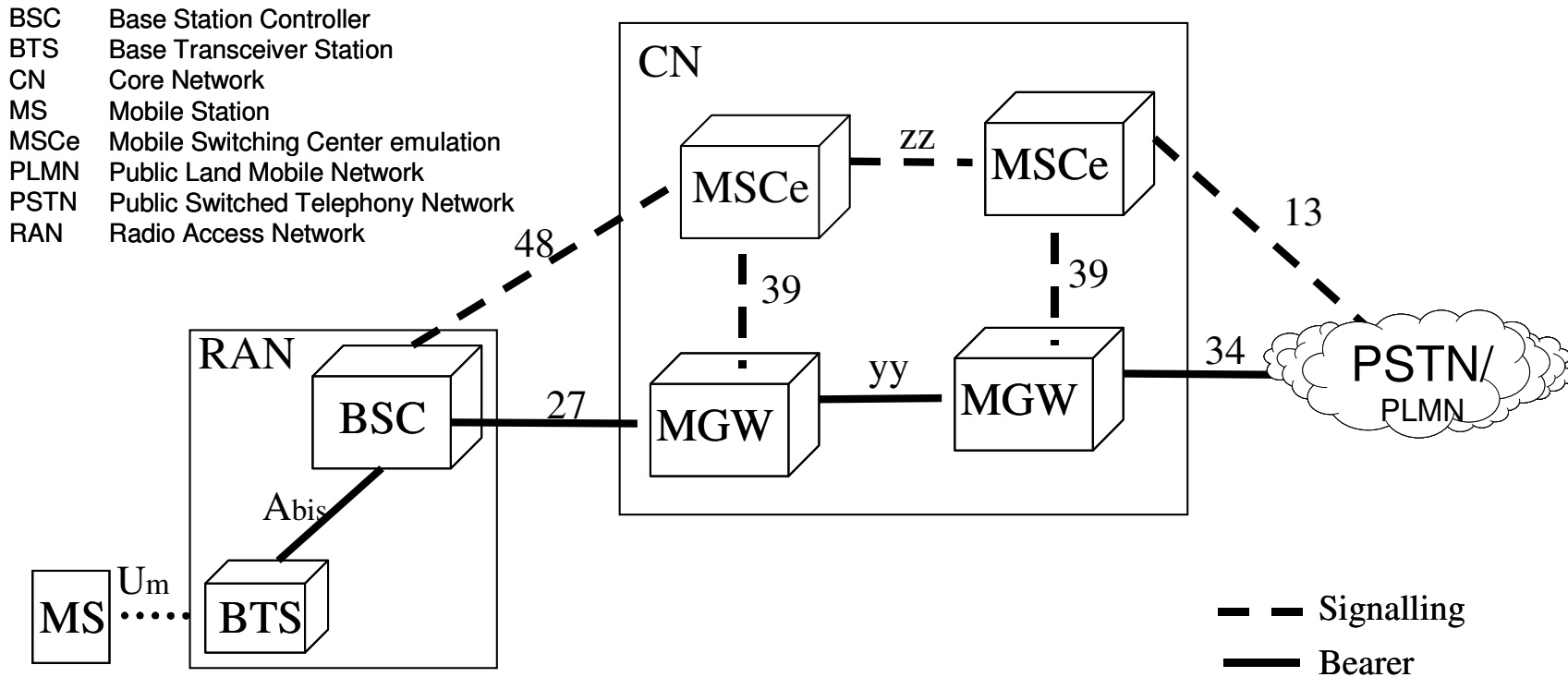
CDMA Radio Access Evolution

Data only			1xEV-DO rev.0				
Data & VoIP			1xEV-DO rev.A	1xEV-DO rev.B	UMB		
Data & CS	IS-95A	IS-95B	1X				
Brand	cdmaOne		cdma2000				
Year	1996	1999	2000	2002	2006	2008	2009



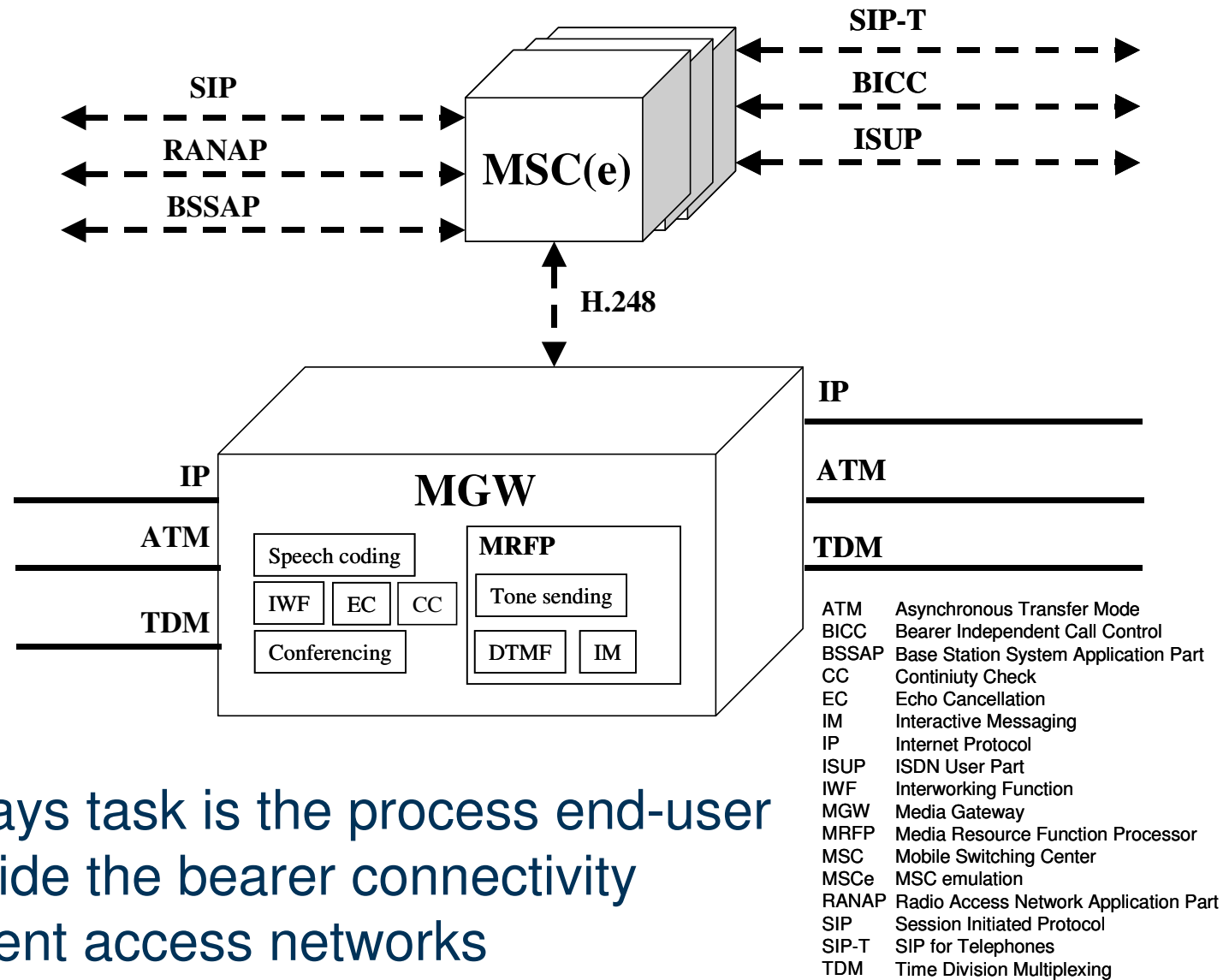
- The CDMA was initially introduced by Qualcomm in 1988
- 1x was the first 3G CDMA radio technology with data rates up to 153 kbit/s
- The current 1xEV-DO rev.A networks provide data rates up to 3.1 Mbit/s

CDMA Network Architecture



- The CDMA network architecture is very much similar to GSM or WCDMA network architecture. Only the use protocols or codecs are different.
- Media Gateway is a Core Network element, which is controlled by MSC Server with H.248 protocol

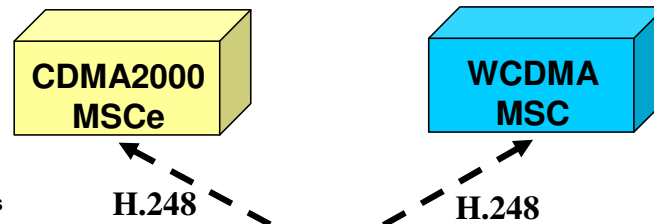
Media Gateways Features and Interfaces



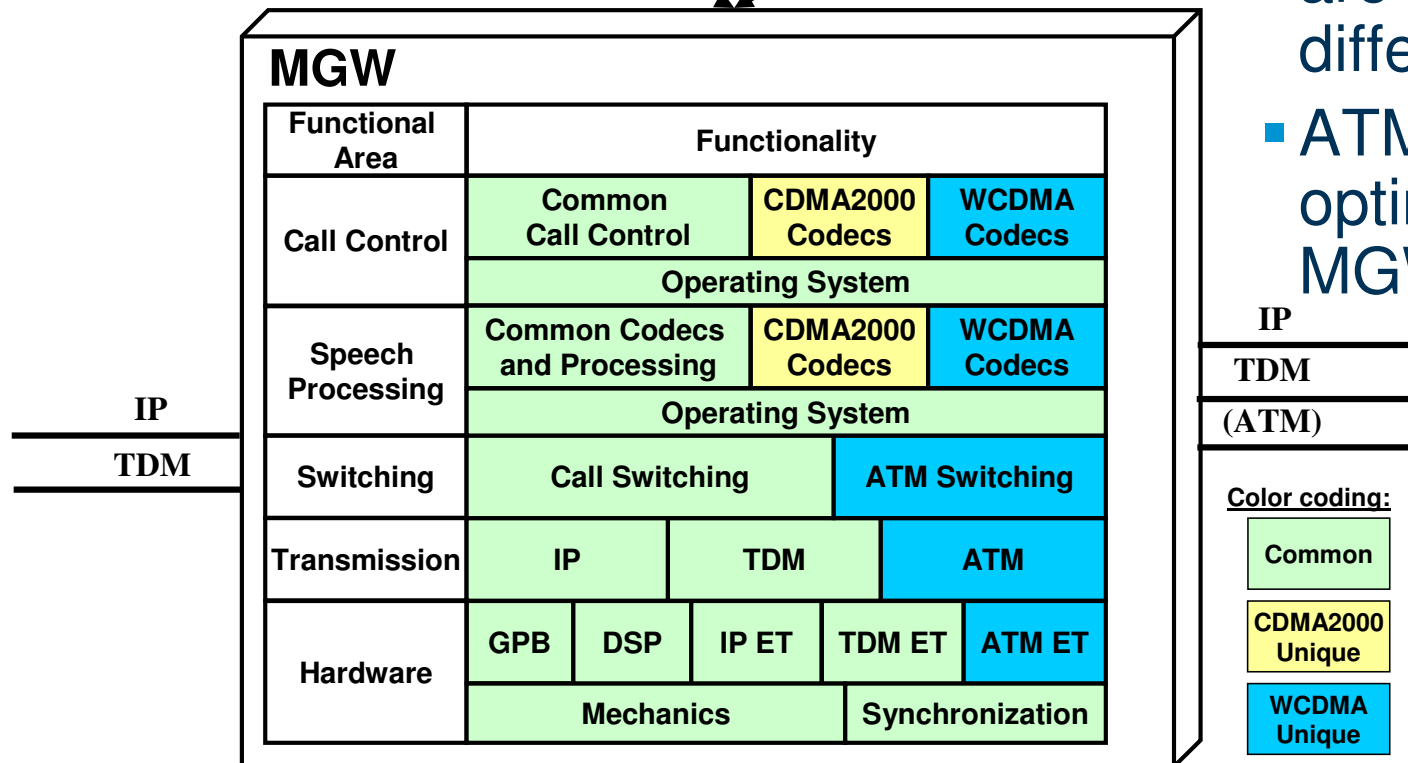
- Media Gateways task is the process end-user data and provide the bearer connectivity towards different access networks

Common Media Gateway Realization

ATM Asynchronous Transfer Mode
 CDMA Code Division Multiple Access
 DSP Digital Signal Processor
 GPB General Purpose Board
 ET Exchange Terminal
 IP Internet Protocol
 MGW Media Gateway
 MSC Mobile Switching Center
 MSCe Mobile Switching Center emulation
 TDM Time Division Multiplexing
 WCDMA Wideband Code Division Multiple Access



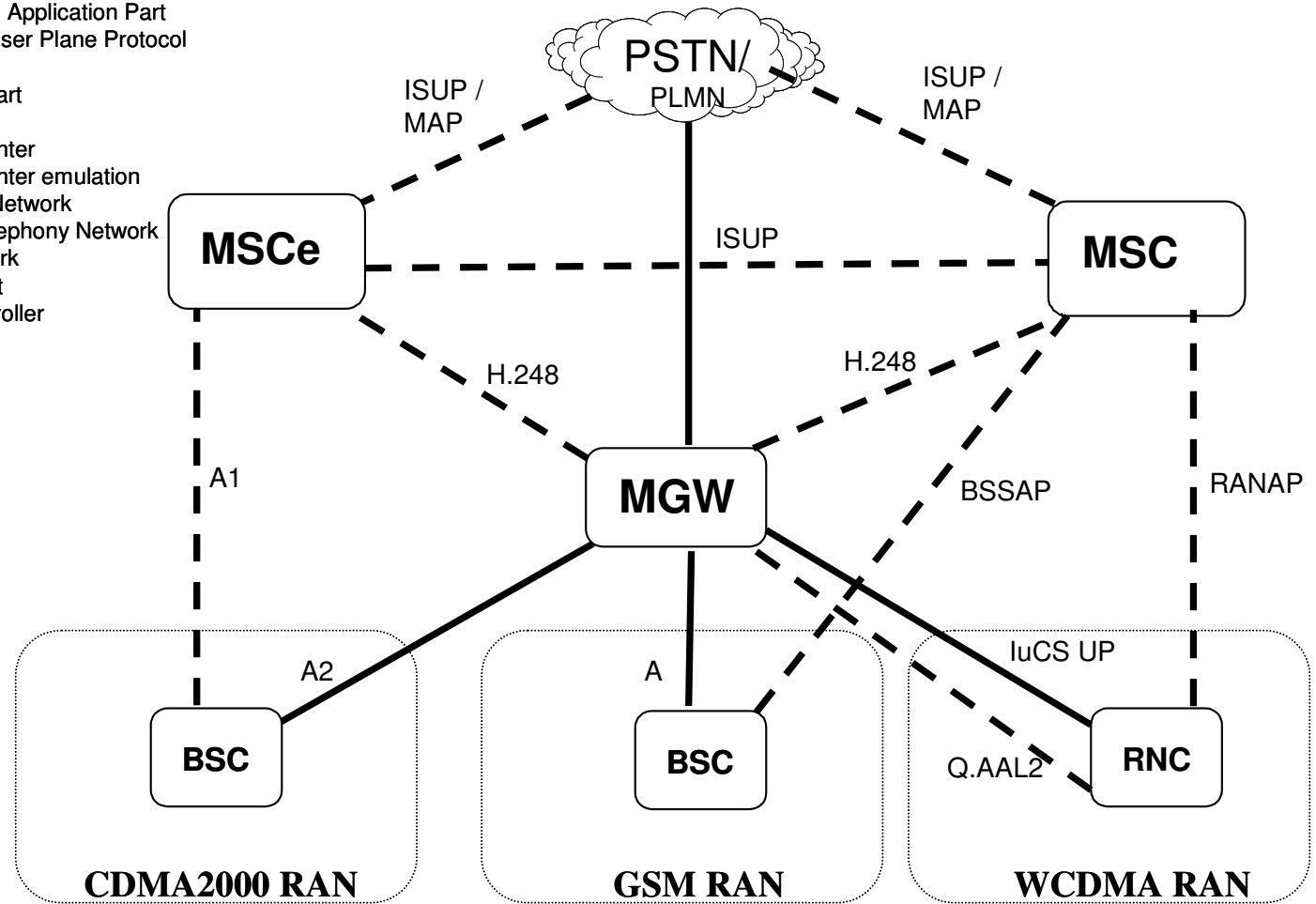
- Large part of the MGW functions are common
- Speech codecs are the main difference
- ATM could be optional part of the MGW



Common Media Gateway with Multiple Radio Access Networks

BSC Base Station Controller
 BSSAP Base Station System Application Part
 IuCS UP Iu Circuit Switched User Plane Protocol
 ISUP ISDN User Part
 MAP Mobile Application Part
 MGW Media Gateway
 MSC Mobile Switching Center
 MSCe Mobile Switching Center emulation
 PLMN Public Land Mobile Network
 PSTN Public Switched Telephony Network
 RAN Radio Access Network
 RANAP RAN Application Part
 RNC Radio Network Controller

- - - Signaling
 — Bearer



- CDMA, GSM and WCDMA networks can be connected to one common MGW, but different MSCs are needed.

Conclusions

- Technically feasible to build a common Media Gateway, which can interconnect to CDMA, GSM and WCDMA networks. Biggest difference in the required speech codecs and framing.
- 3GPP2 requirements are based more on the IETF RFC, but many of the 3GPP2 standards are still not complete!
- Development from the 3GPP based Media Gateway could be done in two steps:
 1. TDM-based A2-interface with 3GPP definitions
 2. IP-based A2p-interface and support for the 3GPP2 speech codecs and framing
- Standardization effort would be needed to align the 3GPP and 3GPP2 H.248 specifications

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