



# New Opportunities in Wireless Network Evolution

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# Wireless Network Evolution

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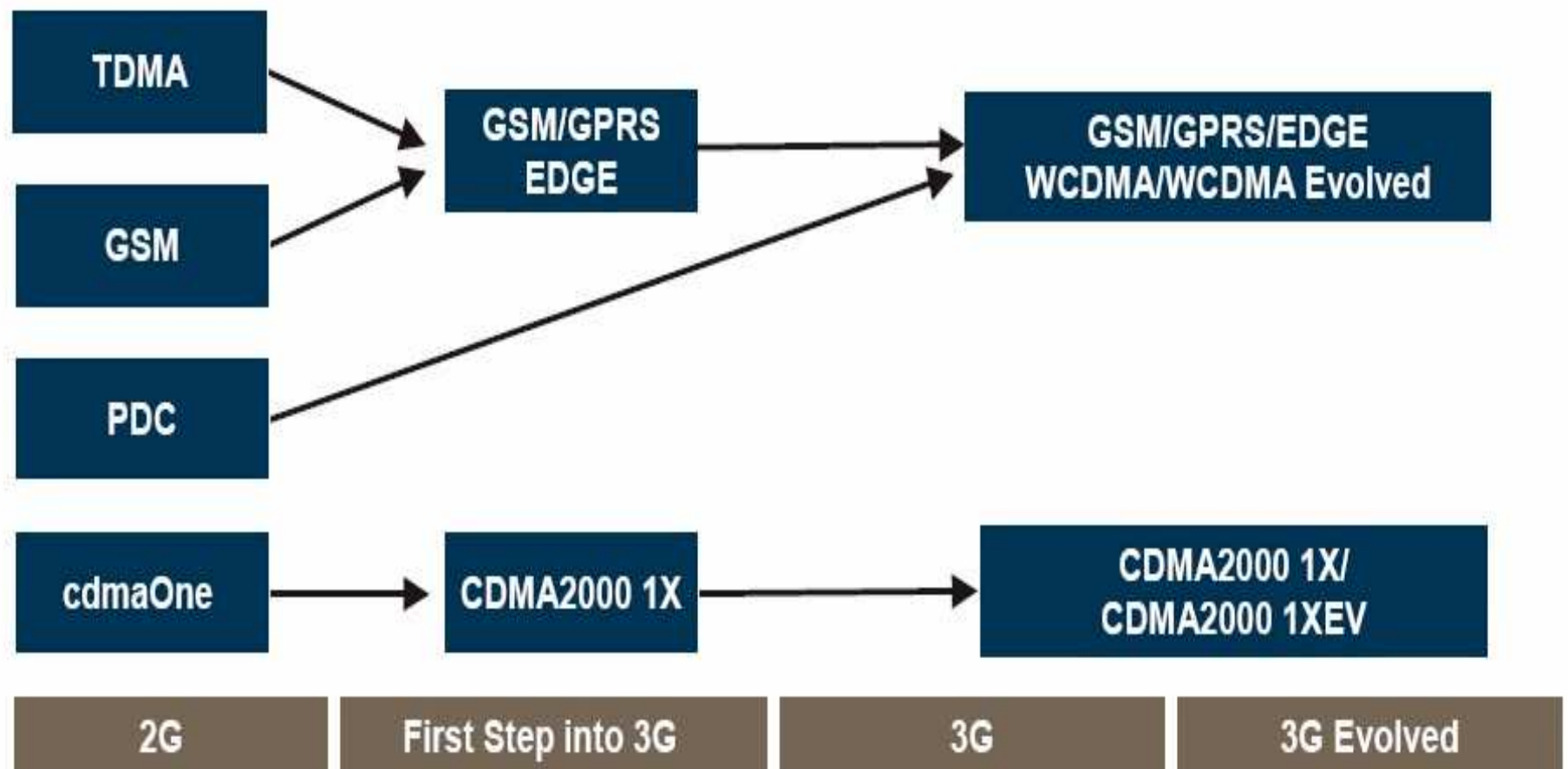
- Access
  - High speed
  - Multi-services
- Core network
  - All IP infrastructure
    - IMS core to replace existing mobile service core
  - Large variety of services
    - MMS, Video Chat, Mobile TV, Digital Video Broadcasting (DVB), Voice, Data, Streaming services
- Ultimate goal
  - Single device, anytime, anywhere and anything

# Wireless Network Evolution

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- An ambitious target
  - Lead and dominate next generation network (NGN)
- Starting from Fix mobile convergence (FMC)
  - Home/personal base station (Femto) – the cut in point

# Wireless Network Evolution



# The Reality

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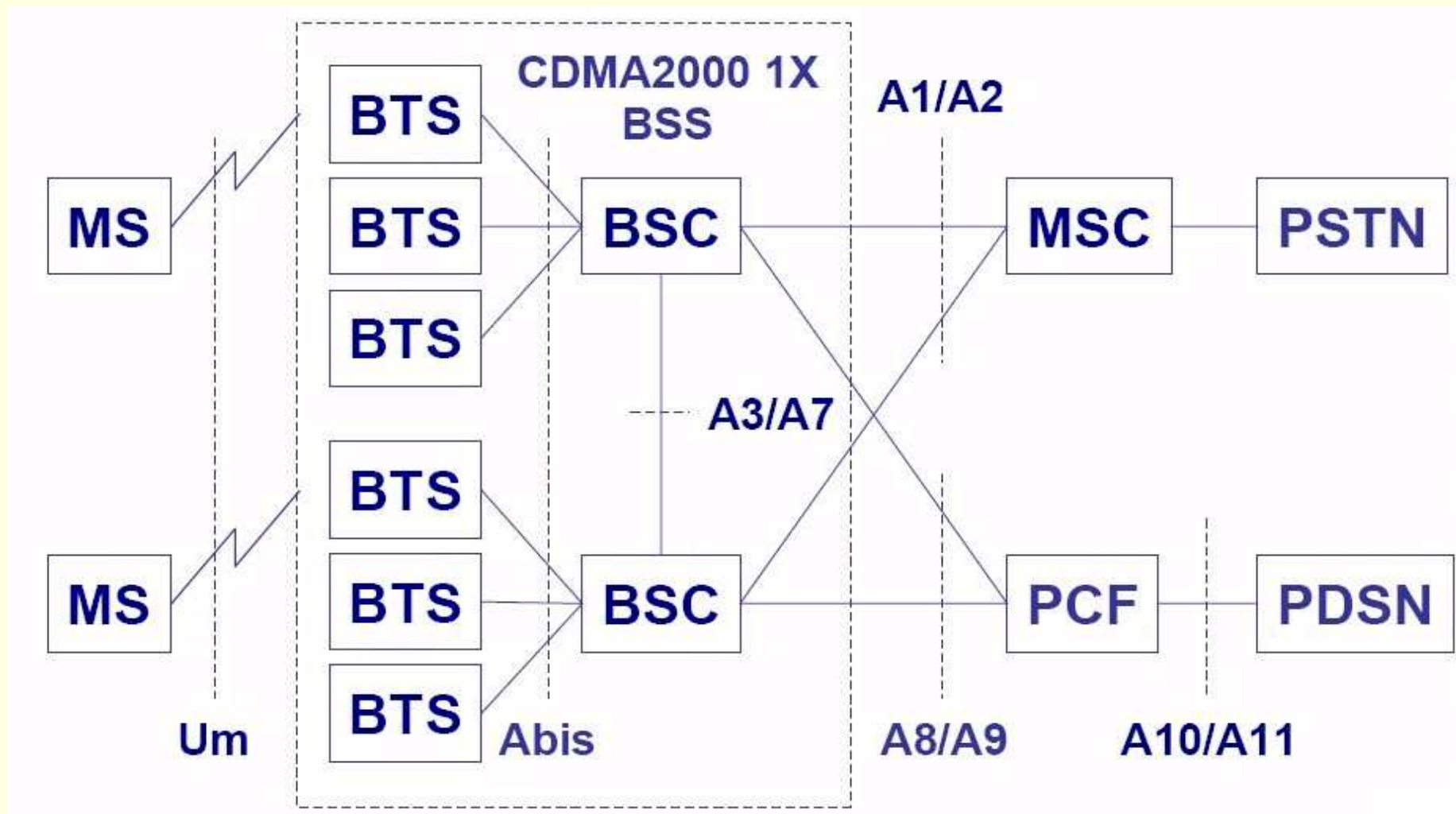
- Existing network infrastructure
  - Large investment
  - Lots of reusable functional entities
  - Mature service platforms
- Existing subscribers
  - Long ramp up curve to adopt new services
  - Satisfied with the current services
  - Existing access terminals
- For a certain long period of time
  - Existing and new network infrastructures will co-exist
  - Services provided in existing network infrastructure need to be accessible to new comers

# The Needs

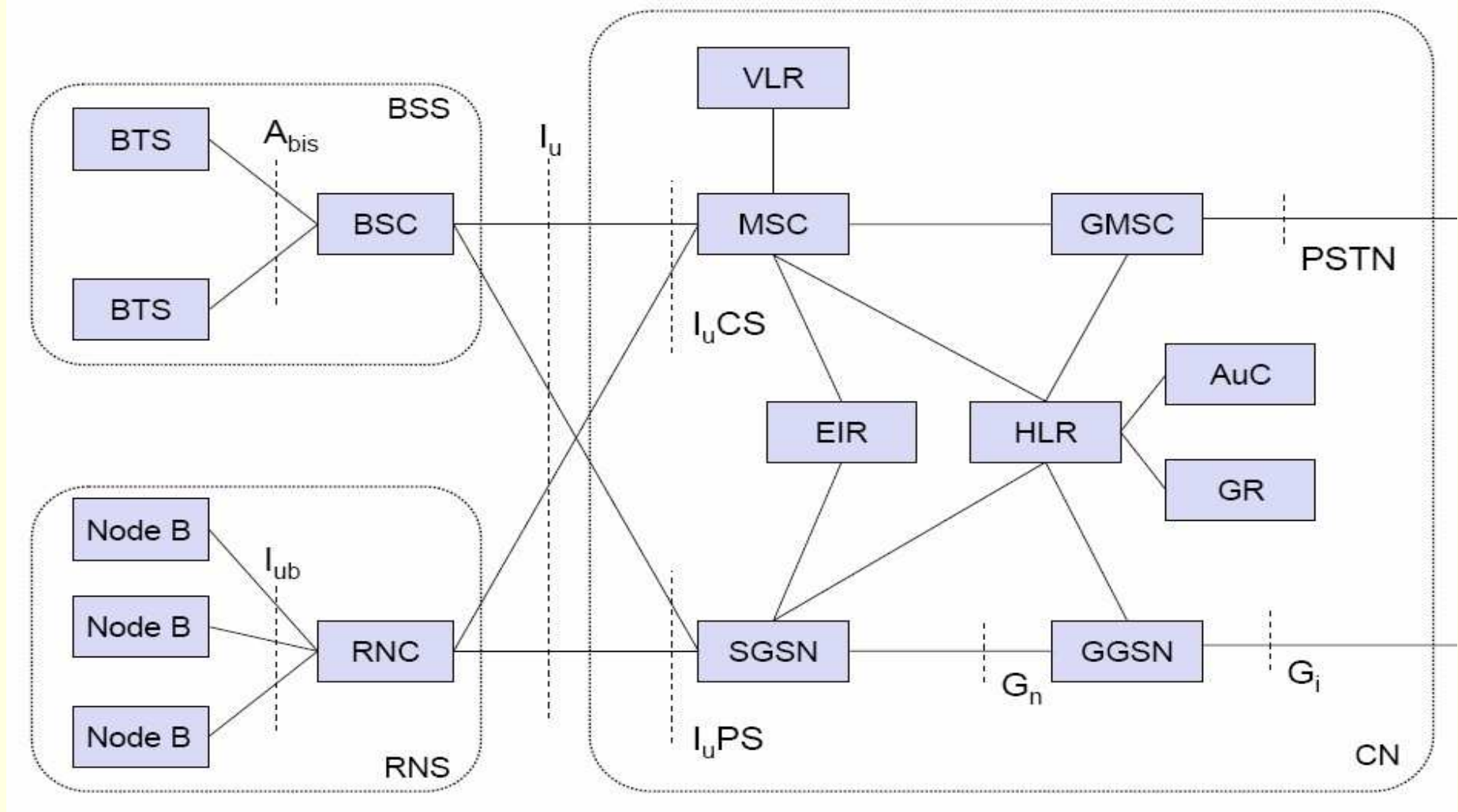
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- Convergence functions that can bridge the new and existing network infrastructures
- Not a simple adaptor
  - Long term value in new network infrastructure
  - Unique and essential functionalities

# Mobile Network Status -- CDMA

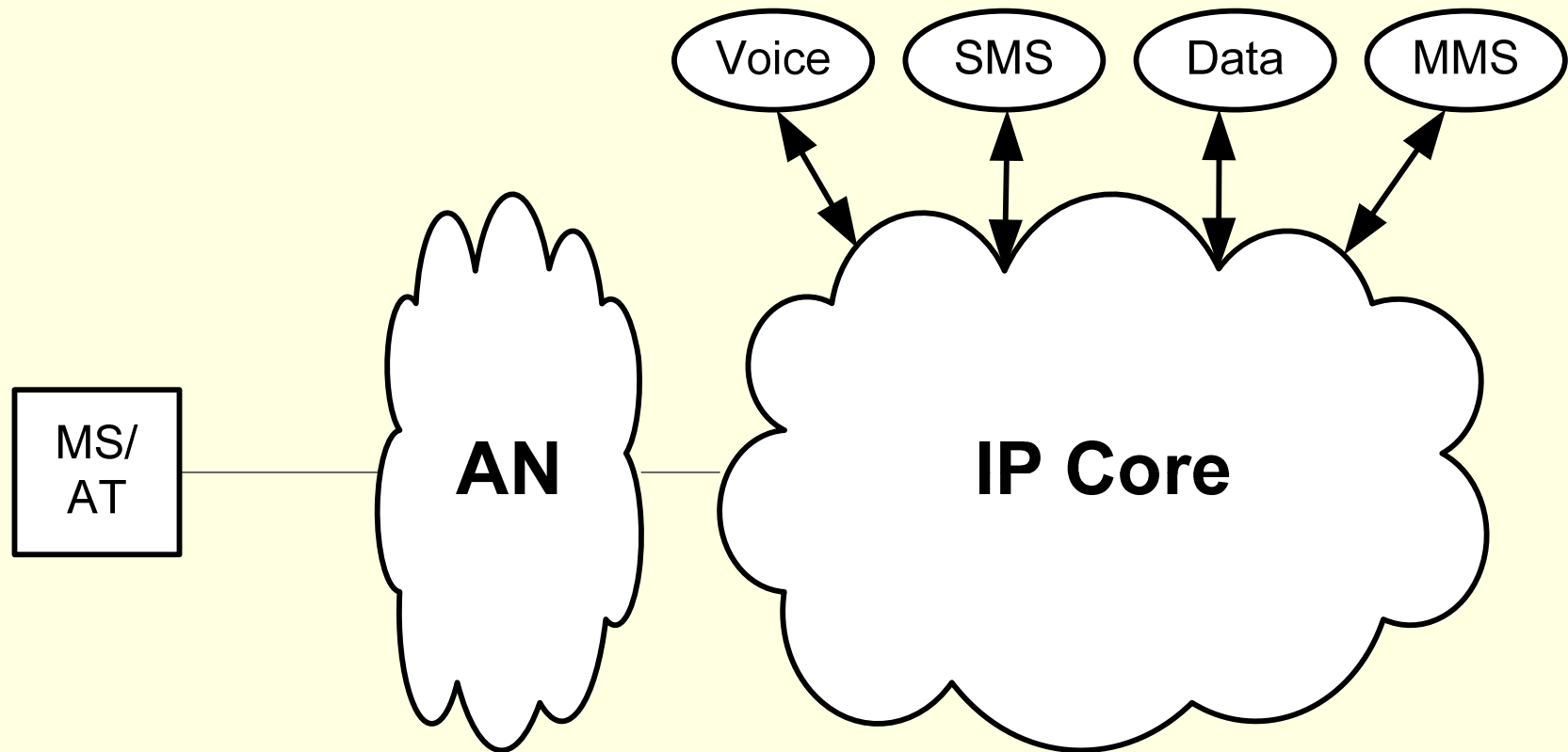


# Mobile Network Status -- GSM





# Common Future: All IP Core

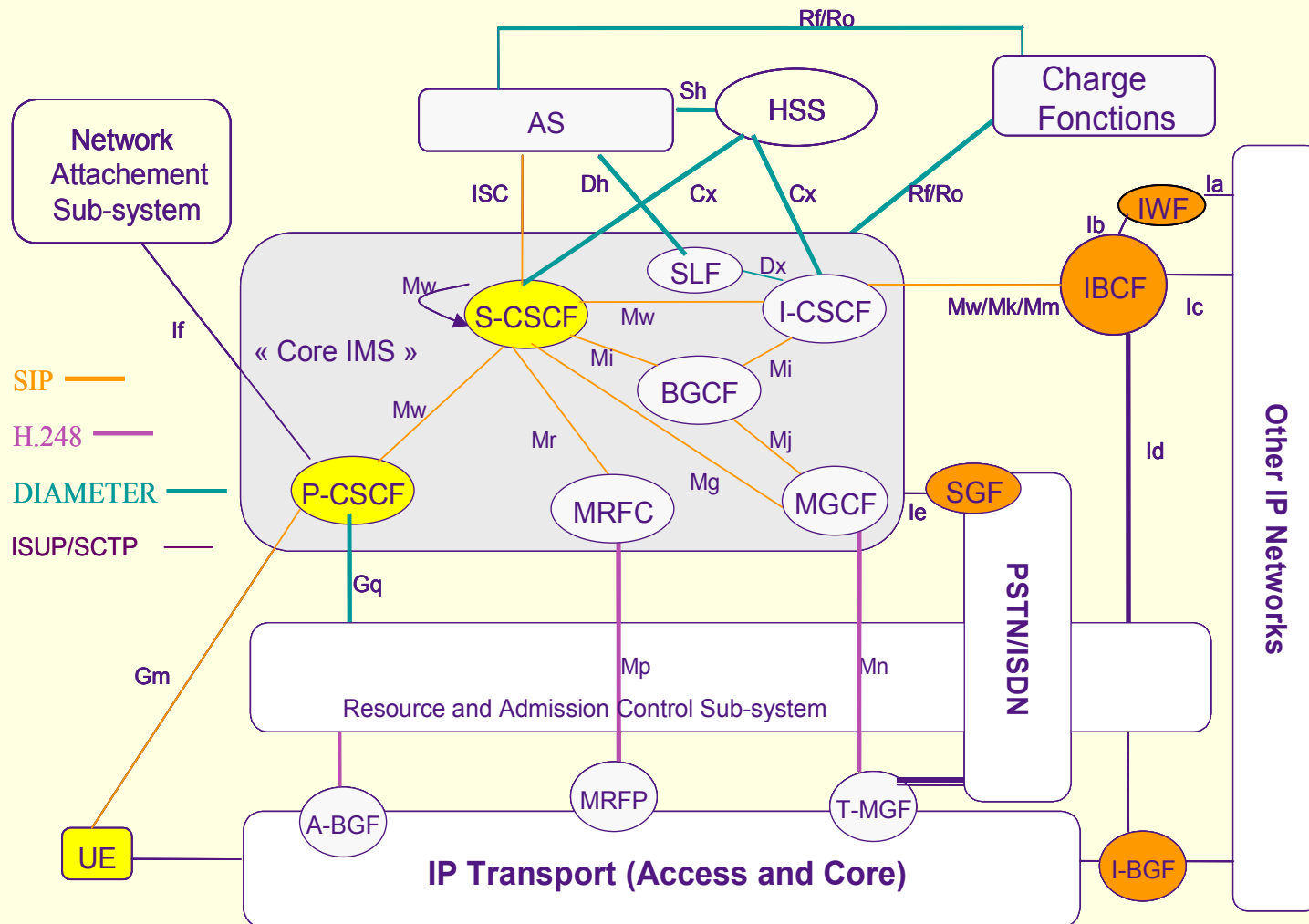


# IMS Core: The Service Control Plane

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- While migrating to AIP core ...
  - IP Subsystem (IMS) core serves all signaling and service control purposes
    - Call/session signaling
    - Mobility management
    - Registration/Location services
    - AAA services
    - Multi-media service delivery
    - Media path control
    - Interworking
    - Breakout control
    - Service feature control

# IMS Core: Key Components



# IMS Core: Major Protocols

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- SIP Signaling
- H.248 Media Control
- DIAMETER: AAA, Service/Location management

# Existing Reusable Network Elements

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- Database elements
  - HLR/VLR → HSS
  - EIR
  - Subscriber Profile
  - Network Policy Rules
- MSC
  - Backward compatibility
  - Handin/handout control
- Protocols
  - MAP / ANSI.41

# A New Element: Convergence Server

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- Bridging IMS core and traditional mobile core
  - Signaling interworking SIP  $\leftrightarrow$  MAP / ANSI.41
  - Service interworking: call/session, SMS etc.
  - Mobility interworking: IMS and mobile cores
  - Mobility management in IMS core
  - Location management in IMS core
  - Feature service enabling in IMS core
  - Access control in IMS core (AAA)

# Position of Convergence Server

## HLR – Home Location Registry:

- ✓ SS7 GSM MAP/D (VLR to HLR)

## SMSC – Short Message Service IW/Gateway MSC

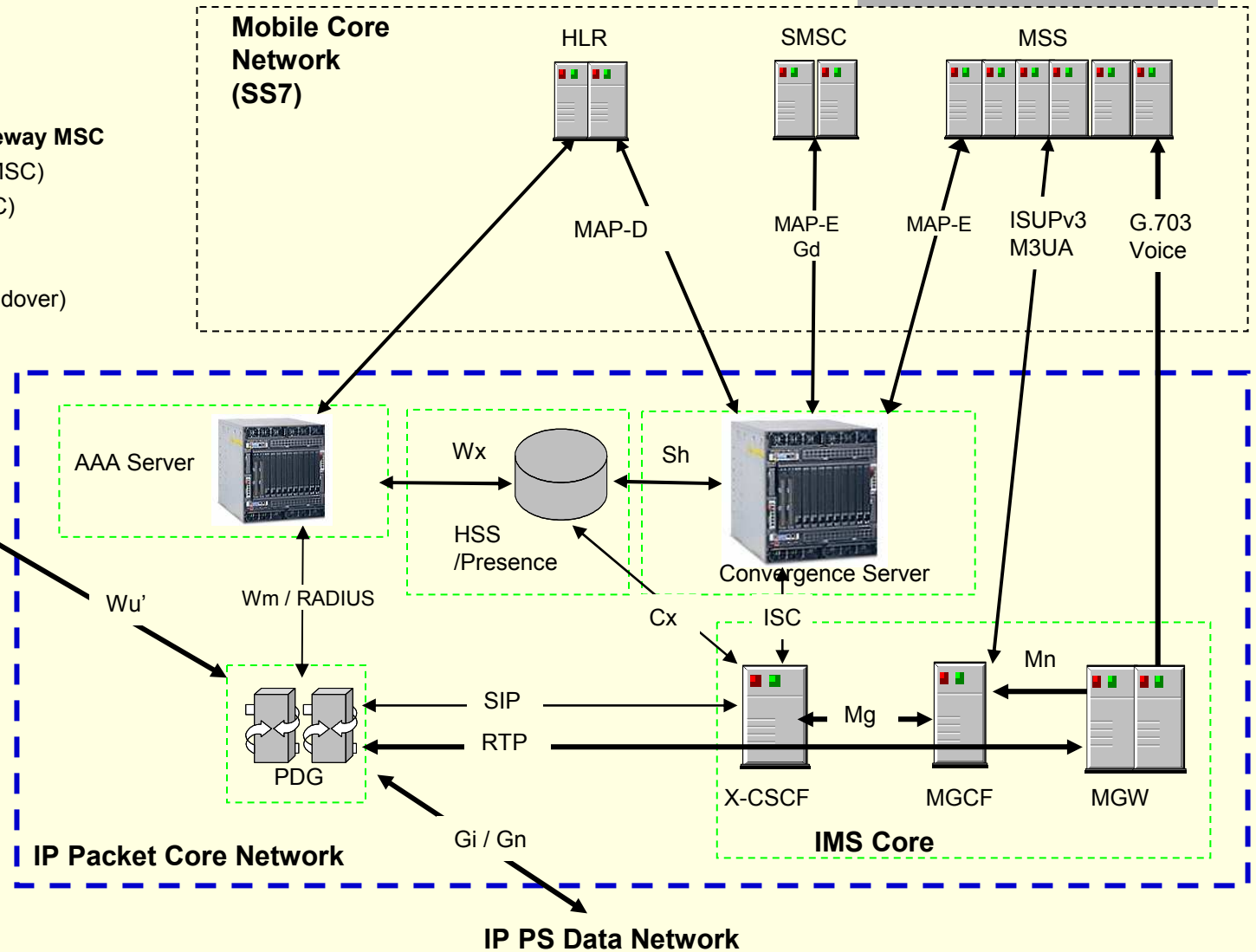
- ✓ SS7 MAP/Gd interface (SGSN to SMSC)
- ✓ SS7 MAP/E interface (MSC to SMSC)

## MSS – Media Switching Centers

- ✓ SS7 GSM MAP/E (MSC to MSC handover)

## PDG – Packet Data Gateway

- ✓ Wu – IPsec Tunnel (AP to PDG)
- ✓ Wm – RADIUS/Diameter AAA (PDG to AAA)
- ✓ AAA Server
- ✓ Wx Diameter (AAA to HSS)
- ✓ Convergence Server
- ✓ Sh – Diameter (Conv Svr to HSS)
- ✓ ISC – SIP interface (Conv Svr to S-CSCF)



# An Immediate Application: Femto Access control

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- Femto cell
  - Home/personal base station
  - Same handset air interface
  - Backhaul wireless traffic via home broadband (cable/DSL)
  - Targeted issues
    - Coverage
    - Air link congestion
  - Benefit to subscriber
    - Low rate plan
    - Multi-media service to home
    - Single device for everything



# Femto Architectural Approaches

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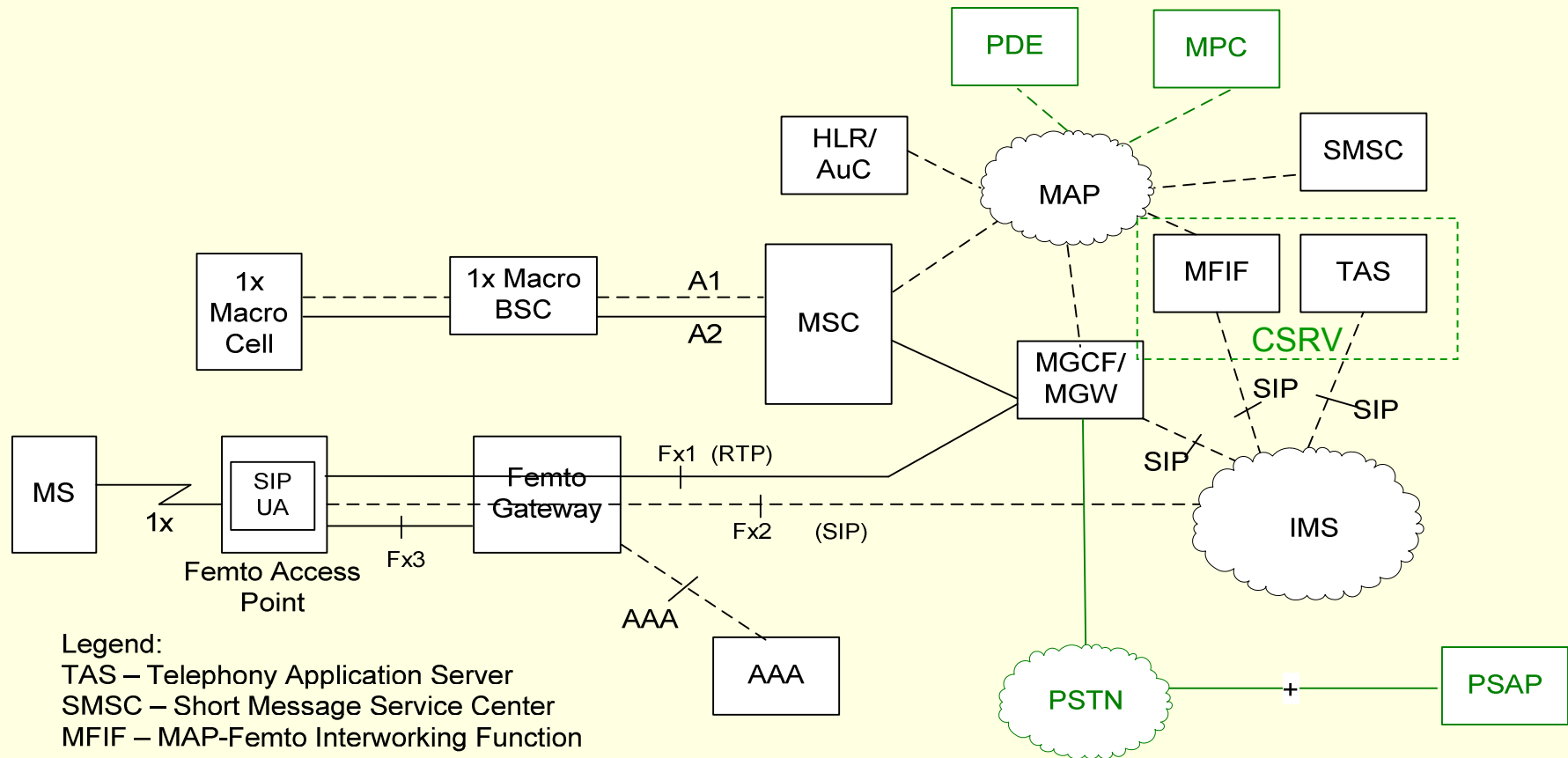
## ■ 3GPP2

- SIP/IMS base solution
- Future facing solution

## ■ 3GPP

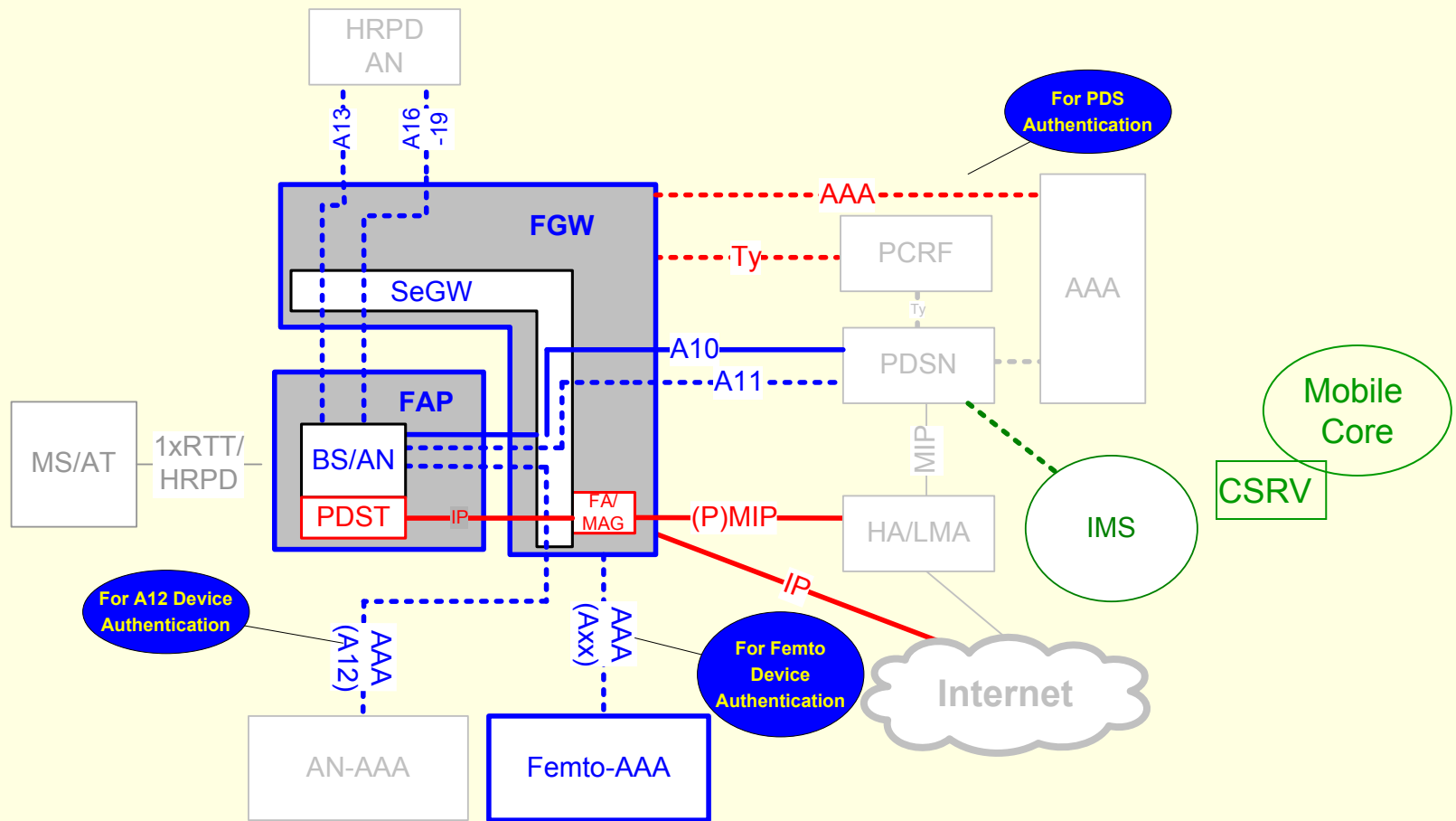
- Existing protocols over IP Sec tunnel
- Leverage existing investment
- Will move to IMS core based solution eventually
- Temporary solution for IMS: Iu/SIP adapter

# 3GPP2 Identified Convergence Server Element (1xRTT)

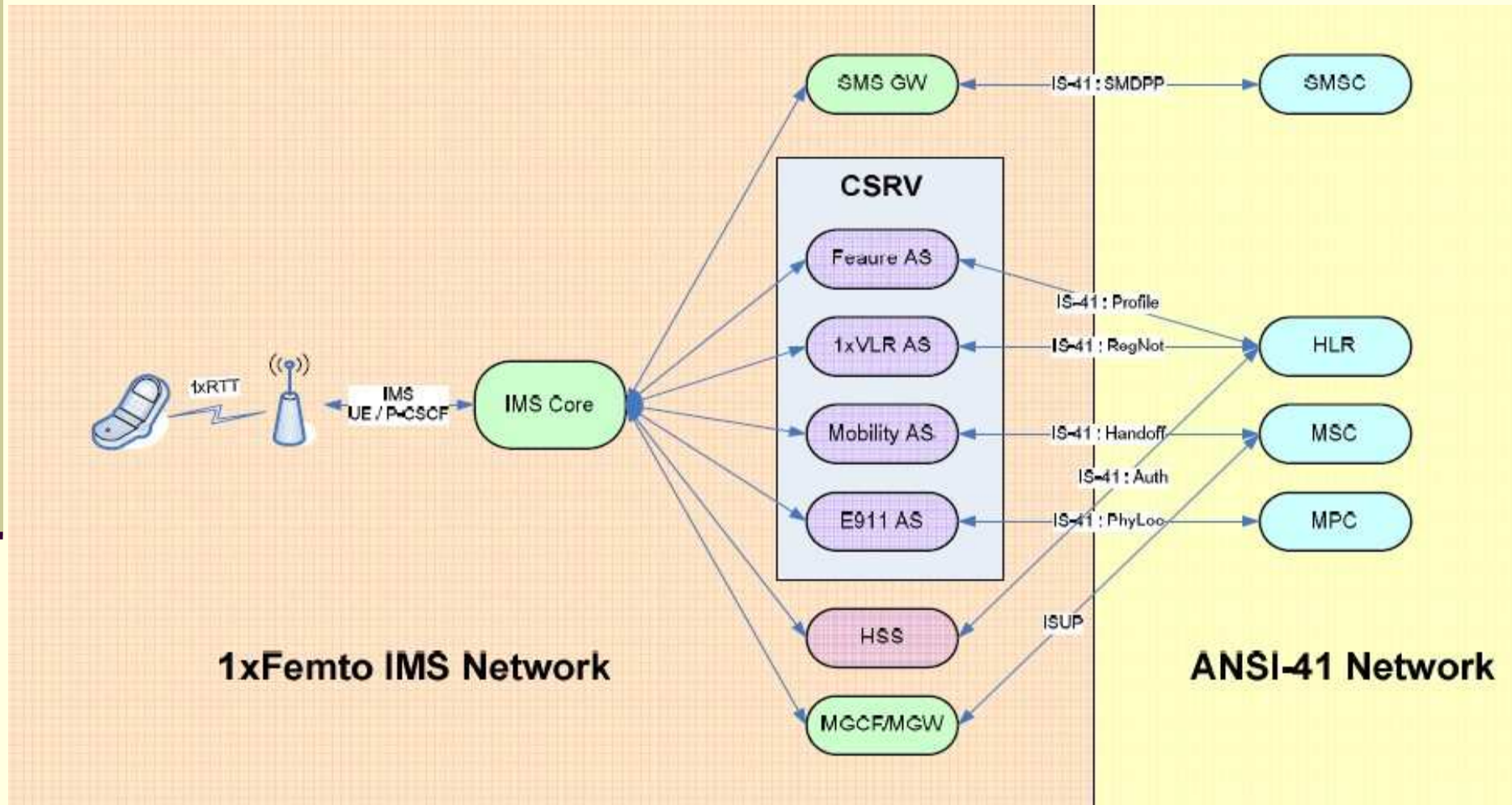


- Legend:
- TAS – Telephony Application Server
  - SMSC – Short Message Service Center
  - MFIF – MAP-Femto Interworking Function
  - PSTN – Public/Private Switched Telephone Network
  - PDE – Position Determining Entity
  - MPC – Mobile Positioning Center
  - PSAP – Public Safety Answering Point

# 3GPP2 Identified Convergence Server Element (HRPD 1x Packet)



# Convergence Server: Major Functions



# Convergence Server: Major functions

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- Acting as a VLR, performs SIP subscriber registration and location tracking
- Supports IMS-MSC call interworking
- Supports IMS-MSC messaging interworking
- Performs IMS supplementary service control and interworking with mobile core
- Provides SLF function in IMS core
- Anchors IMS calls for handoff support
- Performs IMS – MSC roaming services
- Provides IMS subscriber AAA functions
- Supports OSA, WIN, CAMEL etc. service building logics

# Convergence Server: Potential expansions

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- Supports full CSCF functions
- Support SS7 signaling gateway functions
- Supporting MEGACO functions and acting as eMSC

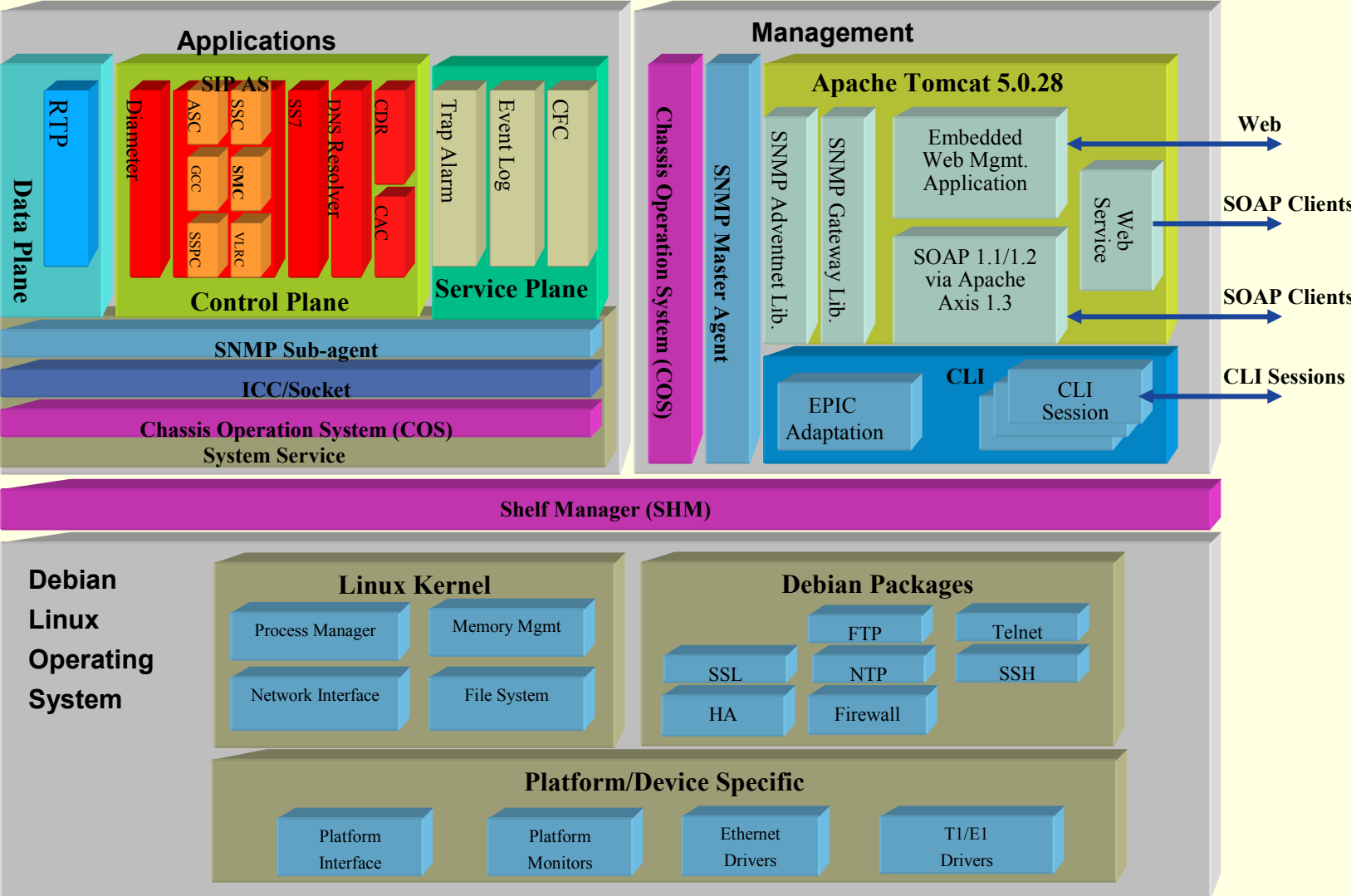
# Convergence Server: HW Architecture

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- No customized hardware needs
- Pure software solutions, works on
  - standard ATCA chassis and general server modules
  - Standard Blade Server system and server modules

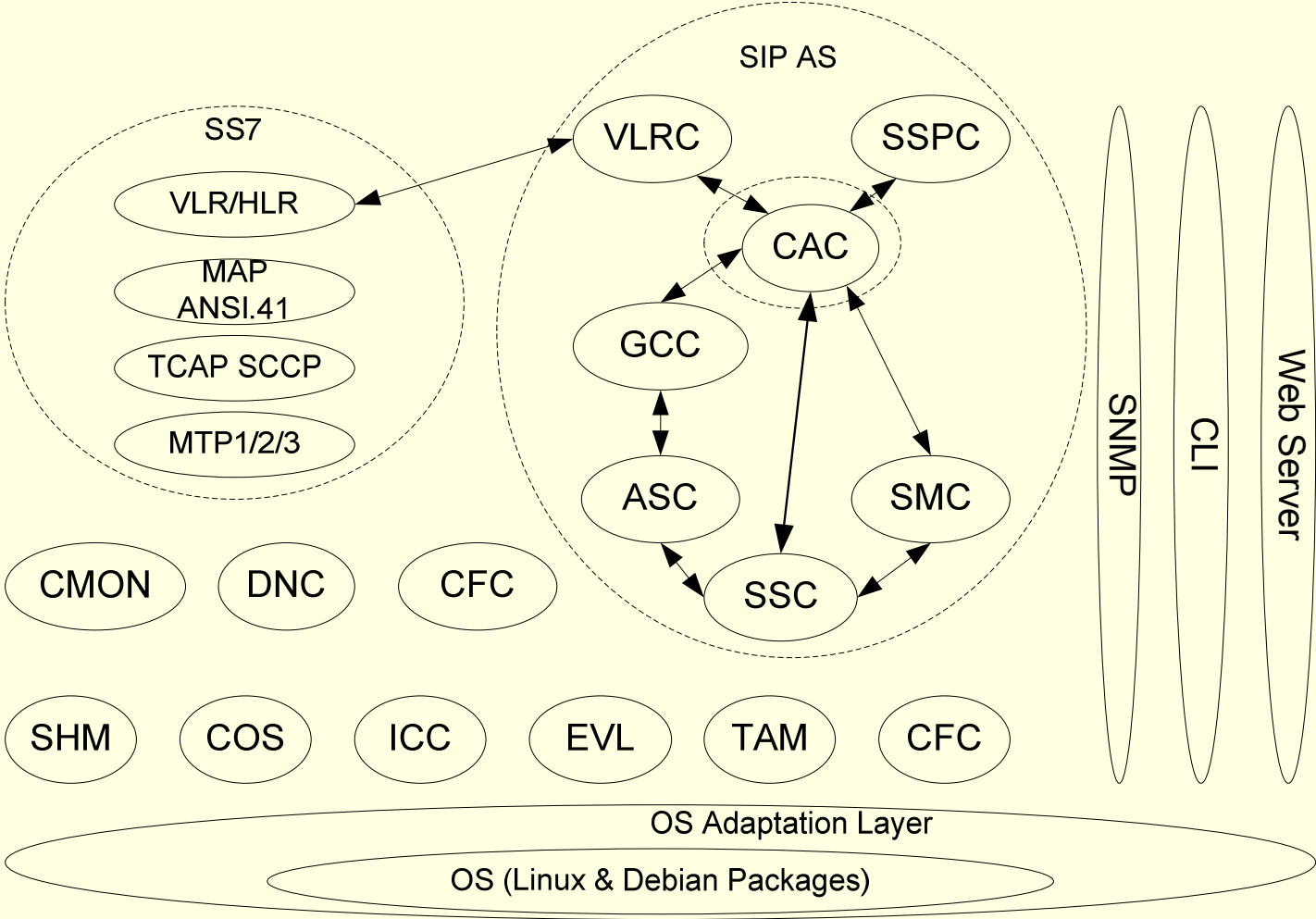


# Convergence Server: SW Architecture





# Convergence Server: SW Architecture

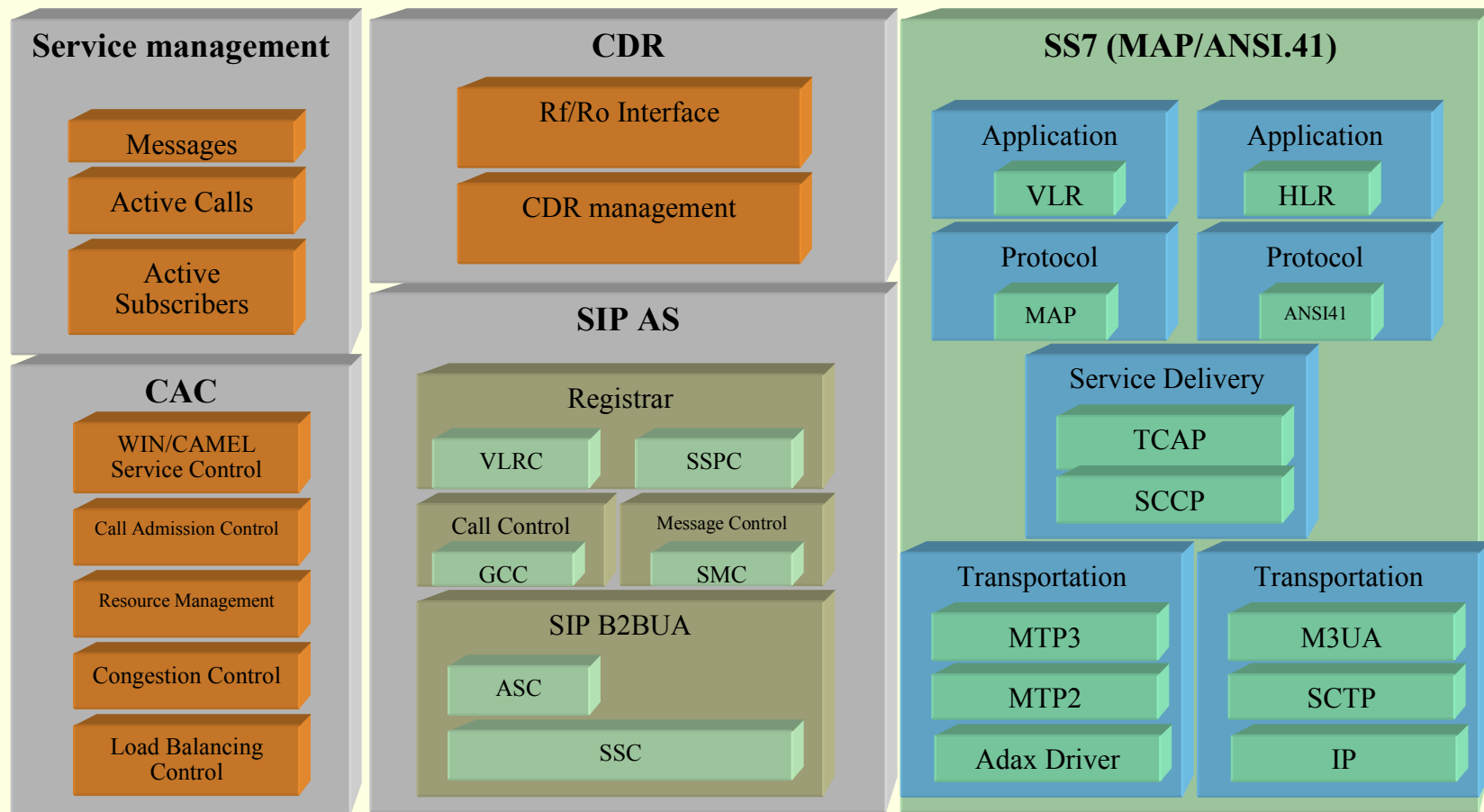


# Convergence Server: Service Plane

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- OS Adaptation Layer (OSA)
- Shelf Manager (SHM)
- Chassis Operation System (COS)
- Inter Component Communications (ICC)
- Event Log Service (EVS)
- Trap and Alarm Management (TAM)
- Configuration File Control (CFC)

# Convergence Server: Control Plane



# Convergence Server: Control Plane

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- Signaling Stack Control (SSC)
  - SIP SSC, SS7 SSC
- Access Signaling Control (ASC)
  - ASCi & ASCe
- General Call Control (GCC)
- Call Admission Control (CAC)
- Short Message Control (SMC)
- Visitor Location Registrar Control (VLRC)
- Subscriber Service proxy Control (SSPC)
- Call Detail Record (CDR)
- Domain Name Control (DNC)
- Other Misc. Component (e.g. Service management)

# Convergence Server: Management Plane

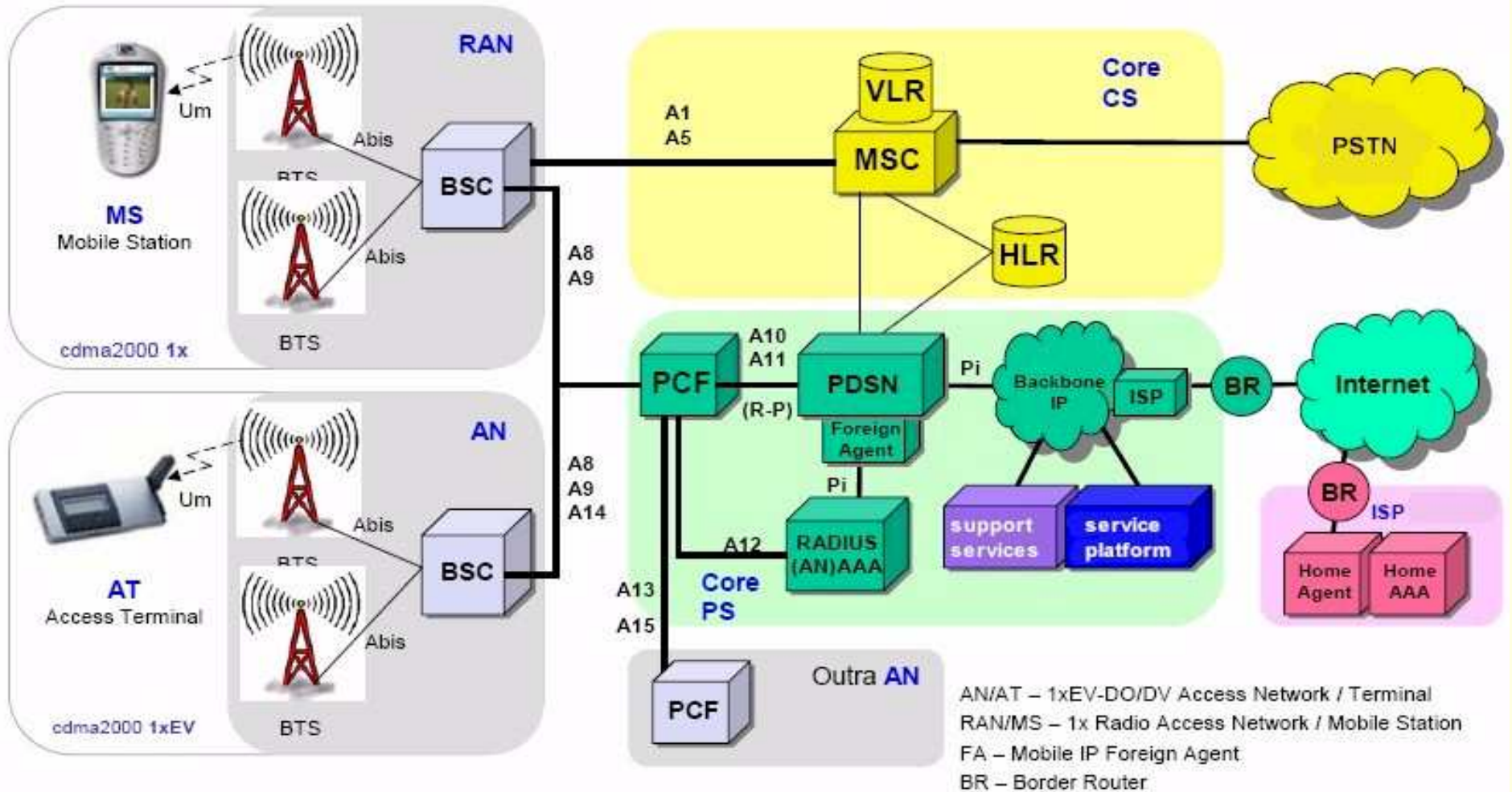
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- MIB/SNMP
- CLI
- SOAP
- Web
- Generic Management Framework (GMF)

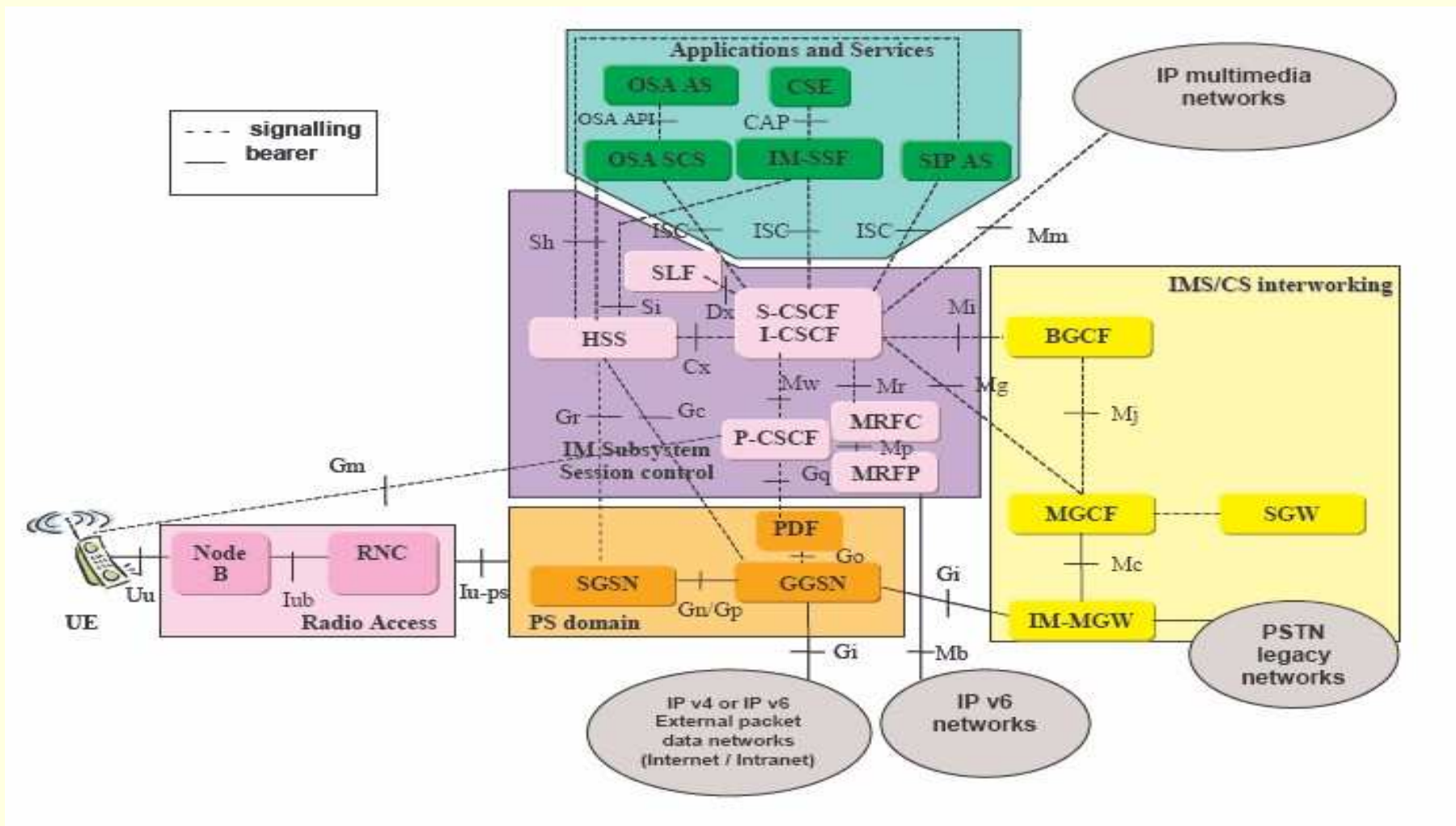


# Backup Slides

# Mobile Network Status -- CDMA

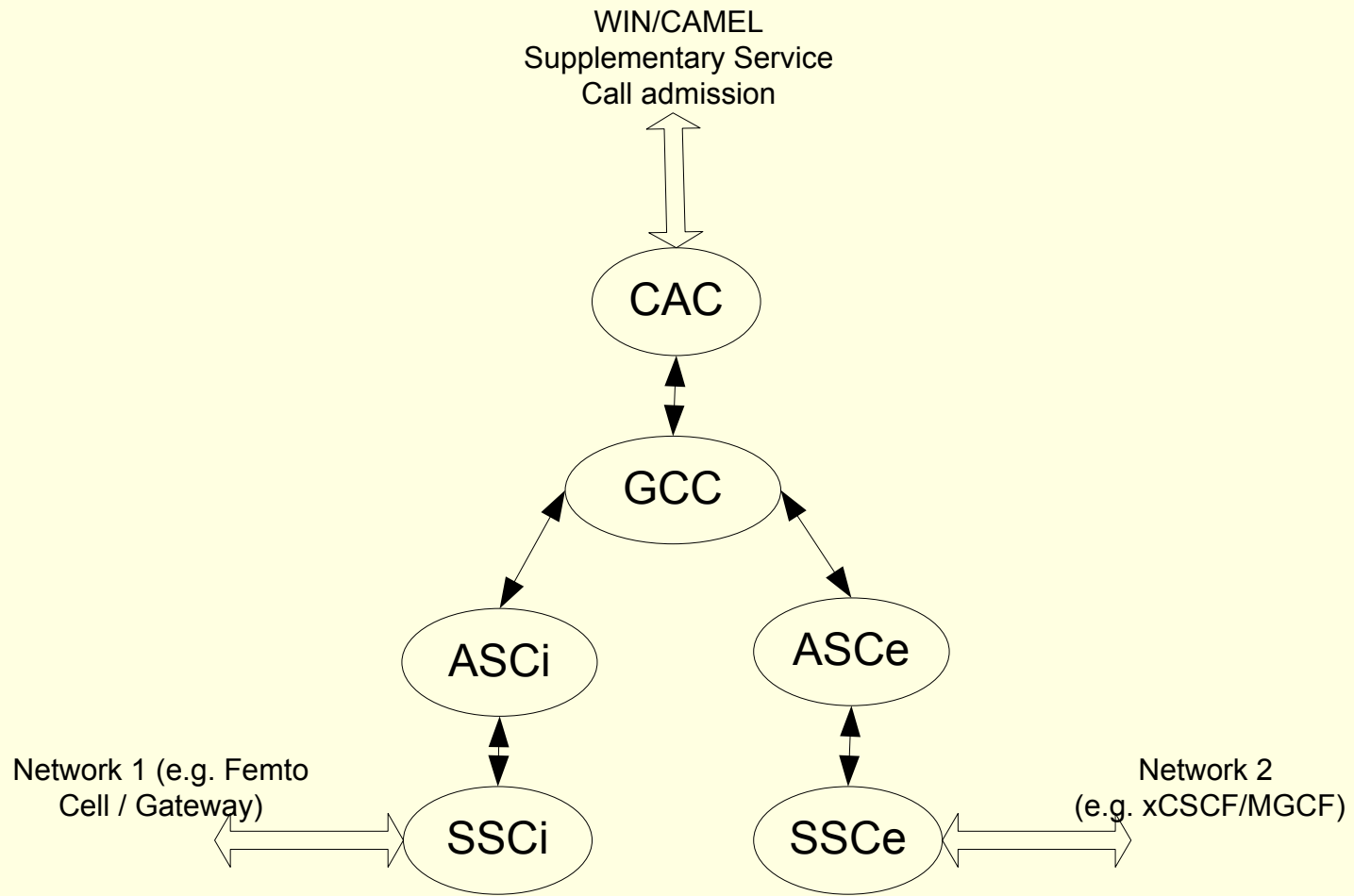


# IMS Core

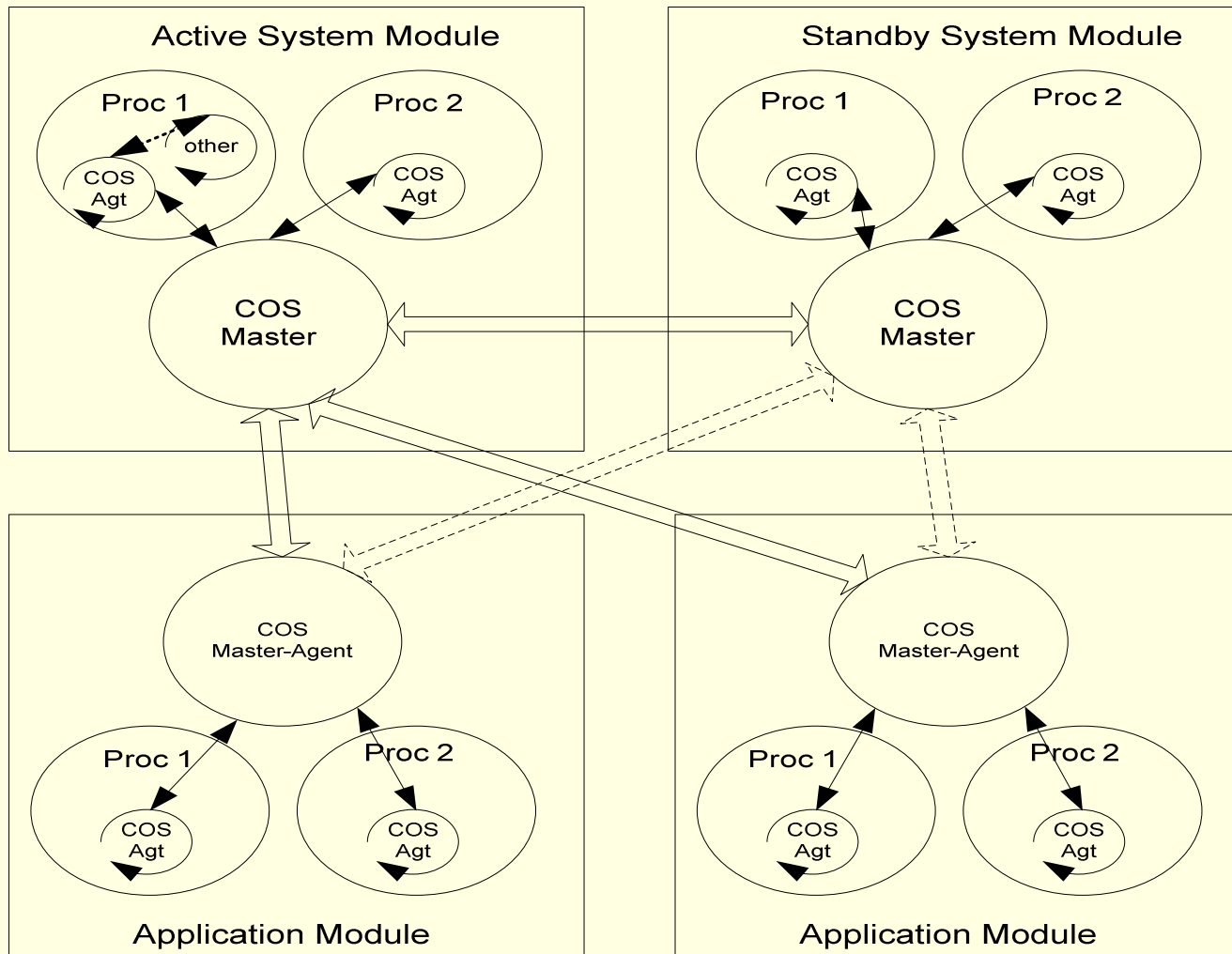




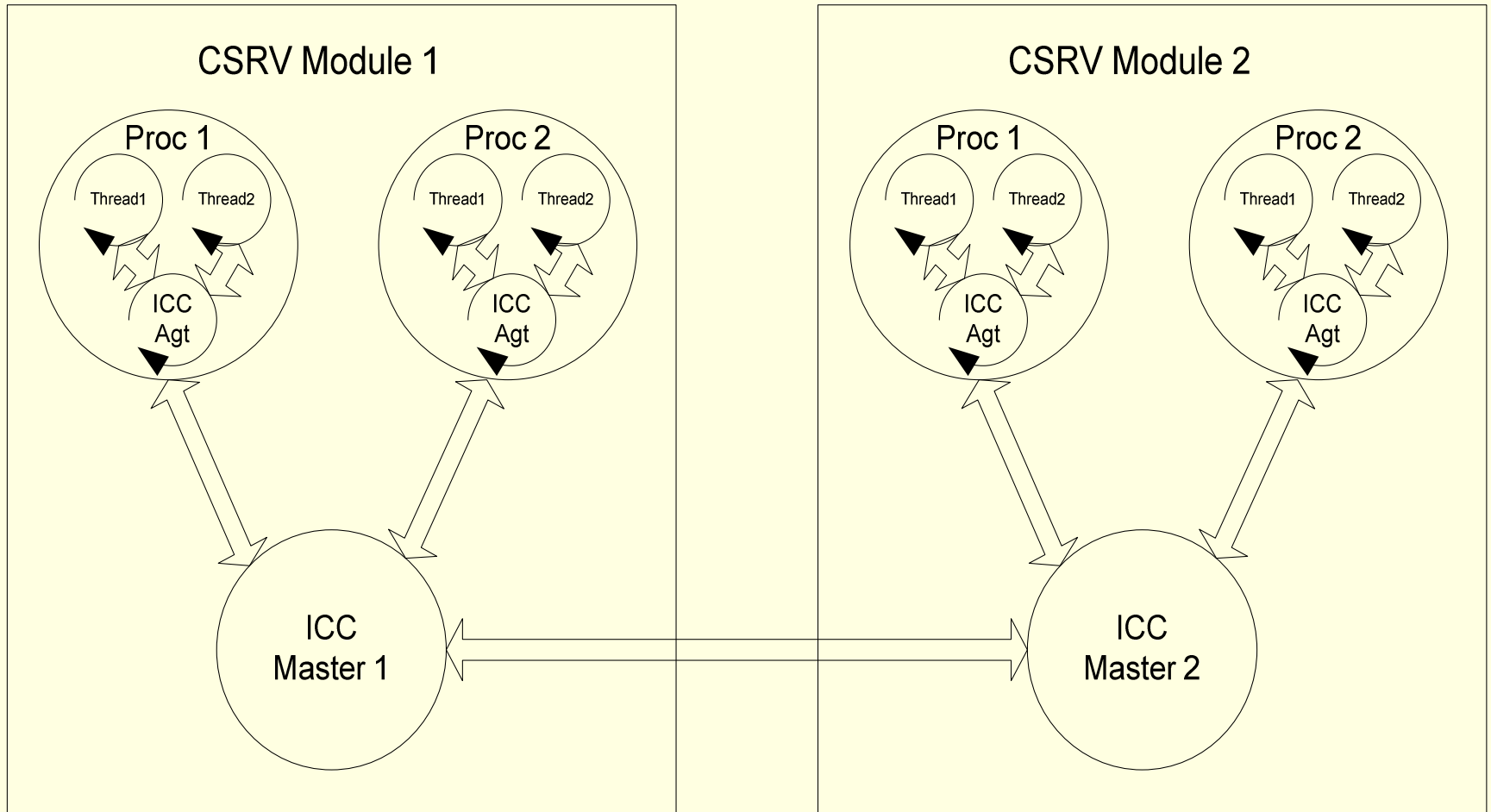
# Convergence Server: Call Control



# Convergence Server: COS

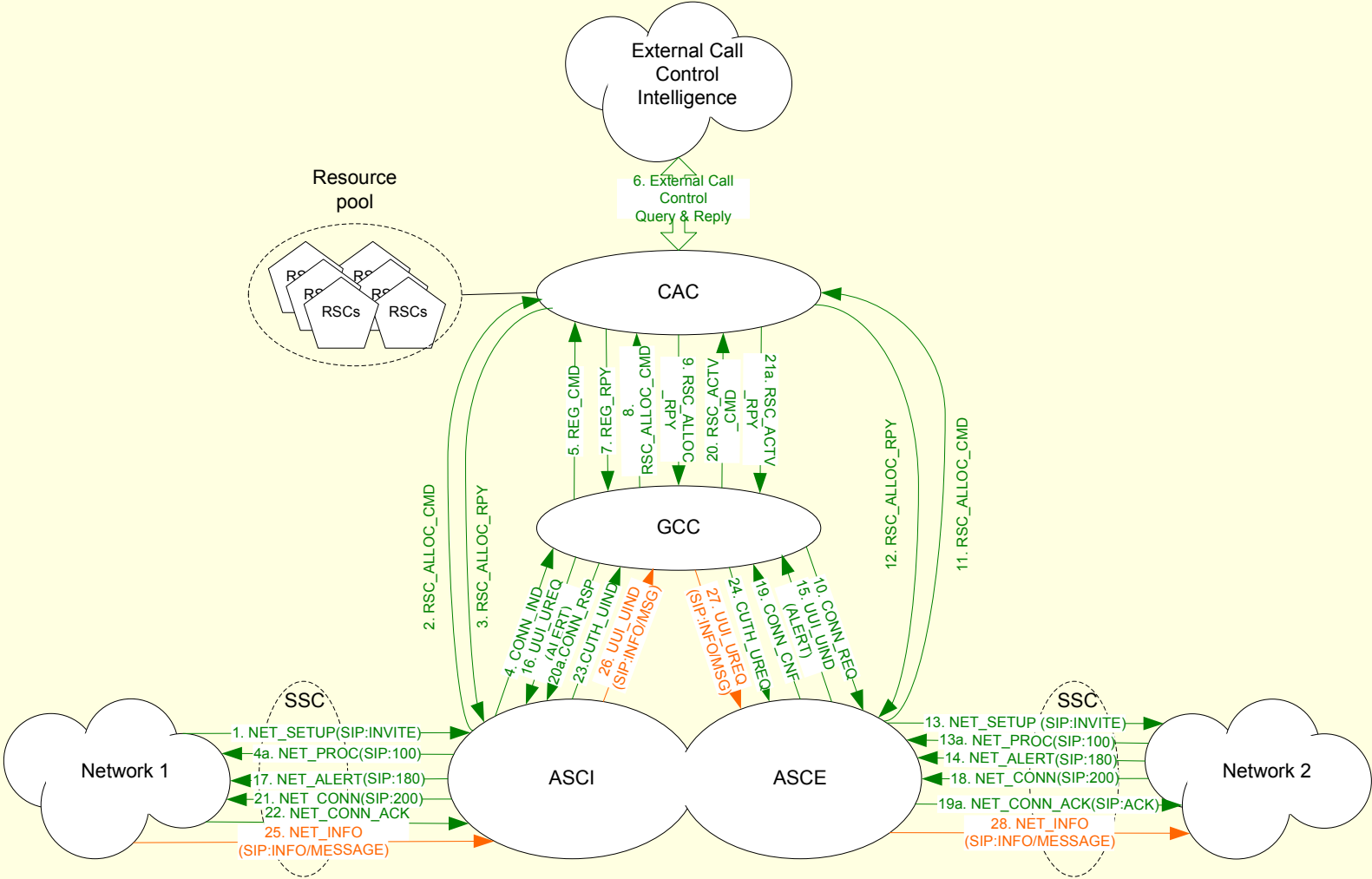


# Convergence Server: ICC

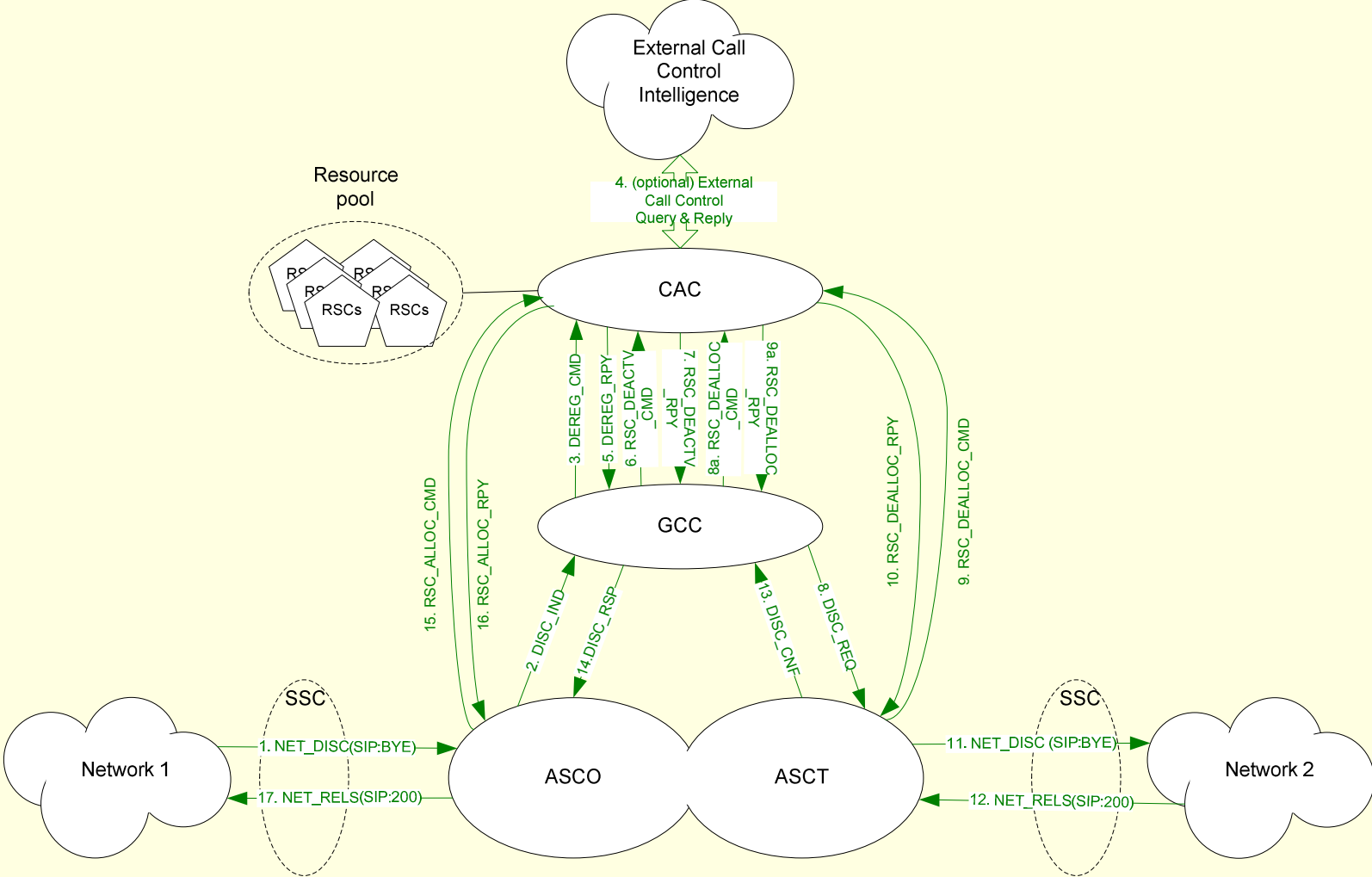




# Convergence Server: Call Setup

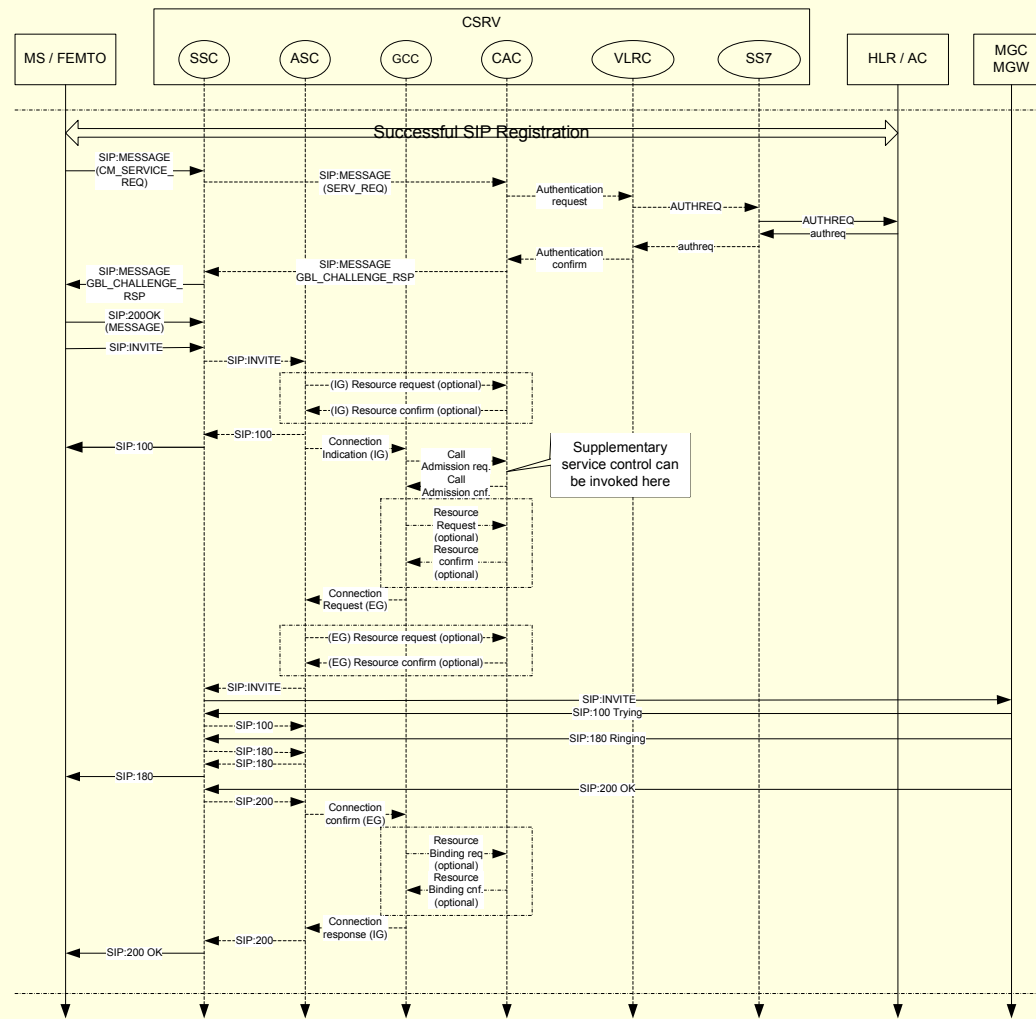


# Convergence Server: Call Teardown



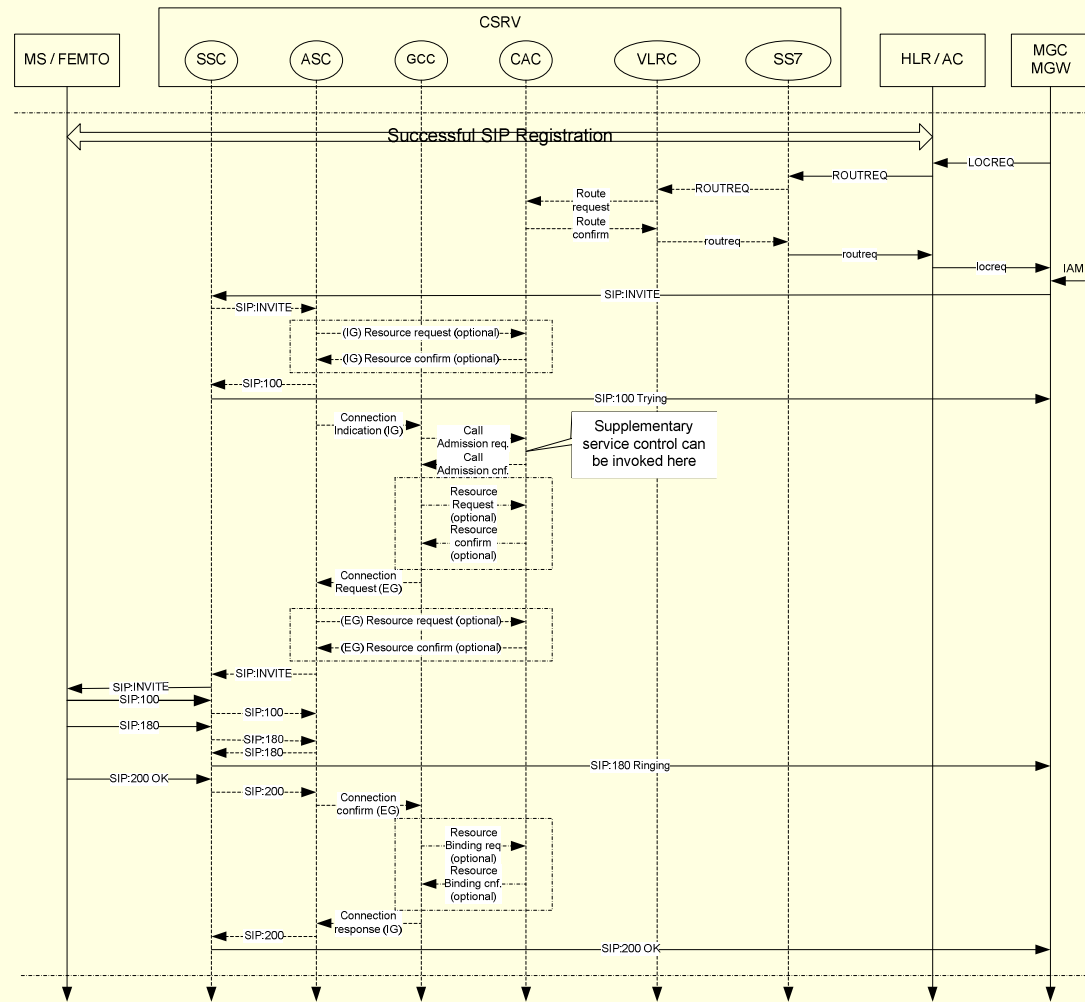


# Convergence Server: Call Originating

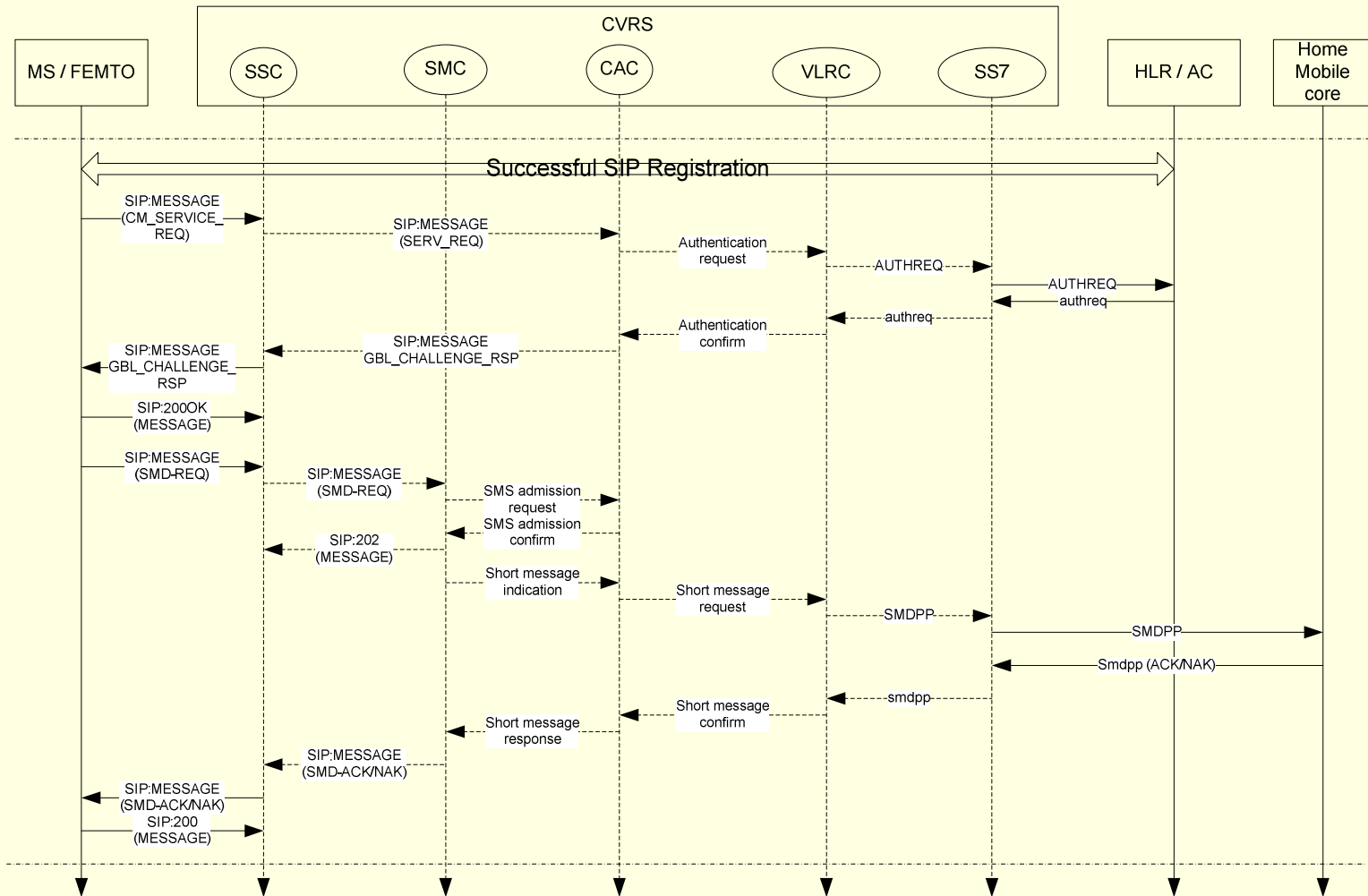




# Convergence Server: Call Terminating



# Convergence Server: SMS Originating



# Convergence Server: SMS Terminating

