

# GPRS/UMTS

IAB Workshop

February 29 - March 2, 2000

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Nokia

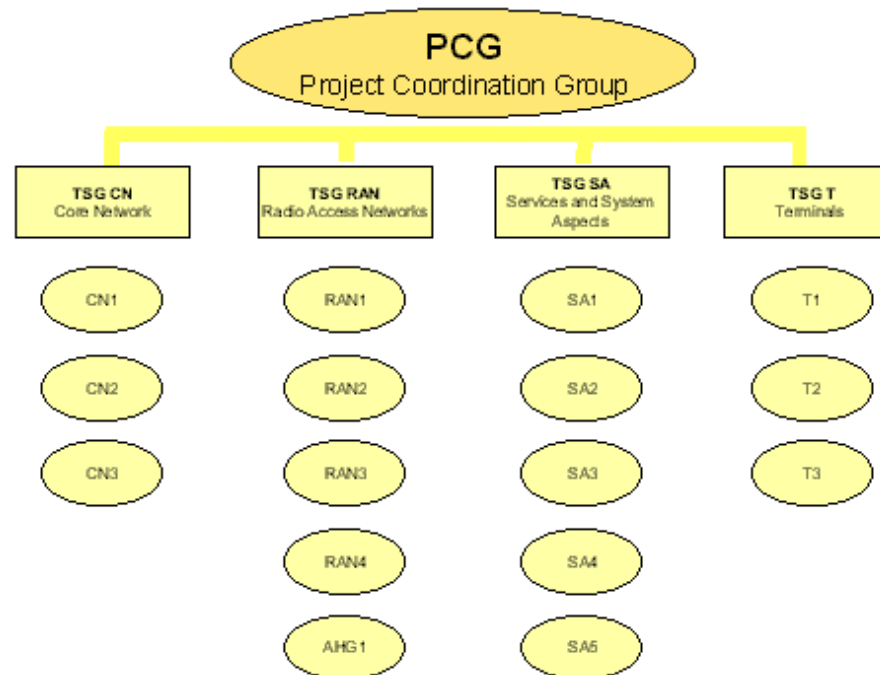
# Outline

- Introduction to 3GPP
- GPRS/UMTS Architecture
  - GPRS/UMTS Introduction
    - GPRS Architecture
    - UMTS Packet Architecture
  - GPRS/UMTS Protocols
- Combined GSM and M-IP mobility handling in UMTS IP CN
  - Introduction
  - Step 1
  - Step 2
  - Step 3
- Overview to UMTS Release 2000 All-IP Option

# Introduction to 3GPP (1/5)

- Participation
  - Organizational Partners
    - ARIB
    - CWTS
    - ETSI
    - T1
    - TTA
    - TTC
  - Market Representation Partners
    - Global Mobile Suppliers Association - GSA
    - GSM Association
    - UMTS Forum
    - Universal Wireless Communications Consortium (UWCC)
    - IPv6 Forum
  - Individual Members
    - Companies
  - Observers, Guests

# Introduction to 3GPP (2/5)



# Introduction to 3GPP (3/5)

- TSG CN (Core Network)
  - WG1 (MM/CC/SM) (Iu)
  - WG2 (MAP/GTP/CAMEL)
  - WG3 (Interworking with external networks)
- TSG RAN
  - WG1 (Radio Layer 1)
  - WG2 (Radio Layer 2 and Radio Layer 3 RR)
  - WG3 (Iub, Iur, Iu, UTRAN O&M requirements)
  - WG4 (R. performance, protocol aspects)
  - AHG1 (Ad-hoc group on ITU (internal) co-ordination)
- TSG SA
  - WG1 (Services)
  - WG2 (Architecture)
  - WG3 (Security)
  - WG4 (Codec)
  - WG5 (Telecom Management)

# Introduction to 3GPP (4/5)

- TSG T
  - WG1 (Mobile Terminal Conformance testing)
  - WG2 (Terminal Services & Capabilities)
  - WG3 (USIM)

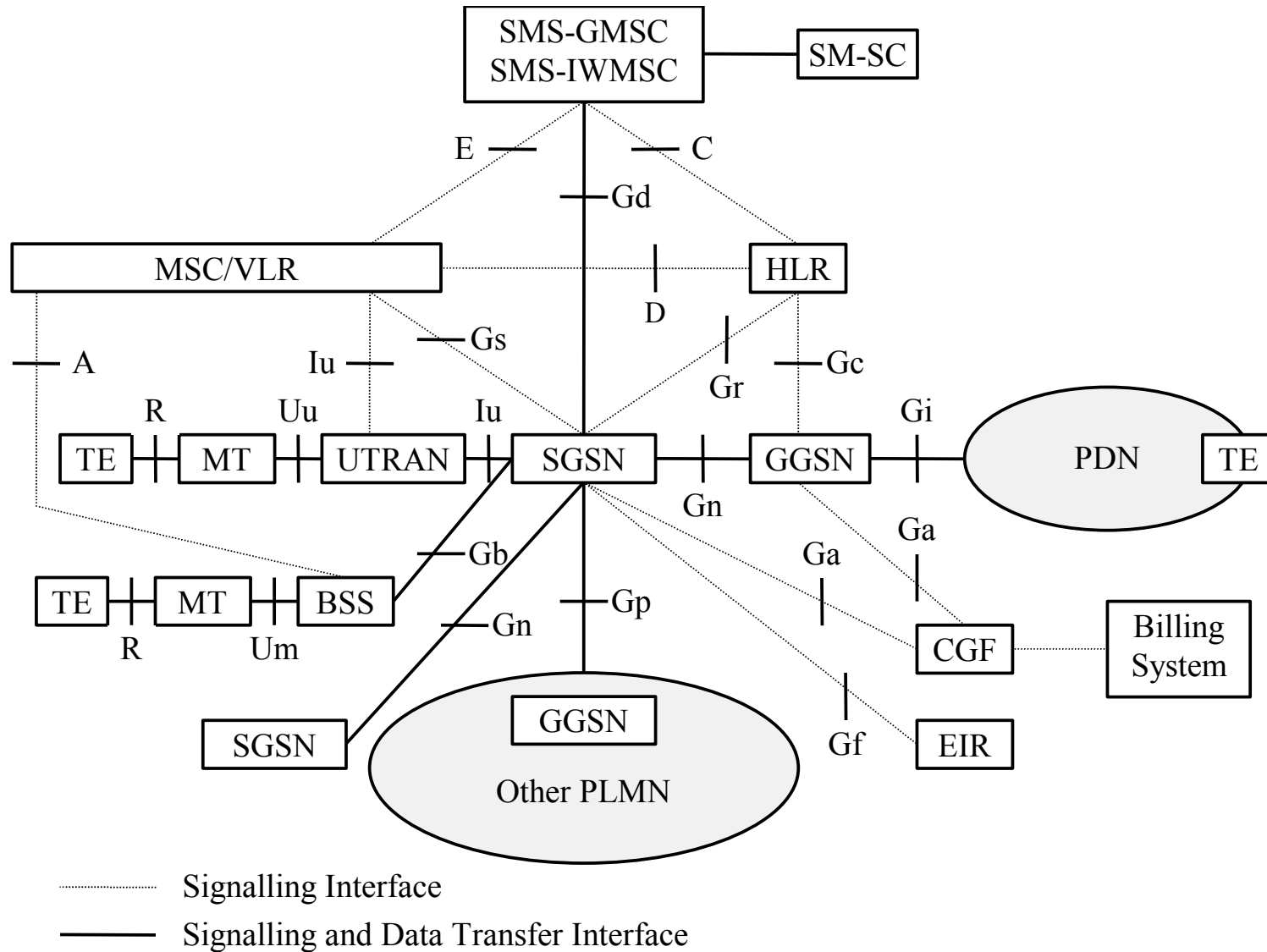
# Introduction to 3GPP (5/5)

- Technical Work Done in WGs
- Meetings
  - As Necessary
  - Decision through Consensus or Voting
  - Most of the Work Done in Meetings
- Deliverables
  - Technical Reports/Technical Specifications
  - Approval by Consensus or Vote
  - Change Control When Sufficiently Stable
- Inter-WG Coordination
  - In TSGs
  - Information Exchange through Liaison Statements
- Standards
  - Releases

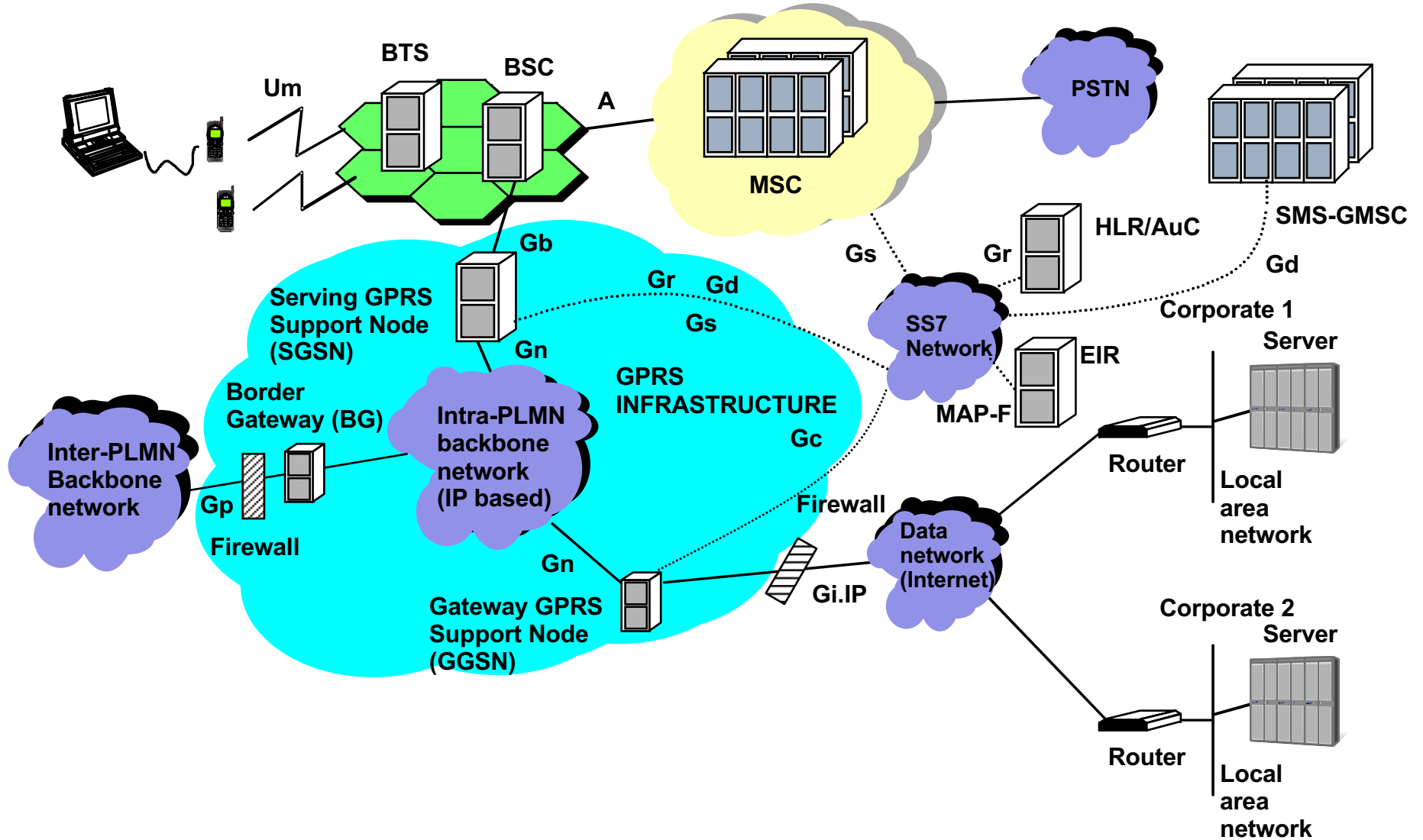
# GPRS/UMTS Architecture



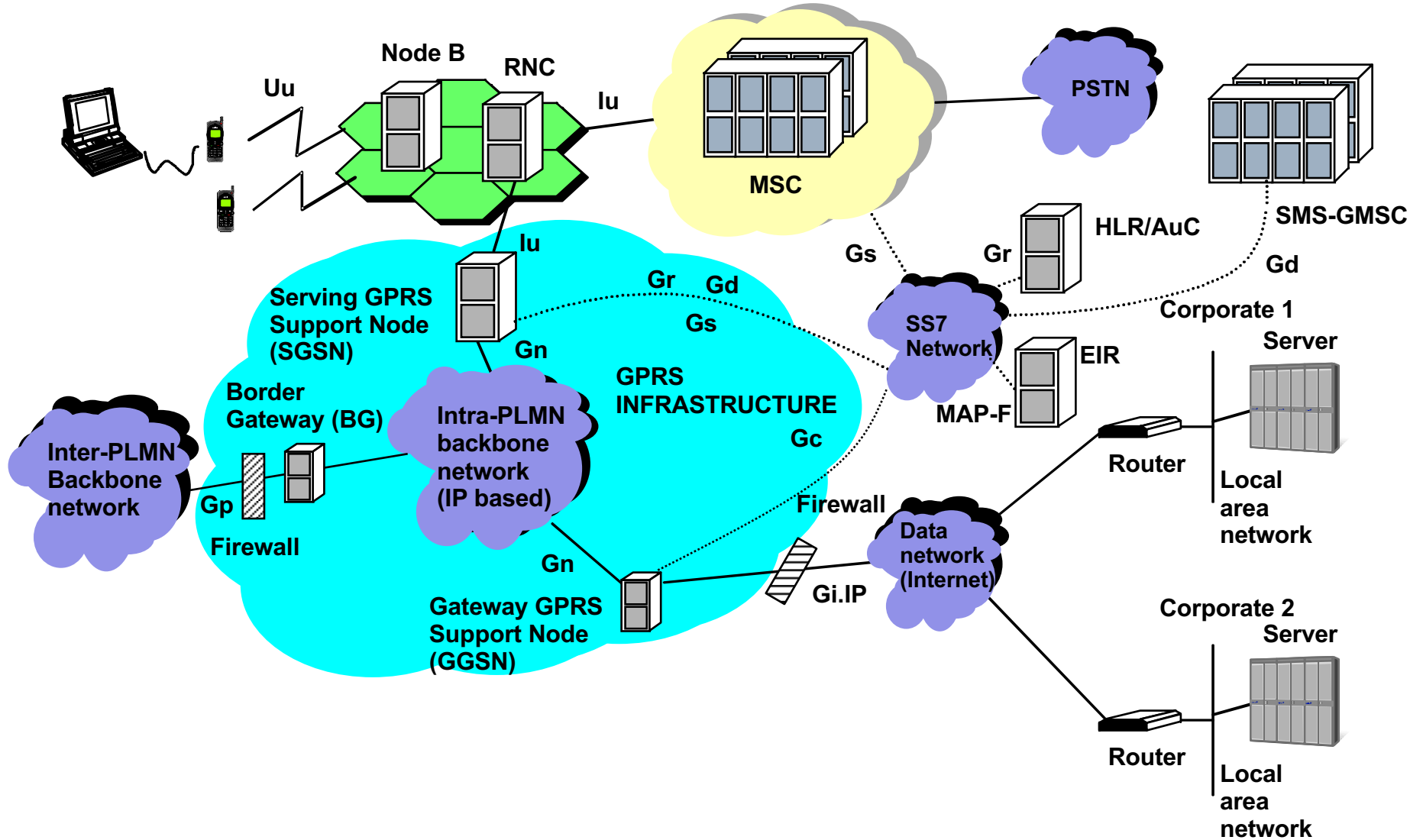
# GPRS/UMTS Release 99 Architecture



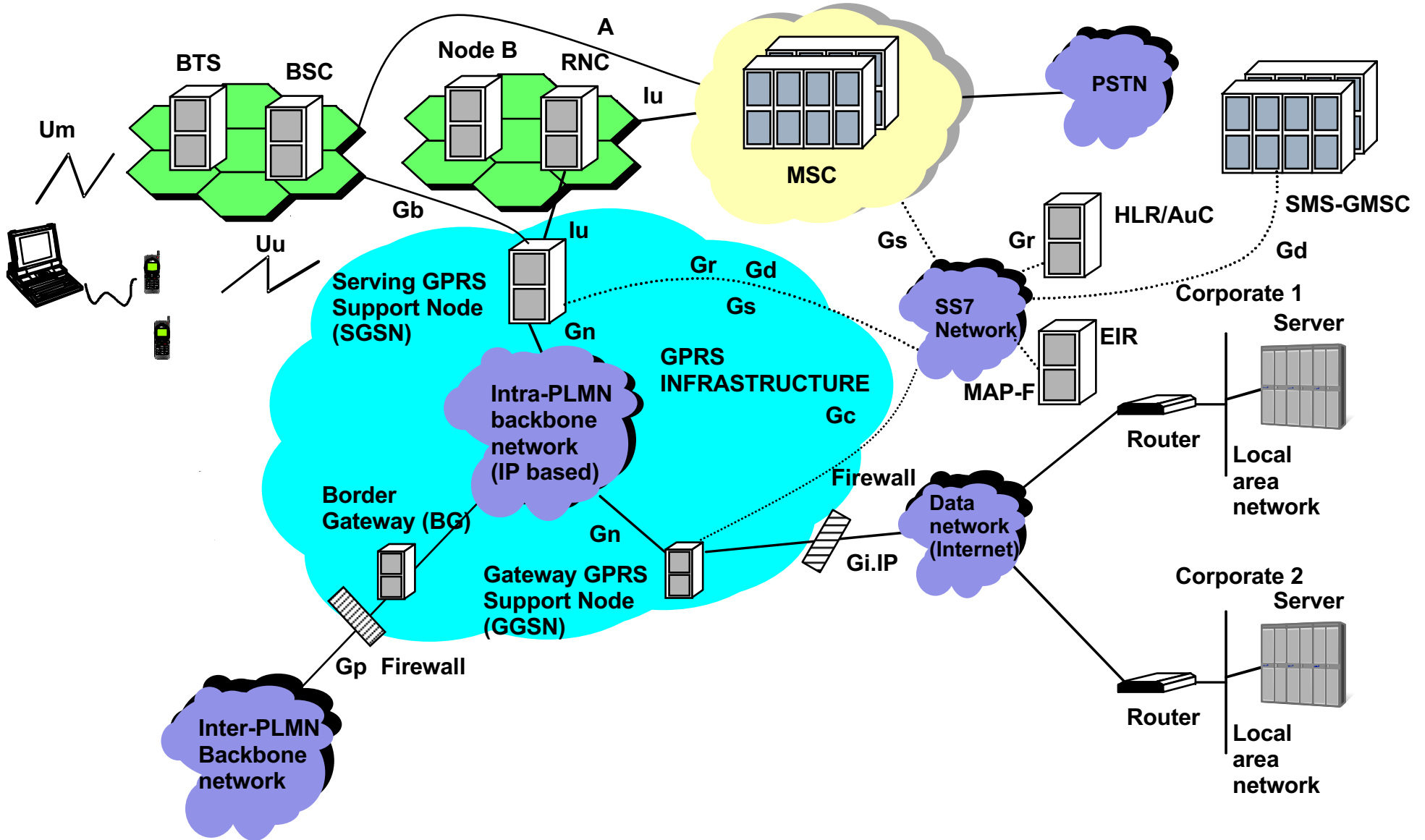
# GSM Architecture / GSM Radio



# UMTS Architecture / WCDMA



# The R99 Architecture



# Entities

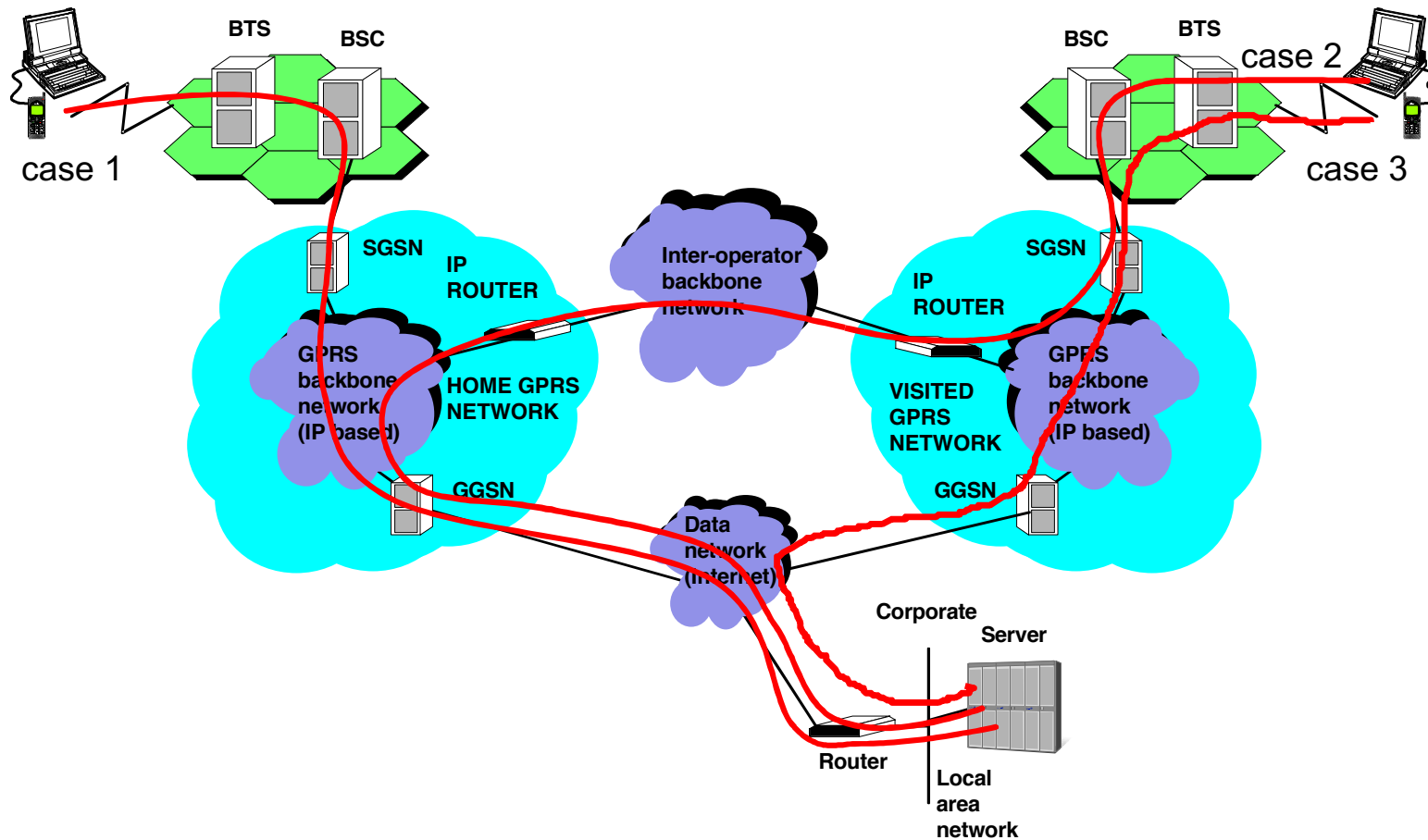
- The Serving GPRS Support Node (SGSN)
  - Mobility Management
  - Authentication
  - Gathers Charging Information
- Gateway GPRS Support Node (GGSN)
  - Gateway between UMTS Core Network and external networks
  - Address allocation for MS
  - Gathers Charging Information
  - Filtering
- Base Station Subsystem (BSS) / Radio Network Subsystem (RNS)
  - BSS
    - BSC
    - BTS
  - RNS
    - RNC
    - Node-B

# PDP Context

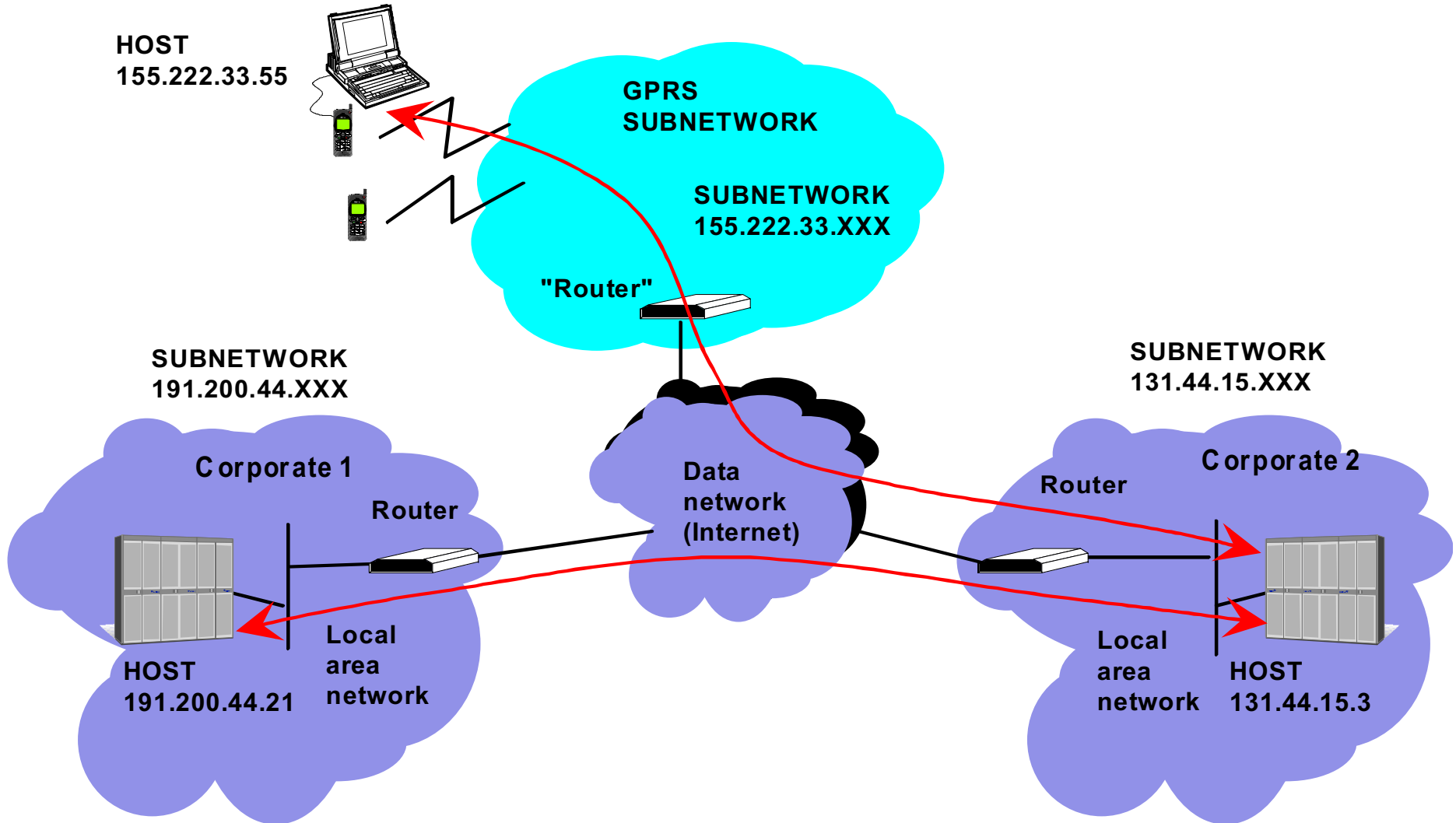
- Packet Data Protocol (PDP) Context
  - Session
    - Logical Tunnel between MS and GGSN
    - Anchored GGSN for Session
  - Multiple PDP Contexts
    - Per Mobile
    - Per PDP Address
- PDP Context Activities
  - Activation
  - Modification
  - Deactivation

# R99 Interfaces and Protocols

## Routing Example



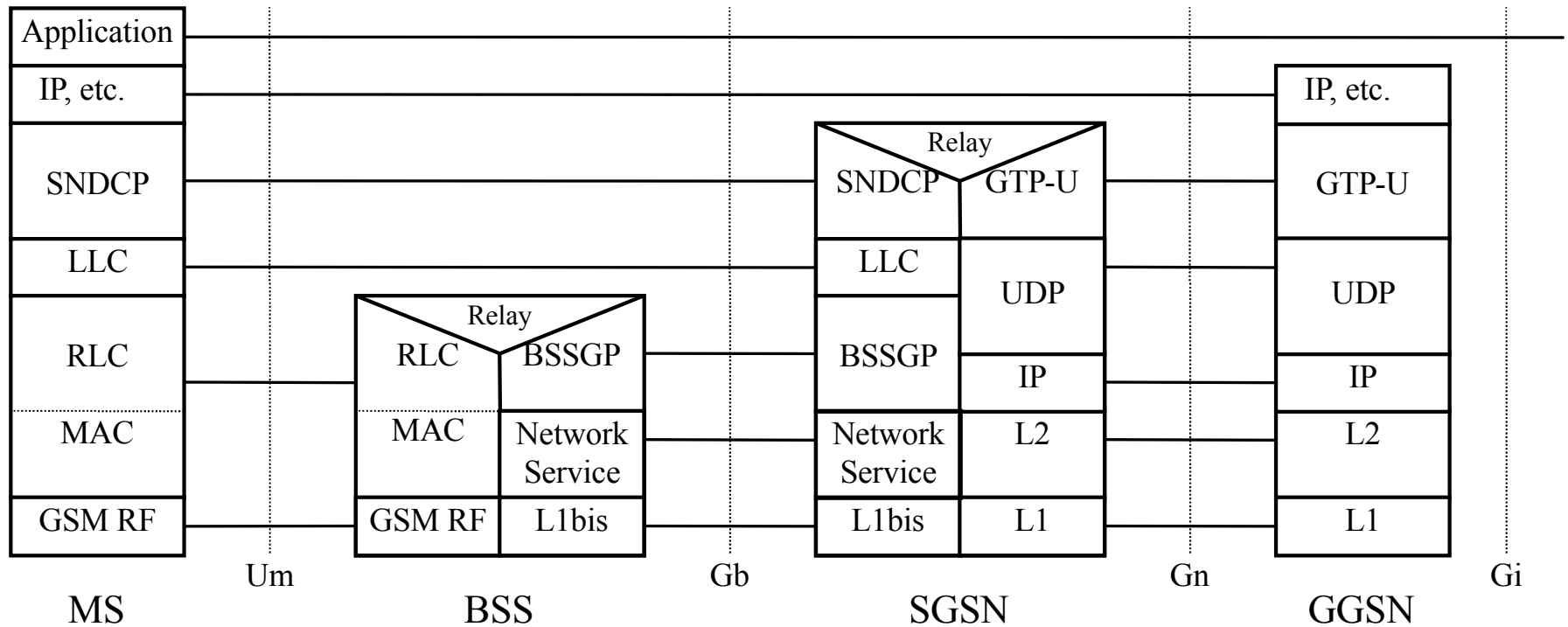
# GPRS Network from the Internet





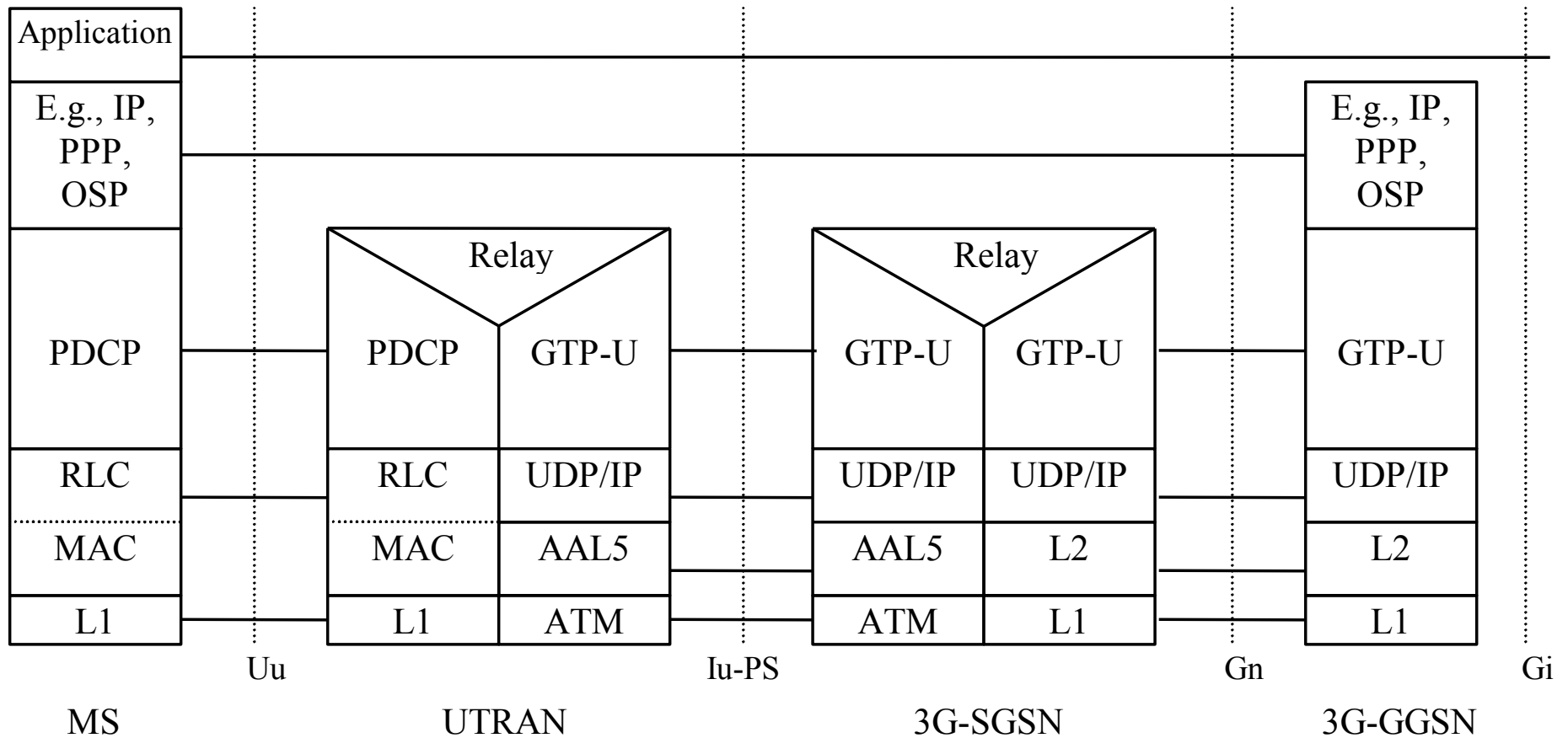
# R99 Interfaces and Protocols

## GSM User Plane



# R99 Interfaces and Protocols

## UMTS User Plane



# Mobile IP in UMTS

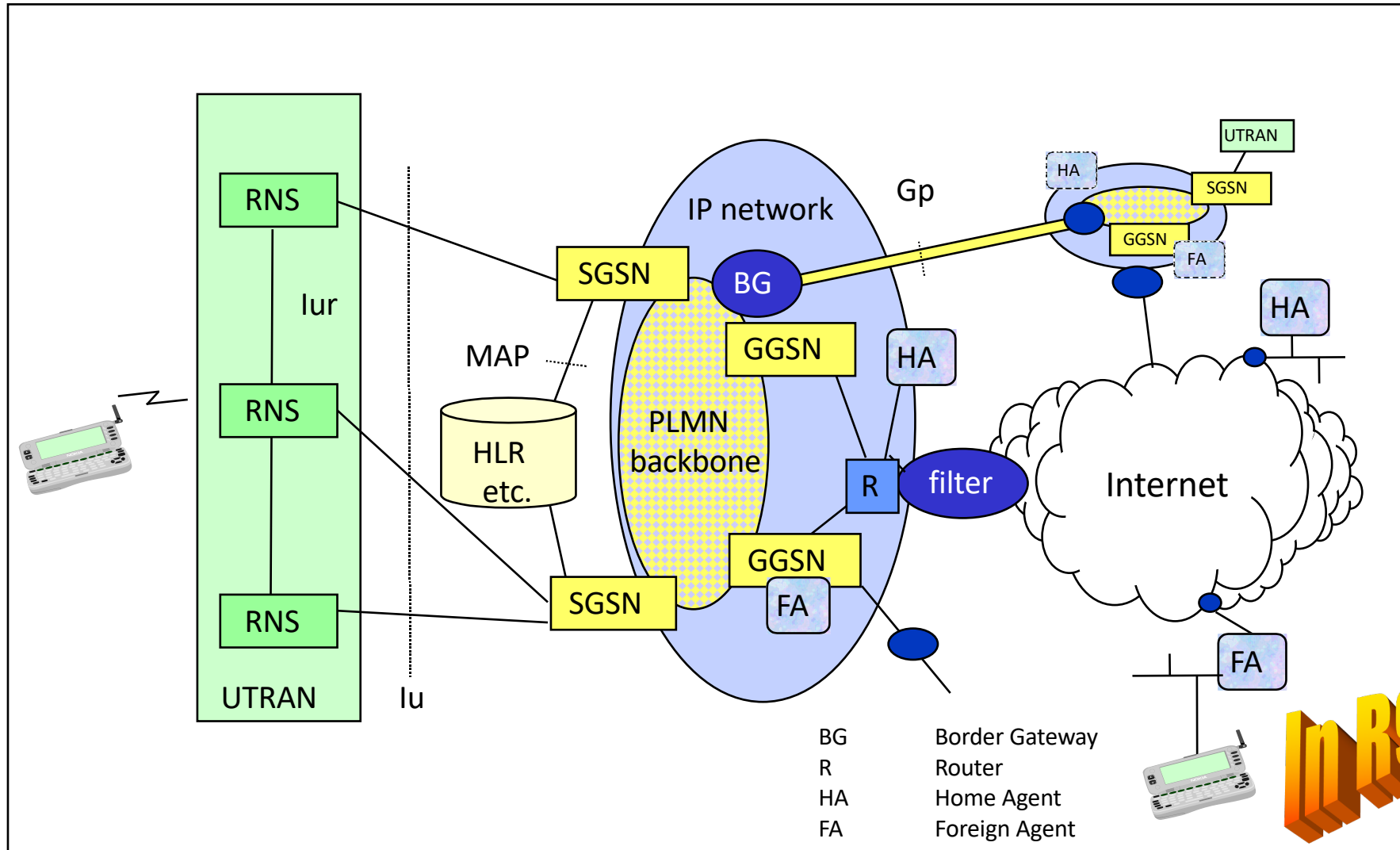
## 3GPP TSG-SA WG2 Mobile IP Ad Hoc

# Mobile IP in UMTS

## A Staged Approach

- Step 1: Offering Mobile IP service
  - UMTS Release 99
- Step 2: Intermediate GPRS-Mobile IP system
- Step 3: Using Mobile IP for Intra System Mobility

# Mobile IP in UMTS Step 1



In R99

# Mobile IP in UMTS

## Step 1 (Cont.)

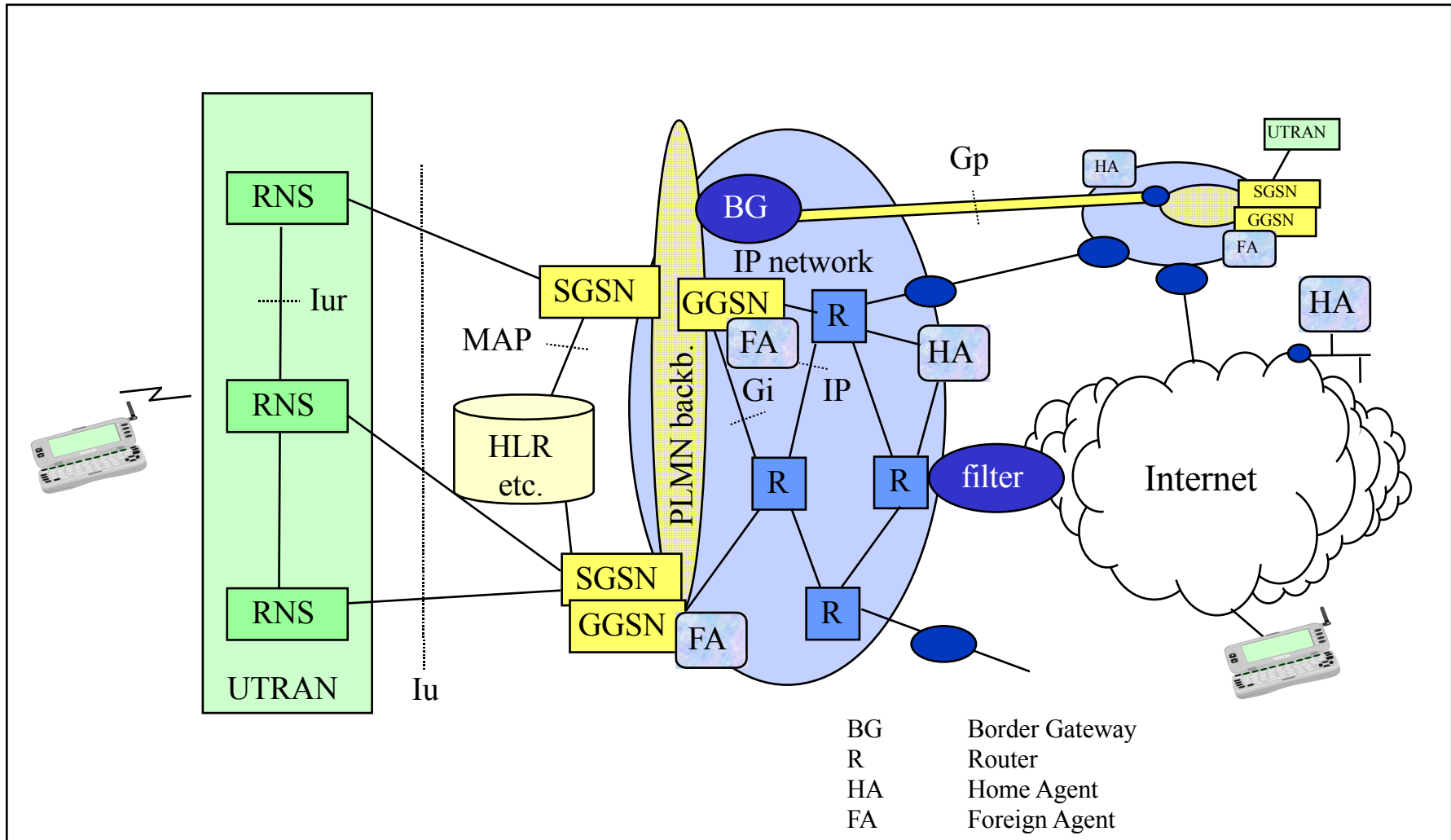
- Changes
  - FA functions at GGSN
  - Mobile IP in the mobile if needed
- Does not change
  - GSM MAP, VLR and HLR
  - Network architecture
  - No changes to the MS

**Mobile IP as a Service**



**NOKIA**

# Mobile IP in UMTS Step2



# Mobile IP in UMTS

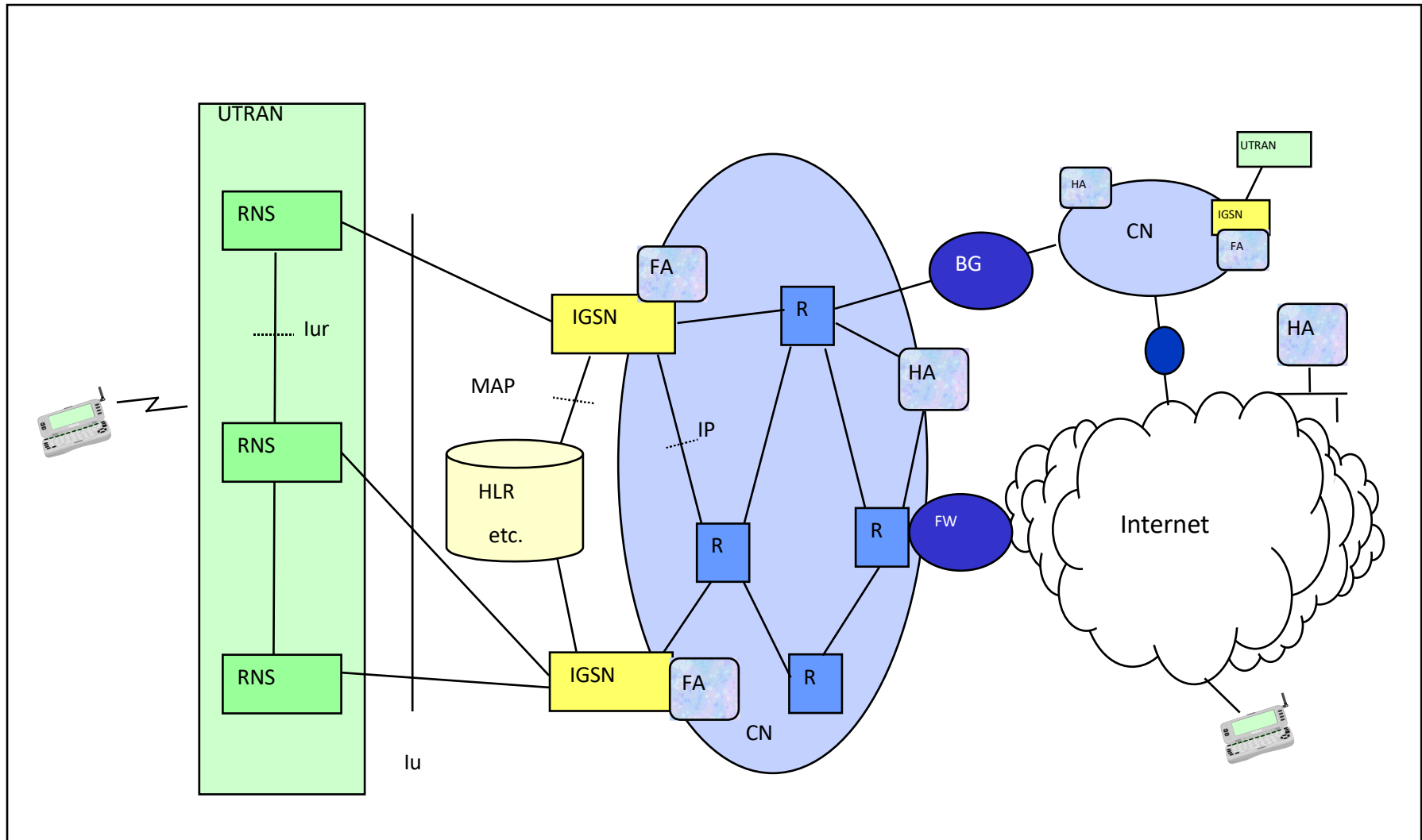
## Step 2 (cont.)

- Changes to Step 1
  - GGSN/FA can be changed during a session if more suitable available
- Applicability
  - Maybe in Release 2000

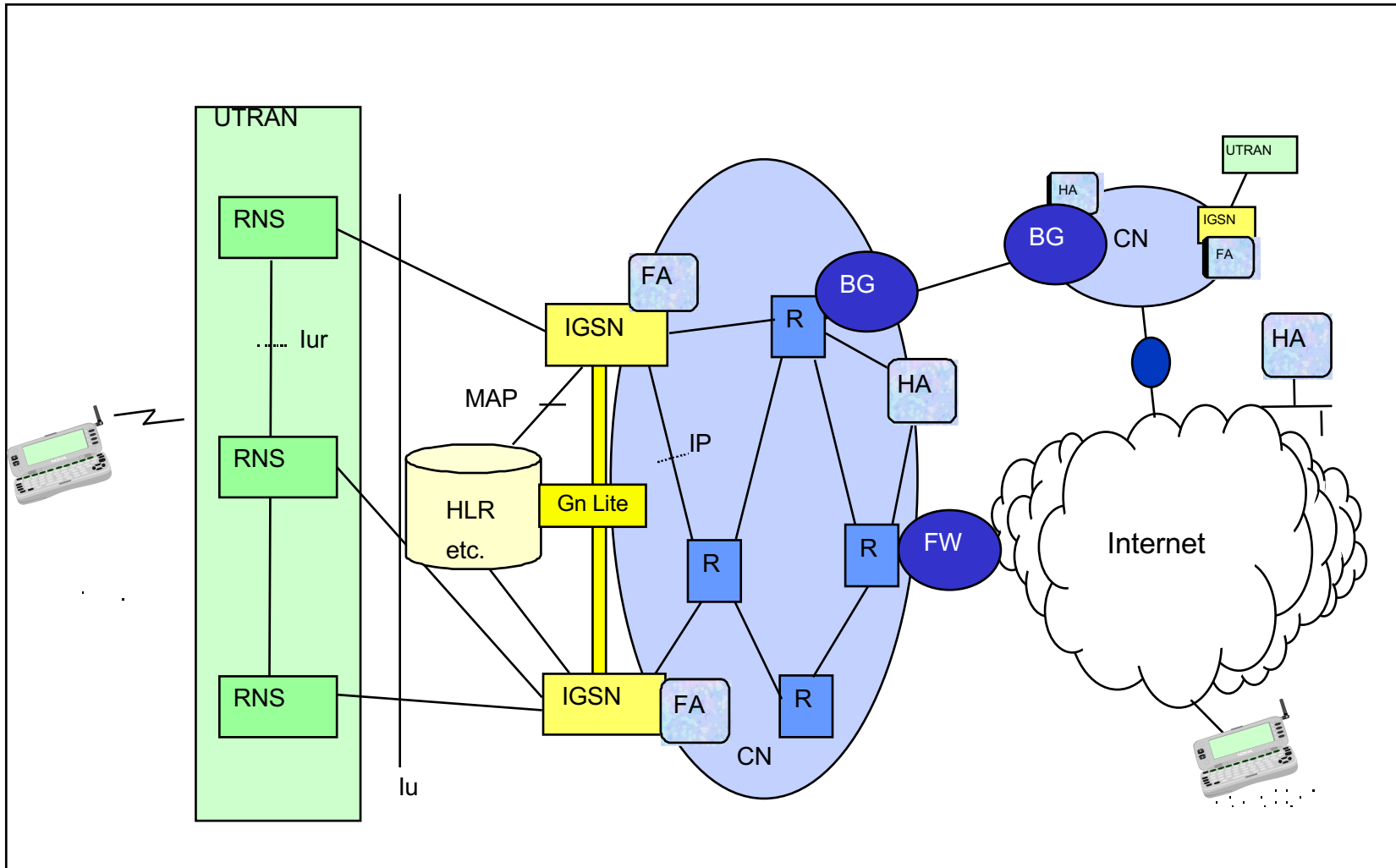
# Mobile IP & GTP Interworking



# Mobile IP in UMTS Step 3



# Mobile IP in UMTS Step 3 (the reality)



# Mobile IP in UMTS

## Step 3 (Cont.)

- Changed from Step 1 & Step 2
  - GTP only on control plane (almost)
  - No SGSN + GGSN -> IGSN
  - Mobile IP based Macro Mobility Management
  - MS has to be changed to support Mobile IP
- Problems
  - Interworking with pre-Step 3 networks
  - Support for non-M-IP mobiles
  - etc.
- Applicability
  - Not defined

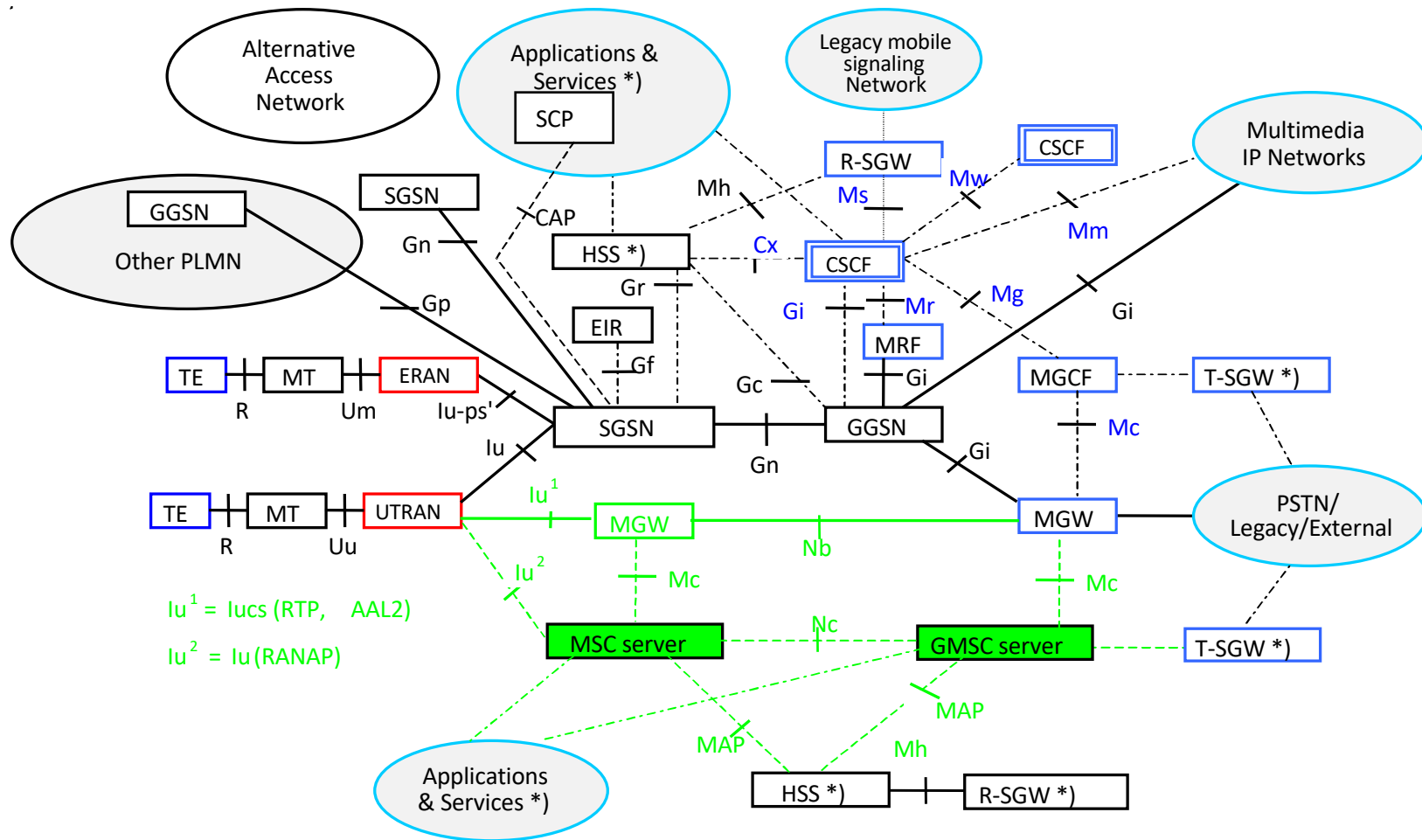
**More Mobile IP Integration**

# Release 2000 All-IP Architecture

# Release 2000 Architecture

- Includes All-IP Architecture Option
- GPRS as basis
  - Includes GPRS Core Network
  - Home Subscriber Server (HSS) instead of HLR
- New Entities - Voice over IP infrastructure
  - Call State Control Function (CSCF)
  - Media Gateway Control Function (MGCF)
  - Media Gateway Function (MGW)
  - etc.
- New Interfaces
- New Protocols

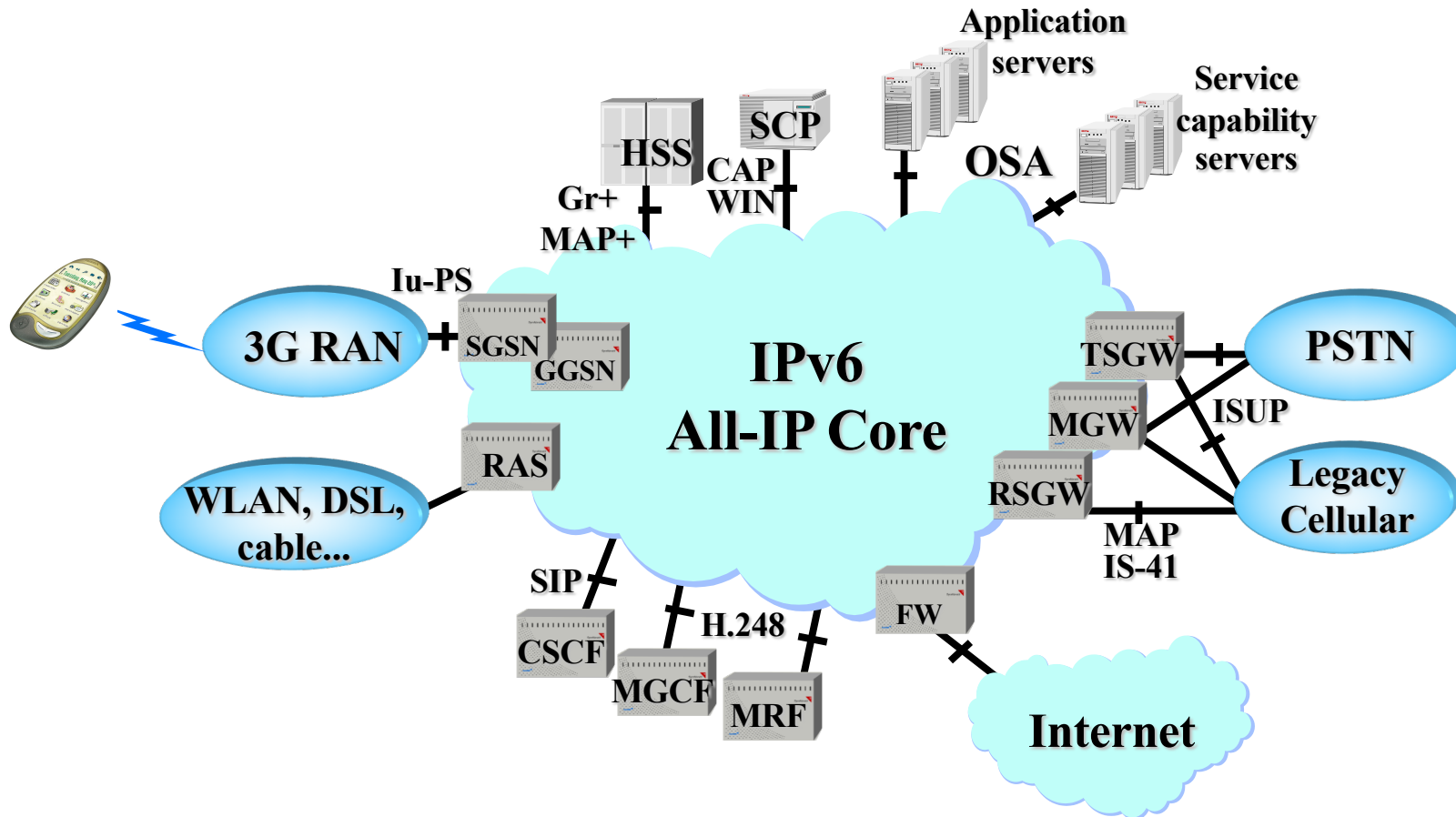
# R00 All-IP Reference Architecture



..... Signalling Interface  
 ——— Signalling and Data Transfer Interface

\*) those elements are duplicated for figure layout purpose only, they belong to the same logical element in the reference model

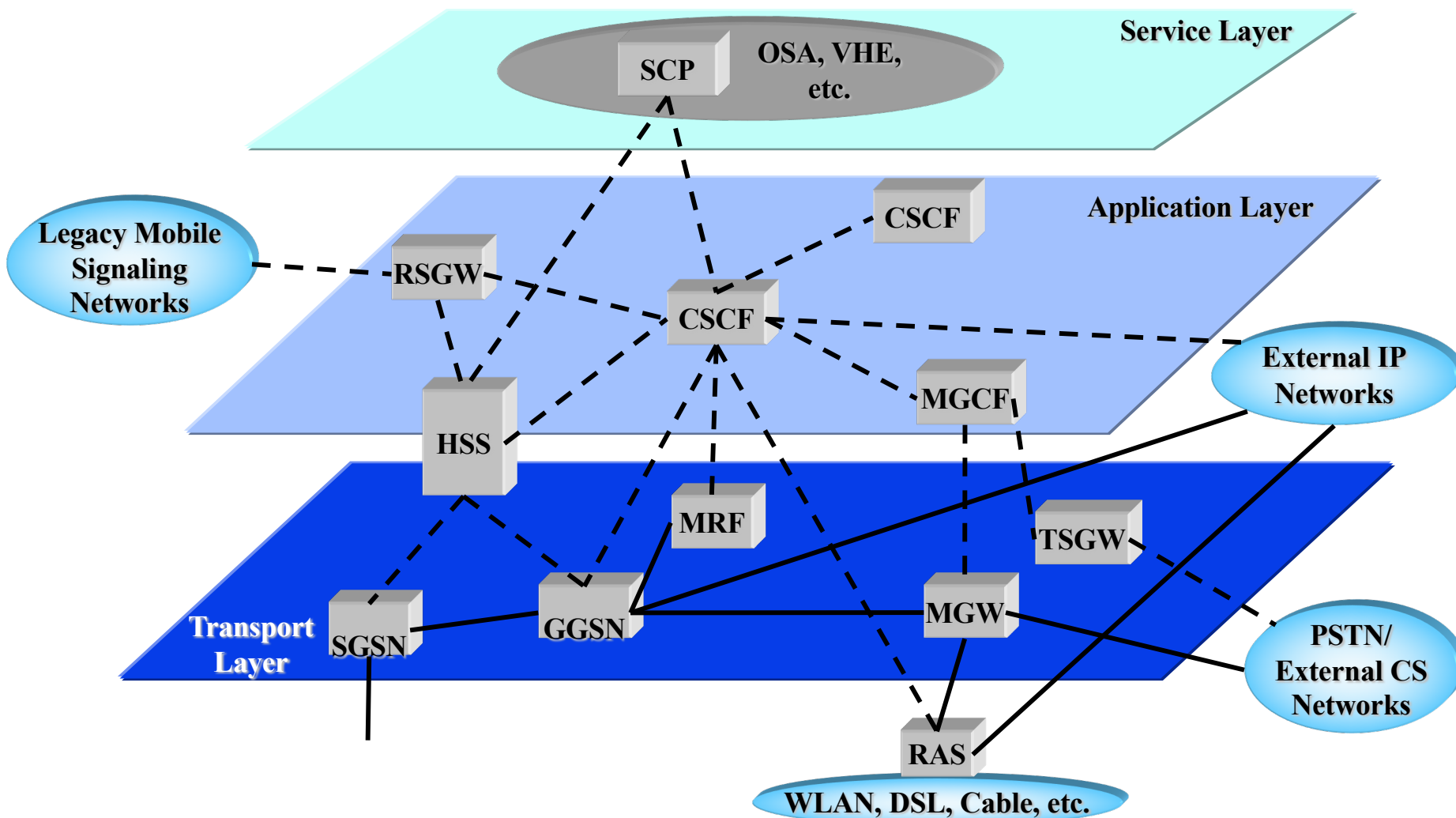
# All-IP System Level Architecture



**CSCF** Call State Control Function  
**HSS** Home Subscriber Server  
**MGCF** Media Gateway Control Function  
**MGW** Media Gateway

**MRF** Multimedia Resource Function  
**RAS** Remote Access Server (DSLAM, head end...)  
**RSGW** Roaming Signaling Gateway  
**TSGW** Transport Signaling Gate

# R00 All-IP Reference Architecture





# R00 New Protocols (?)

- Protocol between CSCF and Mobile or IP Phone:
  - H.323 or SIP
- CSCF-MRF: Mr
  - H.248/Megaco
- CSCF-MGW: Mc
  - H.248/Megaco
- CSCF-HSS:Cx
  - IP based Interface
- CSCF-CSCF: Mw
  - Bear Independent Control Protocol (BICC) or SIP?
- CSCF-Legacy Mobile Network: Ms
  - IP based signaling - The same as Mw
- CSCF-Applications/Services:
  - Difference: Camel over IP (Sigtran)
- Real-time IP transport:
  - RTP/UDP/IP

# Thank You!

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