

---

# General Packet Radio System (GPRS)

Overview

---

# Introduction

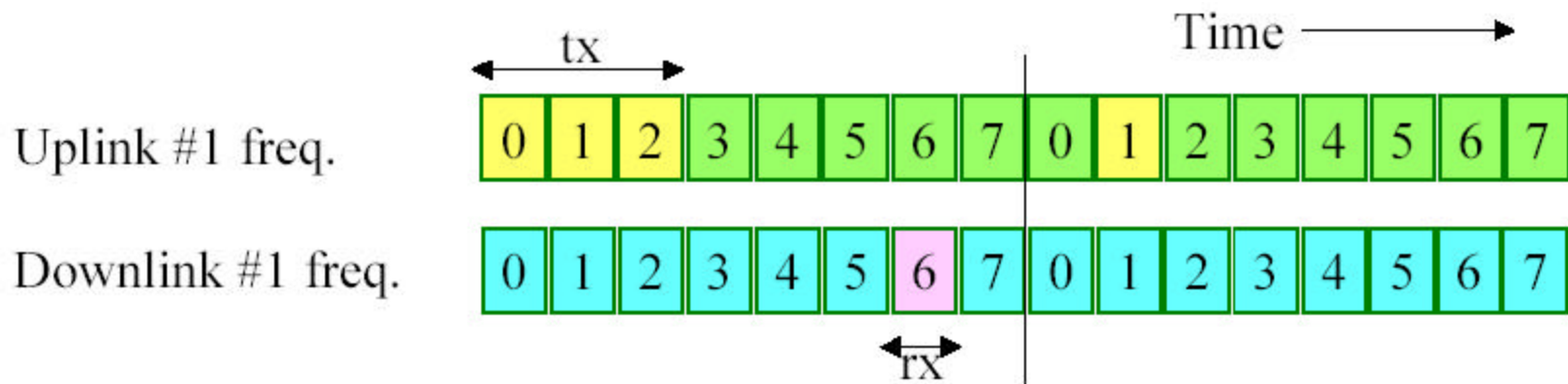
---

- General Packet Radio Service (GRPS) today
    - ▶ “Packet overlay” network on top of the existing GSM (Digital) circuit switched voice-based network
    - ▶ **TCP/IP-based:** allows data packets to be conveyed across the mobile network using packet switching
    - ▶ “Always on” / “always connected”
      - After initial “log-on”, user is permanently connected to IP services
        - Instant access, no further log-on
        - Flat rate (about \$30/mo in the LA area)
        - User perceived performance: fluctuates (as GPRS users defer to voice users) to a max of 50Kbps
      - Network resources only used when information ready to be exchanged – bandwidth on demand ...
        - More efficient utilization of air-time
-

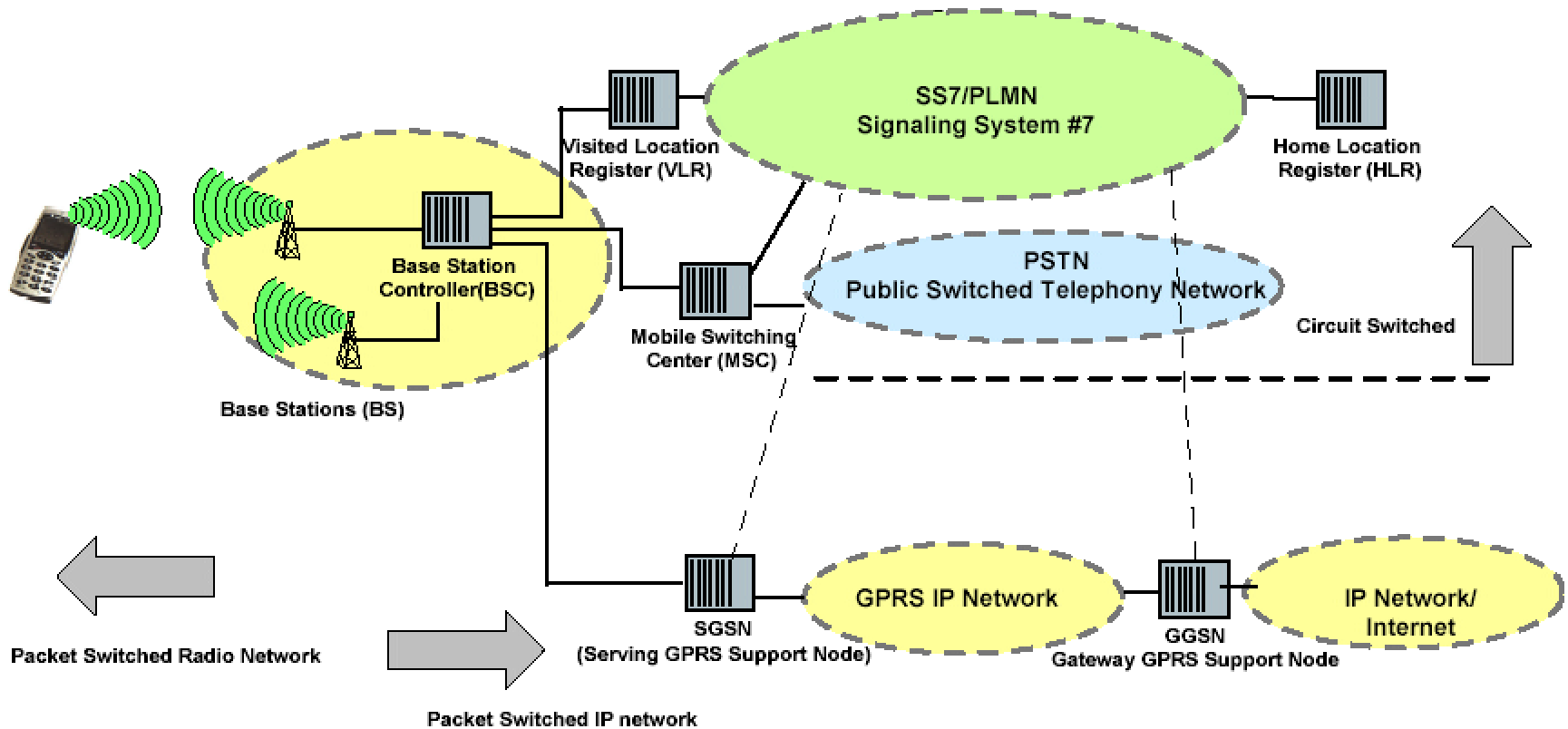
# GSM - GPRS

---

- Provides high speed packet data access
- uses modified GSM hardware (different phones/cards)
- Several time slots can be (dynamically) allocated to transmit a block of data



# GSM/GPRS Architecture, simplified

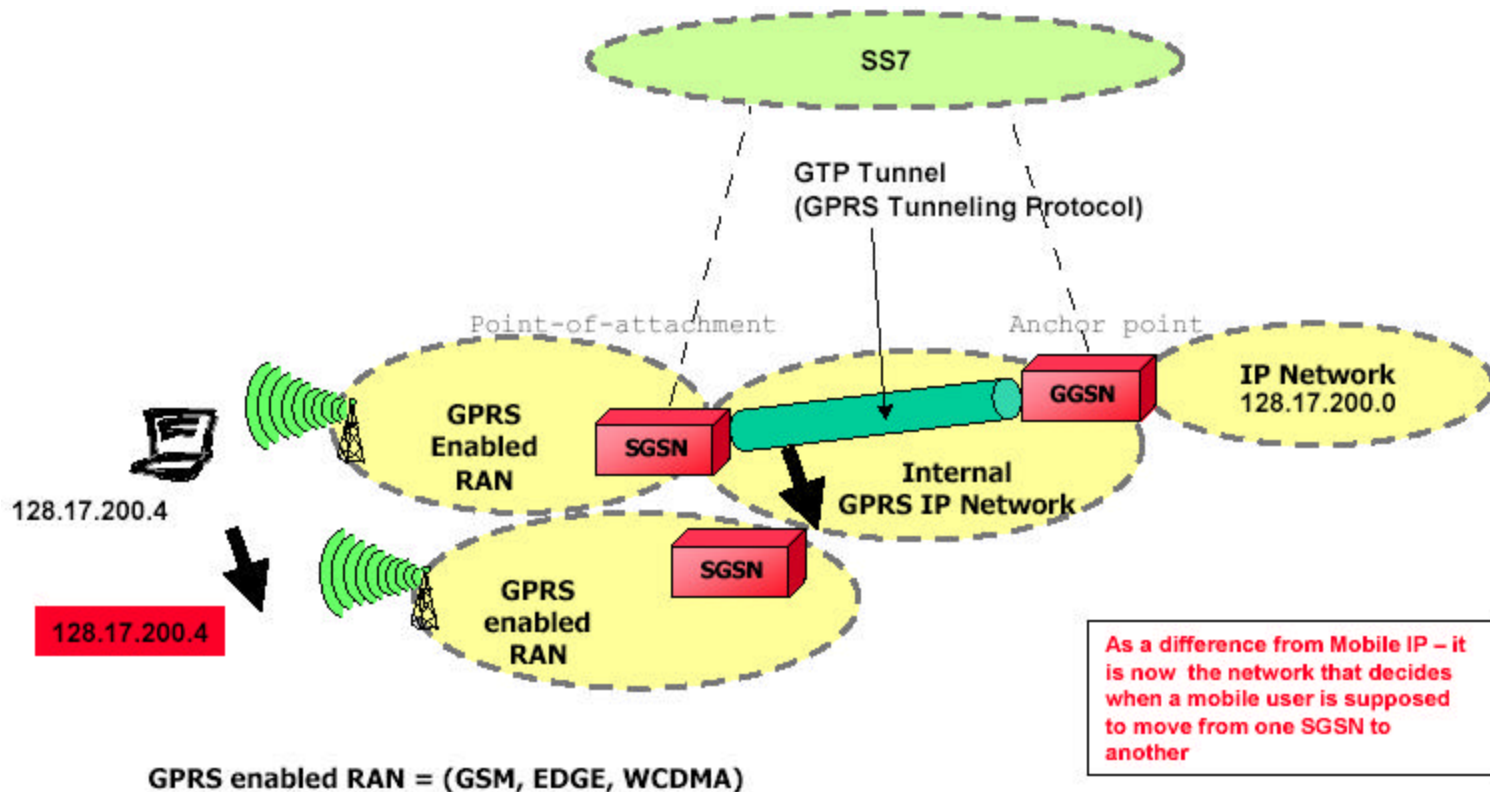


# Uplink/downlink

---

- The uplink channel is shared by a number of mobiles, and its use is allocated by a BSC (Base Station Controller)
    - ▶ The MS (Mobile Station) requests use of the channel in a “packet random access message”.
    - ▶ The BSC allocates an unused channel to the mobile and sends a “packet access grant message” in reply
  - The downlink is fully controlled by the serving BSC and random access is not needed
-

# GPRS Mobility Tunnelling

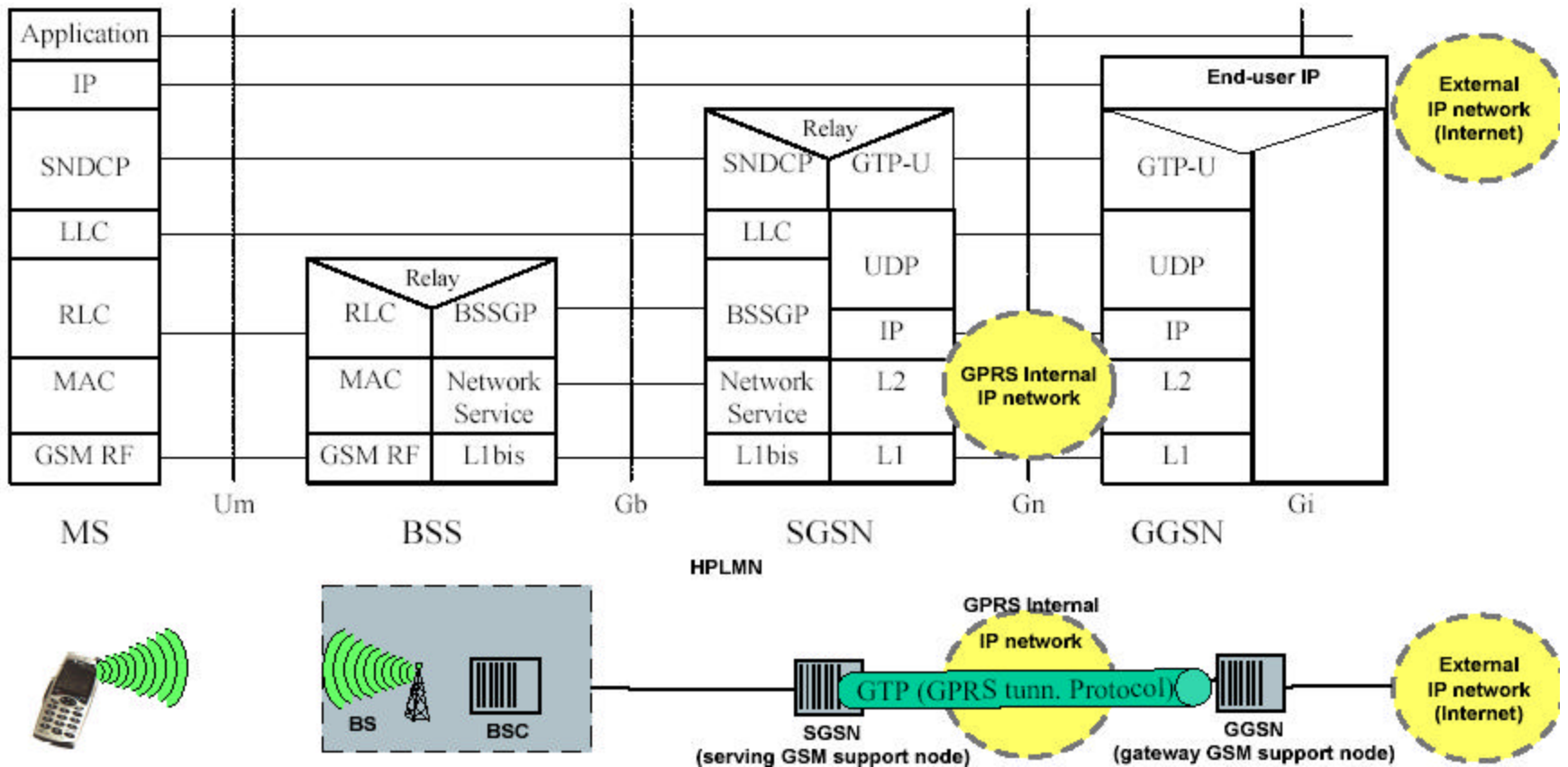


# Supporting Nodes – main functions

---

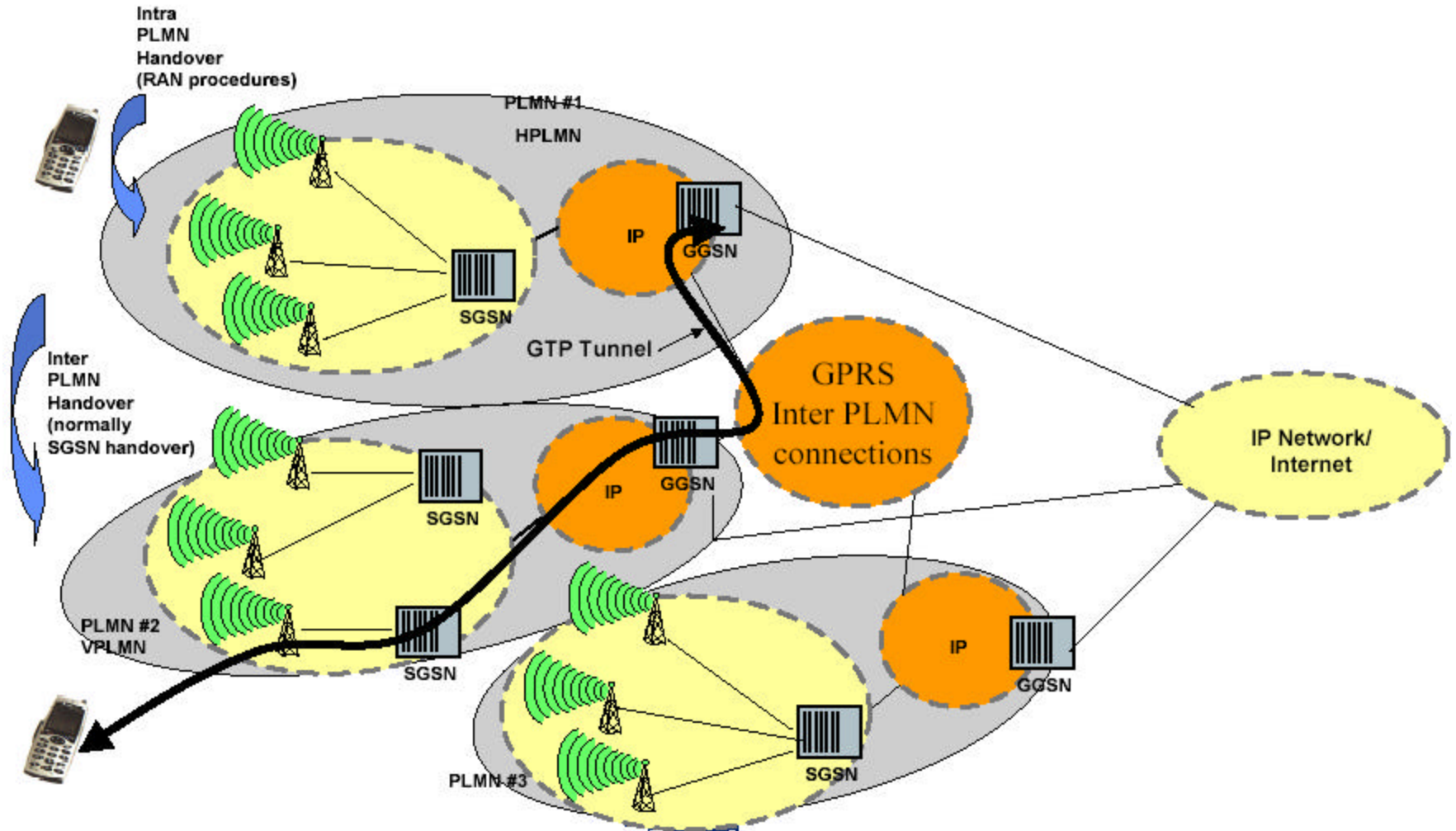
- 2G/3G SGSN (serving node)
    - Authentication/Authorization towards HLR
    - Admission control
    - Charging (billing)
    - Encapsulation/tunneling
    - Mobility Management
    - Ciphering
    - Compression
  - GGSN (gateway node)
    - Screening (filtering)
    - Charging
    - Encapsulation/Tunneling
    - Mobility Management
    - Connections to external IP networks
      - Corporate networks
      - Internets
      - Services (WAP etc)
-

# GPRS/GSM Protocols - Overview





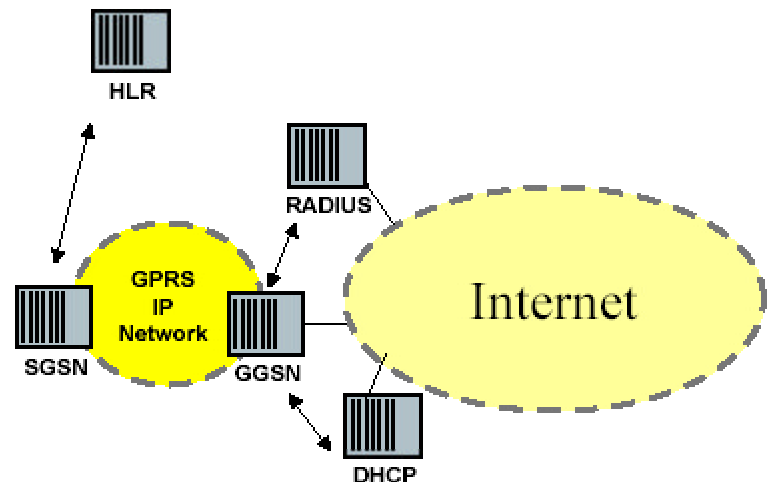
# Routing in GPRS



# Mobile Address Allocation

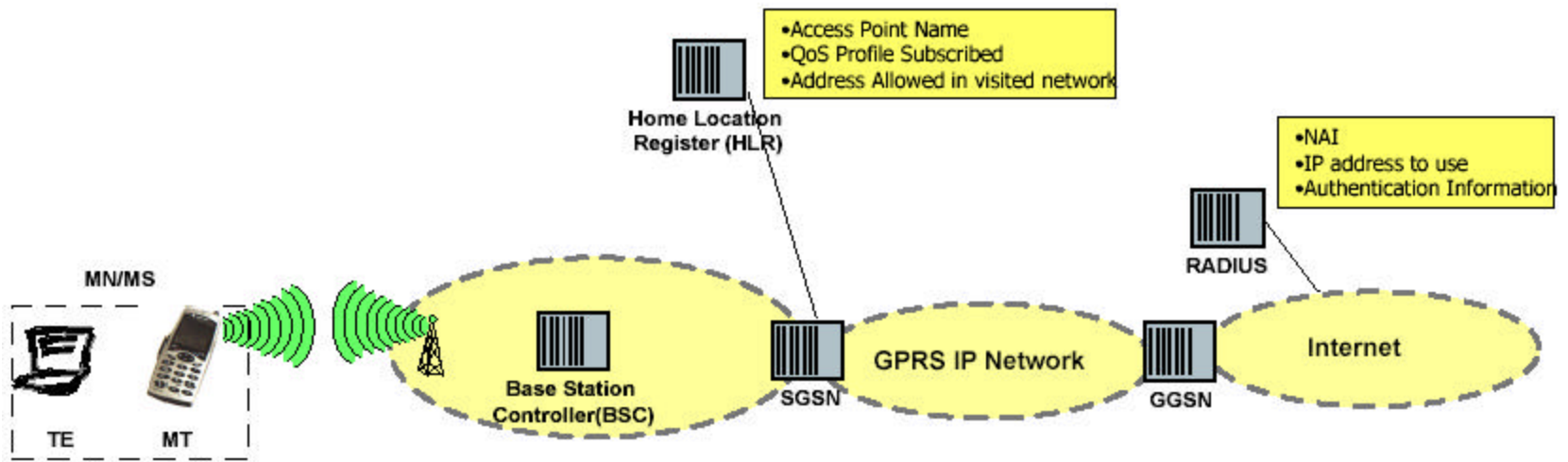
---

- GGSN Address Pools
  - ▶ Static, dynamic allocation at GPRS packet data activation
- HLR
  - ▶ The HLR may keep a static IP address that is fetched by the SGSN at GPRS *attach*
- RADIUS
  - ▶ The GGSN may interact with an external AAA server in order to perform AAA functions as well as dynamic IP address allocation at GPRS packet data activation
- DHCP server
  - ▶ The GGSN may interact with an external DHCP server to perform dynamic IP address allocation at GPRS packet data activation
- IPv6 auto configuration



# GPRS initial State

---



# GPRS Attach

---

- When a MS is turned on, the first function it performs is a GPRS *attach*
    - ▶ GSM access authentication (towards Home Network, HLR (Authentication Center))
    - ▶ User profile is downloaded from HLR to the serving SGSN
  - When the GPRS *attach* is complete, the MS is physically connected to the visited network
-

# The Packet Data Protocol (PDP) Context

---

- In order to be able to send and receive data, the mobile must set-up a packet data bearer
    - ▶ The PDP bearer is associated with contexts in each nodes that data are traversing
  - The bearer is set-up via “PDP context activation” procedures
  - PDP context describes requirements of the connection to the packet networks: Type, network address, Access Point Name (APN), QoS, etc.
    - ▶ SGSN validates request against subscription information downloaded from HLR during GPRS Attach
    - ▶ Access point name sent to DNS, IP address(s) of suitable GGSNs returned
    - ▶ Logical connection using GPRS tunnels (GTP) between SGSN and GGSN
    - ▶ IP address allocated (GGSN pool, DHCP, RADIUS)
-

# PDP Context Activation

