**MOBILE COMPUTING – ASSIGNMENT PRESENTATION**

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# LOCATION MANAGEMENT IN GPRS

## What is GPRS ?

GPRS stands for General Packet Radio Service. It is a standard for wireless communication that allows data to be transmitted over a cellular network. GPRS is a technology that is used to enable data transfers over mobile networks, allowing users to connect to the internet and exchange data with other devices.

## Mobile Station States :

In mobile telecommunications, a mobile station (MS) refers to the device used by a user to connect to a wireless network(Eg: Smartphones, tablets, mobile hotspots, wearable devices). The mobile station states refer to the different states that a mobile station can be in during its operation. Here are some of the most common mobile station states:

- Idle state: This is the state where the mobile station is switched on and ready to use but is not currently connected to a wireless network.
- Active state: This is the state where the mobile station is connected to the network and is actively using network services, such as making a call or using mobile data.
- Standby state: This is the state where the mobile station is connected to the network, but is not currently in use. In this state, the mobile station is still reachable by the network.
- Out-of-service state: This is the state where the mobile station is not able to connect to the network, either because the network is unavailable or because the mobile station is out of range.
- Power-off state: This is the state where the mobile station is switched off and is not able to connect to the network.

## Routing Area :

In mobile telecommunications, a routing area is a geographical area defined within a wireless network. It is used to track the location of mobile stations (MS) as they move from one cell to another within the network.

A routing area is typically made up of several cells, which are grouped together based on their geographic proximity. Each routing area is identified by a unique routing area code (RAC), which is used by the network to keep track of the mobile stations that are currently located within the routing area.

When a mobile station moves from one cell to another, it may also move between routing areas. When this happens, the mobile station sends a location update message to the network, indicating its new location. This information is used by the network to keep track of the mobile station's location, and to ensure that incoming calls and messages are properly routed to the mobile station.

## SGSN :

In General Packet Radio Service (GPRS), **the Serving GPRS Support Node (SGSN)** is a network node that is responsible for managing and controlling the communication between the mobile station (MS) and the core network of the wireless network operator.

The SGSN performs several key functions in the GPRS network, including:

- Authentication and security: The SGSN is responsible for authenticating the MS and ensuring that all communications between the MS and the network are secure.
- Mobility management: The SGSN tracks the location of the MS within the network, and manages the handover of the MS from one cell to another as it moves between different areas within the network.
- Packet routing and forwarding: The SGSN is responsible for routing and forwarding data packets between the MS and the core network of the operator.

- Quality of Service (QoS) management: The SGSN manages the QoS parameters for each MS, ensuring that the network resources are allocated appropriately to meet the needs of each user.

The SGSN is typically connected to the core network of the operator, and communicates with other network nodes, such as the Gateway GPRS Support Node (GGSN), which is responsible for providing connectivity to external networks, such as the Internet.

**Routing Area Update:**

Routing Area Update (RAU) is a procedure in mobile telecommunications that allows a mobile station (MS) to update its location with the wireless network. The routing area is a geographical area in the network, which is used to track the location of the mobile station.

The RAU procedure is triggered when the mobile station moves to a new routing area or when the current location update timer expires. When this happens, the mobile station sends a message to the network, indicating its new location. This message is sent to the serving network node, which is responsible for updating the location of the mobile station in the network's location database.

The purpose of the RAU procedure is to ensure that the network has up-to-date information on the location of the mobile station, which is important for several reasons. For example, if a call is made to the mobile station, the network needs to know where the mobile station is located in order to route the call to the correct cell or location area.

**Mobility Management :** Refers to the managing of mobile devices across a wireless network.

Micro mobility management : It refers to the management of mobility within a cell or small group of cells, typically within a single location area (LA). The Serving GPRS Support Node (SGSN) is responsible for micro mobility management, and performs functions such as tracking the location of the mobile station (MS), managing handovers between cells, and ensuring that the MS has access to the appropriate network resources.

Macro mobility management : It refers to the management of mobility between different LAs, which may be located far apart from each other. This is typically handled by the Gateway GPRS Support Node (GGSN), which manages the movement of data traffic between different LAs and different SGSNs. The GGSN communicates with the SGSNs to ensure that the MS is properly authenticated and authorized, and that data packets are properly routed to their destination.