

## USER PROFILE REPLICATION

### What is User Profile?

A user profile is a set of parameters that describe the location and mobility characteristics of a mobile device user. These parameters are used by the mobile network operator to track the location of the user's device and to provide location-based services.

The user profile typically contains information such as the user's home location, which is the location where the user is registered with the mobile network, and the current location of the user's device. The profile may also include information about the user's mobility patterns, such as the frequency of movement between locations and the distance between locations.

### What is User Profile Replication?

Definition given in PPT:

- When a call is initiated from a certain LA, the corresponding MSC determines if a replication of the called MS's user profile is available locally.
- If available, no HLR query is needed.
- When the MS moves to another location, the network updates all replications.

Explanation:

User Profile needs to be present in the local database of the MSC enabling call routing and location management functions to be performed locally.

When a user moves to a new Location Area and a call is initiated, the corresponding Mobile Switching Center (MSC) checks if a replication of the called MS's user profile is available locally.

If the replication of the user profile is available in the local MSC, it means that the MSC has a copy of the user profile stored in its database. This is because when the MS moved into LA, its user profile was replicated to the local MSC.

In this case, there is no need to query the Home Location Register (HLR). This means that the MSC can access the user profile information from its local database and proceed with call setup without involving the HLR.

If the user profile is not available locally, the MSC needs to query the HLR to obtain the user profile.

### How is this done?

The HLR is responsible for updating the user's location information in its database and notifying the relevant MSCs of the change. The new MSC replicates the user's profile locally.

## POINTER FORWARDING

Definition given in PPT:

- Each time a user moves to a new LA, a forwarding pointer is set up to its previous VLR to point to the new VLR.
- Calls to the user will first query the HLR to determine the first VLR and then follow the chain to reach the current VLR.
- The length of the pointer chain is limited to a maximum value N.
- This method can reduce the cost of updating the HLR.

Pointer forwarding is a technique used to reduce the signal traffic between HLR and MSC.

**Problem:** When a mobile station (MS) moves from one Location Area (LA) to another, its location information is updated in the HLR. The HLR then notifies the MSCs associated with the old and new LAs of the location update. However, in a large network, the number of MSCs that need to be notified can be significant, leading to high signaling traffic and network congestion.

**Solution:** When a user moves to a new Location Area (LA) in a mobile cellular system, a forwarding pointer is set up to its previous Visitor Location Register (VLR) to point to the new VLR. This creates a chain of pointers linking the user's previous VLRs to the current VLR.

### **What is location forwarding?**

When a call is made to the user, the Home Location Register (HLR) is queried to determine the first VLR in the pointer chain. The call is then routed through the chain of VLRs until it reaches the current VLR associated with the user's current LA. This process is known as call forwarding or location forwarding.

To prevent an infinite pointer chain, the length of the pointer chain is limited to a maximum value N. This value is determined by the system operator and is typically set to a small value to prevent excessive signaling traffic.

### **What is a forwarding pointer?**

A forwarding pointer is a pointer that links a user's current location in a mobile cellular system to their previous location. It is used to enable call forwarding and location forwarding when a user moves to a new location area (LA).

To enable call forwarding and location forwarding to the user's new location, a forwarding pointer is set up from the user's previous VLR to the VLR in the new LA.