Home Location Register (HLR)

What is a Home Location Register (HLR)?

A HLR is a database of user (subscriber) information, i.e., customer profiles, used in mobile (cellular) networks. It is a key component of mobile networks such as GSM, TDMA, and CDMA networks. A HLR contains user information such as account information, account status, user preferences, features subscribed to by the user, user's current location, etc. The data stored in HLRs for the different types of networks is similar but does differ in some details.

HLRs are used by the Mobile Switching Centers (MSCs) to originate and deliver arriving mobile calls.

What is a Visiting Location Register (VLR)?

A VLR is a database, similar to a HLR, which is used by the mobile network to temporarily hold profiles of roaming users (users outside their home area). This VLR data is based on the user information retrieved from a HLR. MSCs use a VLR to handle roaming users.

How are the HLR and VLR used?

Each mobile network has its own HLRs and VLRs. When a MSC detects a mobile user's presence in the area covered by its network, it first checks a database to determine if the user is in his/her home area or is roaming, i.e., the user is a visitor.

- User in Home Area: HLR has the necessary information for initiating, terminating, or receiving a call.
- User is Roaming: VLR contacts the user's HLR to get the necessary information to set up a temporary user profile.

The user's location is recorded in the HLR, and in case the user roaming, it is also recorded in the VLR.

Suppose that the user wants to make a call:

- User in Home Area: MSC contacts the HLR prior to setting up the call.
- User is Roaming: MSC contacts the VLR prior to setting up the call.

Suppose that there is a call for the user (call goes to the home MSC):

- User in Home Area: Home MSC delivers the call immediately.
- User is Roaming: Home MSC contacts the VLR to determine the appropriate switch in the roaming area to handle the arriving call and then transfers the call to the roaming area MSC.

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What are Some Issues with HLRs?

- Performance, especially fast lookups.
- Ability to handle different types of networks, including 3G networks.
- Capability/data to support user authentication.
- Support for data backups, fault tolerance, and reliability.
- Scalability.

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