

The logo of Galgotias University, featuring a stylized 'G' composed of overlapping curved bands in shades of yellow, blue, and red.

UNIT-II

Mobility Management

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Mobility Management

1. Location Management
2. Handoff Management

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Mobility Management

- Traditional mobile communication applications were in two-way voice communication, text, emails and remote file downloading.
- The emerging applications in video streaming, sensor networking, telemedicine and surveillance are expected to dominate and shape the next generation of mobile communication systems.
- One critical feature that enables the ubiquitous communication is the mobility management - which is perceived to provide continuous constant quality of service even under very harsh and unexpected conditions.
- Basic mobility management operations include location update as mobile units move around and location lookup as mobile units are wanted.

Mobility issues

- Radio resource management
- Location info management
- Security
- Temporary loss of connectivity with movement
- Scarce resources : Small devices, low battery power, small CPU, less memory, light weight,.....
- React to sudden change in environment due to bandwidth and other resource changes

Location Management

- Location management schemes are based on users' mobility and incoming call rate characteristics. The network mobility process has to face strong antagonism between its two basic procedures: location update (or registration) and paging.
- The location update procedure allows the system to keep location knowledge more or less accurately in order to find the user. Location registration also is used to bring the user's service profile near its location.
- The paging process by the system sends paging messages in all cells where the mobile terminal could be located. A network must retain information about the locations of endpoints in the network in order to route traffic to the correct destinations.

Location tracking

- Location tracking (also referred to as mobility tracking or mobility management) is the set of mechanisms by which location information is updated in response to endpoint mobility. It is important to differentiate between the identifier of an endpoint and its address (i.e., where the endpoint is located).
- Mechanisms for location tracking provide a time-varying mapping between the identifier and the address of each endpoint. Most location tracking mechanisms may be perceived as updating and querying a distributed database (the location database) of endpoint identifier-to-address mappings.

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Two operations of LM

- The **paging operation** is performed by the cellular network.
- When an incoming call arrives for a mobile station, the cellular network will page the mobile station in all possible cells to find out the cell in which the mobile station is located so that the incoming call can be routed to the corresponding base station. This process is called paging. The number of all possible cells to be paged is dependent on how the location update operation is performed.
- The **location update operation** is performed by an active mobile station.

Paging schemes

- **Blanket paging in GSM** : Paging the MS in all the cells within a LA (location area) simultaneously. If the LA update is correct, in the very first paging cycle, the MS will receive a paging request & respond to it. Here the delay of the paging response is kept to a minimum. The disadvantage is that paging has to be done in several cells with the same LA!
- **Closest-cells first**: The cell where the MS was last seen is paged first followed by subsequent rings of cells that are equidistant from this cell in each paging cycle. Also called sequential paging.

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Location Tracking

- Has two components: (1) determining when and how a change in a location database entry should be initiated; and (2) organizing and maintaining the location database.
- In cellular networks, endpoint mobility within a cell is transparent to the network, and hence location tracking is only required when an endpoint moves from one cell to another. Location tracking typically consists of two operations: (1) updating (or registration), the process by which a mobile endpoint initiates a change in the location database according to its new location; and (2) finding (or paging), the process by which the network initiates a query for an endpoint's location (which also may result in an update to the location database). Most location tracking techniques use a combination of updating and finding in an effort to select the best trade-off between update overhead and delay incurred in finding. Specifically, updates are not usually sent every time an endpoint enters a new cell, but rather are sent according to a predefined strategy so that the finding operation can be restricted to a specific area.

Location Tracking

- Location management methods are most adapted and widely used in current cellular networks, e.g., GSM, IS-54, IS-95, etc. The location management methods are broadly classified into two groups. **The first group includes all methods based on algorithms and network architecture, mainly on the processing capabilities of the system. The second group contains the methods based on learning processes,** which require the collection of statistics on subscribers' mobility behavior, for instance.

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Location update algorithms

- Two types:
- Static
- Dynamic
- A location update scheme can be classified as either **global or local**. A location update scheme is global if all subscribers update their locations at the same set of cells, and a scheme is local if an individual subscriber is allowed to decide when and where to perform location update. A local scheme is also called individualized or per-user based.

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Thank You