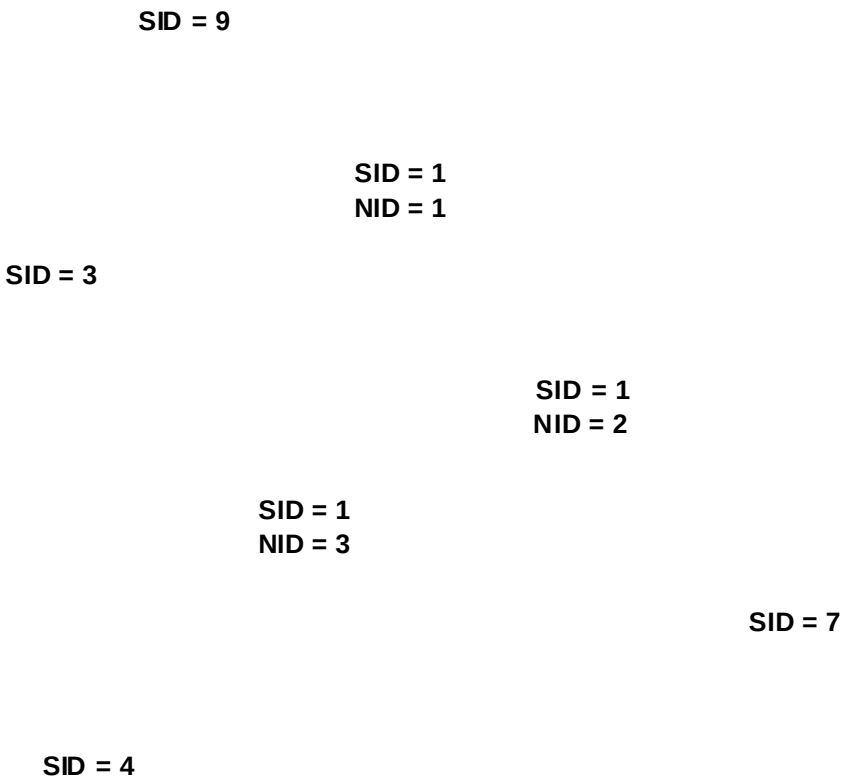
Registration

Objectives

- Discuss the concepts of “TMSI Zones” and “TMSI Codes”.
- Recall the concept of “roaming”, and identify the three roaming states in which a mobile station can be found.
- Recall the differences between “HLR” and “VLR”.
- Define the term registration.
- Discuss the trade-off between registration and paging.
- Identify and discuss the different forms of CDMA registration.

System and Networks



TMSI Zones and TMSI Codes

TMSI_CODE = 111 (octal)

TMSI_CODE = 222 (octal)

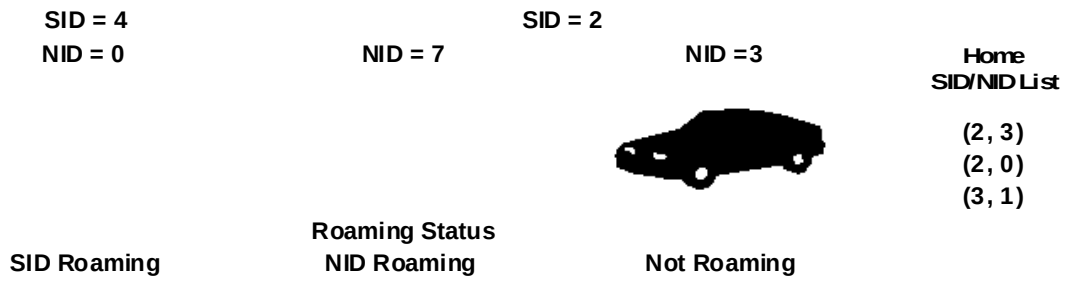
TMSI_ZONE = 527 (octal)

TMSI_ZONE = 303 (octal)

TMSI_ZONE = 142 (octal)

TMSI_CODE = 222 (octal)

Roaming



- A mobile station may be in any of the following roaming states:
  - **Home**: mobile station is at its home location (not roaming)
  - **NID roaming**: mobile station is within a foreign NID but in the home SID
  - **SID roaming**: mobile station is within a foreign SID
- A mobile station maintains a list of one or more " **home pairs**"
  - These are SID/NID combinations defining the mobile station's home location
  - They are stored in semi-permanent memory
- The identity of current SID/NID is contained in the *System Parameters Message* (sent on the Paging Channel)

HLR and VLR

HLR

- Contains permanent subscriber data
  - provisioning information
  - service information
  - features available to the subscriber
- Contains dynamic information
  - mobile station's current location
- Supports call routing
- Queried by the MSC when subscriber information is needed, regardless of the mobile station's current location

VLR

- Stores a subset of the HLR information pertaining to the mobile stations currently registered in the VLR's service area

Forms of CDMA Registration

- Power-up registration
- Power-down registration
- Timer-based registration
- Distance-based registration
- Zone-based registration
- Parameter-change registration
- Implicit registration
- Ordered registration
- Traffic channel registration

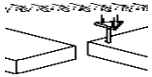
All types of registration can be enabled or disabled by means of the *System Parameters Message*

These Reg. types may not be common to some CDMA vendors

Power-Up Registration



ON

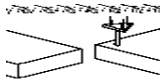


- Mobile station registers when
  - Directed to power-on by the user
  - Switched to an alternate serving system
  - Switched from using an analog system
- Delays 20 seconds
  - Preventing multiple registrations whenever power is quickly turned on and off

Power Down Registration



OFF



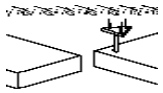
- Mobile station registers when directed to power-down by the user
- Mobile station will not power down until attempt is completed
- Mobile station will not do power down registration if
  - Not registered in the current system

Timer Based Registration



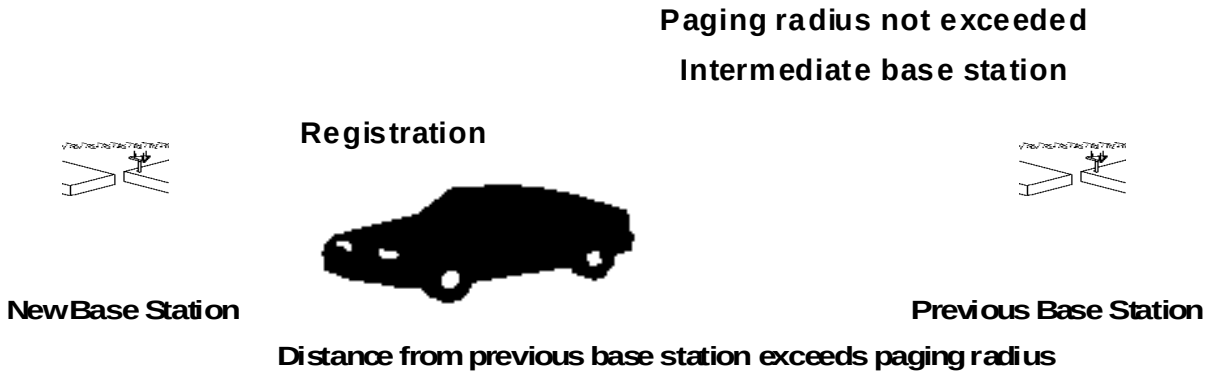
Paging Channel

Access Channel



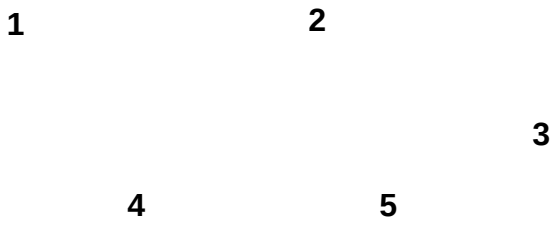
- Mobile station registers when a timer expires
- Registration period is determined by the base station
- Allows system to de-register mobile stations that fail to register on power-down

Distance Based Registeration



- Mobile station registers whenever the distance between the current base station and the base station where it last registered exceeds a specified threshold
- Useful where most mobile stations are fairly static
- Employs a geographic trigger based on GPS data
- Distance moved determined by difference in latitudes and longitudes between base stations
- Required information provided in the System Parameters Message

Zone Based Registration



NOTE: These are registration zones, not TMSI zones!

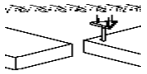
- The mobile station registers when it enters a new zone
- A zone is a subset of the base stations within a network
- The mobile station keeps a list of the zones where it has registered, up to a maximum determined by the base station
- Each zone is uniquely identified by the registration zone number parameter (REG_ZONE) plus the SID and the NID to which it belongs
- The mobile station activates a timer for every zone where it has registered, except the active one, and de-registers when the timer expires
- The mobile station will not re-register if it enters a zone which is already in its list

This method may not be supported by some of the vendors

Parameter-Change Registration

SLOT_CYCLE_INDEX
SLOTTED_MODE
MOB_TERM_HOME
etc.



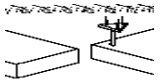


Registration

- The mobile station registers after it modifies any of the following parameters (stored in the mobile station):
  - the call termination enabled indicators
- or the following capabilities supported by the mobile station:
  - the band classes
  - the power classes
  - the rates
  - the operating modes

Implicit Registration

Origination Message --->
Page Response Message -->

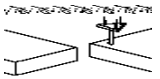




- Occurs when the mobile station and base station exchange messages not directly related to registration
  - Messaging conveys sufficient information to identify mobile station and its location
- Considered successful whenever mobile station sends an Origination Message or Page Response Message
- Compatible with AMPS and IS-54 methods
- Effectiveness considered adequate to preclude use of ordered registration

Ordered and Traffic Channel Registration

Registration Request Order (Paging/Traffic Channel)





Traffic Channel Registration (Traffic Channel)

- Ordered Registration
  - Allows the base station to order a mobile station to register
    - mobile station can be idle or in an active call
- Traffic Channel Registration
  - Allows the base station to obtain registration information about a mobile station that has been assigned to a Traffic Channel
  - Information exchange occurs on the Traffic Channel
  - Suggested use is on inter-system handoffs

This method may not be supported by some of the vendors