To serve all the cell customers a network provider places Base Subsystem Stations ( here after BSS ) which consists of Base Transceiver Stations ( here after BTS ) which is controlled by Base Station Transceivers ( here after BST) all across the geographic location. Each BST has a range and it tries to serve all the cells present in that range. In order to be in service a cell has to be always latched to a BST. When a cell moves; based on the signal strength; BSTs hand off cells from one BTS to any of the adjacent BTSs in order to maintain a permissible signal level for the cell. This very information is logged in each BTS, which we are trying to use for this project.

Based on the above information we can consider this entire network of BTS as a graph with the BTSs as the nodes and the imaginary connection to adjacent BTSs to which a cell can be handed off while the cells are moving; as edges.

[Image]

If we can map this to corresponding routes; we can deduce the traffic movement in any area having BTS.

Practically BTS location rarely changes which information comes from Mobile Switching Center ( here after MSC ) as MSC logs. And in a production system we should be considering this log to calculate the BST and their adjacent BSTs to form the graph described above. But for the simplicity of this project / prototype I’m predefining and hardcoding the BSTs and the graph. Basically we are not considering MSC logs for this project as of now !!!

\*BSS [ Base Substation System : BST + BTS ]

MSC Logs :

MSC logs contain information about the BTSs under the MS. The fields in MS log can be :

BTSID Latitude Longitude Range AntenaType etc

In real system we can use this log to find out the adjacent BTS which can hand off from one to the next for a moving cell. But for simplicity of this project we are assuming a few BSTs in an area with pre-decided adjacent BTSs.

BTS Log :

We are assuming the below BTS log file format :

We are assuming that the data is stored as .log file using a line-oriented ASCII format, in which each line is a record. The format supports a rich set of BTS and SIM specific elements, many of which are optional or with variable data lengths. For simplicity, we shall focus on the basic elements which are always present and are of fixed width :

BTSID direction latitude direction longitude IMSI Date TimeStamp SignalStrength

10 1 8(x10^6) 1 8(x10^6) 15 8 6(24 hrs) 4(x100 / Unit dB)

AAAADDDDDD D[0/1] DDDDDDDD D[0/1] DDDDDDDD DDDDDDDDDDDDDDD DDMMYYYY HHMMSS

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Header | **BTSID** | **Direction** | **Latitude** | **Direction** | **Longitude** | **IMSI** | **Date** | **TimeStamp** | **SignalStrength** |
| Length | 10 | 1 | 8 | 1 | 8 | 15 | 8 | 6 | 4 |
| Type | AAAADDDDDD | D[0/1] | DDDDDDDD | D[0/1] | DDDDDDDD | DDDDDDDDDDDDDDD | DDMMYYYY | HHMMSS | DDDD |

D: Digit

A : Alphabet

HH : Hour

MM : Min

SS: Seconds

DD: Day

MM: Month

YYYY : Year

Example :

ATXA000123112992065177602978404685505601234040820131631223123

Preferred Field in BTS LOGS:

ATXA000123 -> BTSID

1 -> Latitude Direction (+)

12°99'20.65" -> Latitude

1 -> Longitude Direction (+)

77°60'29.78" -> Longitude

404685505601234 -> IMSI (masked)

04082013 -> Date DD MM YYYY

16:31:22 -> TimeStamp HH:MM:SS

3123 -> Signal Strength 31.23 dB

We are assuming that we have a fixed set of BTSs having fixed range of 400m and have a overlay between BTSs as 100m at least. So the distance between 2 BTSs will be at most 700m.

Below are the routes considered; having BTS id and their corresponding coordinates :

**Route 1**: (Jayamahal Main Road -> Jayamahal Second Main road -> Mekri Circle)

ATXA000829 : +12° 59' 37.72", +77° 35' 47.14"

ATXB000876 : +12° 59' 58.04", +77° 35' 36.02"

ATXX000278 : +13° 00' 19.42", +77° 35' 39.88"

ATXZ000289 : +13° 00' 41.09", +77° 35' 19.95"

ATXR000009 : +13° 00' 53.63", +77° 35' 03.75"

**Route 2**: (Jayamahal Main Road-> Nandi Durga Road -> Mekri Circle)

ATXA000829 : +12° 59' 37.72", +77° 35' 47.14"

ATXC000268 : +12° 59' 41.78", +77° 36' 08.15"

ATXM000277 : +13° 00' 03.01", +77° 36' 04.60"

ATXX000278 : +13° 00' 19.42", +77° 35' 39.88"

ATXZ000289 : +13° 00' 41.09", +77° 35' 19.95"

ATXR000009 : +13° 00' 53.63", +77° 35' 03.75"

**Route 3**: (Jayamahal Main Road -> Nandi Durga Road-> JC Nagar Main Road)

ATXA000829 : +12° 59' 37.72", +77° 35' 47.14"

ATXC000268 : +12° 59' 41.78", +77° 36' 08.15"

ATXM000277 : +13° 00' 03.01", +77° 36' 04.60"

ATXX000278 : +13° 00' 19.42", +77° 35' 39.88"

ATMA000245 : +13° 00' 42.30", +77° 35' 43.03"

AMCD000784 : +13° 10' 05.85", +77° 35' 56.04"

ATXV000934 : +13° 10' 23.51", +77° 36' 03.81"

**Route 4** : (Jayamahal Main Road -> Jayamahal Second Main road -> JC Nagar Main Road)

ATXA000829 : +12° 59' 37.72", +77° 35' 47.14"

ATXB000876 : +12° 59' 58.04", +77° 35' 36.02"

ATXX000278 : +13° 00' 19.42", +77° 35' 39.88"

ATMA000245 : +13° 00' 42.30", +77° 35' 43.03"

AMCD000784 : +13° 01' 05.85", +77° 35' 56.04"

ATXV000934 : +13° 01' 23.51", +77° 36' 03.81"

Route 5 : (Jayamahal Main Road -> Nandi Durga Road-> Cole’s Park )

ATXA000829 : +12° 59' 37.72", +77° 35' 47.14"

ATXC000268 : +12° 59' 41.78", +77° 36' 08.15"

ATXA002897 : +12° 59' 36.52", +77° 36' 33.65"

**Use Case 1: ( VAASANTHI / DEEPAK )**

User Inputs :

* Starting Point ( latitude, longitude ) here after A,
* End Point ( latitude, longitude ) here after B,
* StartTime
* EndTime

Show the traffic trend for chosen path between A and B for the specified time interval i.e StartTime and EndTime as a static color-coded map.

**Use Case 2: ( SUKANTA )**

User Inputs :

An area in map

StartTime

EndTime

Show the traffic trend for the chosen area as an animation of moving mass for the given time interval i.e StartTime and EndTime

**UseCase 3 : ( DEEPAK / VAASANTHI )**

User Inputs :

* Starting Point ( latitude, longitude ) here after A,
* End Point ( latitude, longitude ) here after B,
* StartTime

Show the optimal route between A and B based on past history of different routes between A and B