



Positioning Handsets on a Telstra GSM network

There are two different types of GSM base stations:

- a. Omni-directional Cell
- b. Sectorised Cell

Omni-directional cells are generally deployed by Telstra in 2 main coverage environments. In rural areas where the aim is to maximise the radio coverage area and in the CBD where there are deployed to create higher traffic density smaller cells. Omni-directional cells may also be used occasionally where a layer approached to cell planning is required to achieve both traffic and coverage demands. The antenna provides coverage in a 360 degree area around the antenna, the maximum coverage of this type of cell is usually up to 35km.

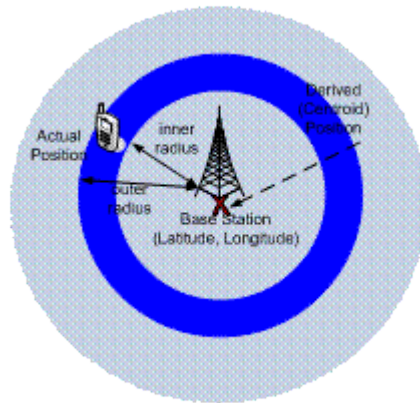


Figure 1 – GSM Omni-Directional Cell

When a subscriber is attached to an Omni-directional cell there is no way tell which direction the subscriber is located relative to the antenna, therefore the mobile positioning only returns the following information:

- Latitude and Longitude of the base-station's antenna
- Assuming CGI/TA technology was used the device should be located in the blue shaded area as shown in Figure 1 where the approximate distance from the base-station given as an inner radius and outer radius

For an Omni cell, the centroid is the location of the base station.

A "Sectorised" cell generally has 3 sets of panel antennas; each set of antennas provides coverage to 120 degrees of the possible 360 degrees. Sectorised sites are generally found in suburban areas and some country locations. Note some sectorised sites have 2 or 4 sectors, providing coverage to 180 or 90 degrees. The maximum coverage of a sectorised call is up to 50km on land and 100km on water.

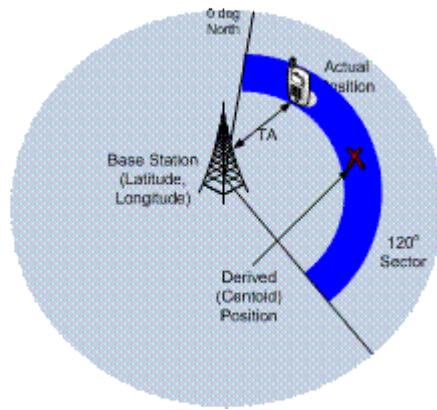


Figure 2 – GSM Sectorised Cell

When a user is attached to such a sectorised cell it is possible to determine which sector they are in and their approximate distance from the base station, the mobile positioning system returns the following information:

- Latitude and Longitude of the base-station's antenna
- Approximate distance from the base-station given as an inner radius and outer radius (shown in Figure 1 as the blue shaded area)
- Start angle of the sector
- Stop angle of the sector

In the case of a sectorised cell the centroid could be calculated to be outside the actual coverage area as this gives the statistical shortest distance to all possible actual locations of the subscriber.

Positioning handsets on a Telstra 3G / WCDMA Network

In 3GSM/WCDMA the positioning information is based on the approximate radio coverage of each cell/sector, this information is returned to the application in a polygon format. The polygon is specified by giving the latitude and longitude of between 3-15 points (corners of the polygon).

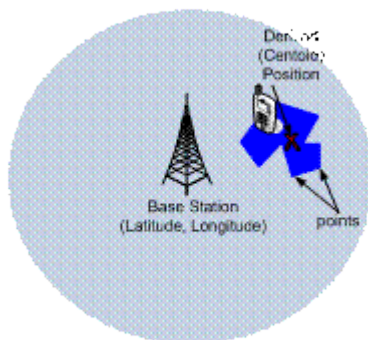


Figure 3 – WCDMA Polygon

The centroid for a WCDMA cell is the mathematical centre of the polygon; this might actually be outside the polygon shape.

The maximum coverage of a current 2.1GHz WCDMA cell is about 10km; however Telstra's new 850MHz WCDMA cells will have coverage up to 100km.