level is determined for the broadcast channel signal level of each cell based on this prediction.

FIG. **8** shows the broadcast channel antenna patterns of FIG. **6** with high traffic demand area **99** located in cell **34**. An example of a relatively high traffic demand area would be a city such as Hong Kong. The broadcast channel signal level of antenna pattern **96** is shown as reduced to limit subscribers outside the antenna pattern region from communicating on traffic channels within cell **34**.

As a satellite moves over high traffic demand area **99**, the relative positions of the antenna patterns change with respect to the high demand area. Subscriber units located within high traffic demand area **99** must eventually transfer to other cells as cell **34** associated with antenna pattern **96** moves.

FIG. **9** shows the broadcast channel antenna patterns of FIG. **8** shifted in time. High traffic demand area **99** which was previously located within antenna pattern **96** of cell **34** is now located within antenna patterns **93** and **94**. Based on the size of the antenna patterns in the preferred embodiment, FIG. **9**, is shifted in time by approximately one minute. Antenna pattern **96** must be increased as high traffic demand area **99** moves to retain subscriber units within antenna pattern **96**. FIG. **9** shows antenna pattern **96** increased back to its original size to include high traffic demand area **99** as high traffic demand area **99** has moved. Antenna patterns **93** and **94** have been reduced in size to include high demand area and exclude potential subscriber units located in the area previously included by antenna patterns **93** and **94**. For subsequent time periods, as high traffic demand area **99** passes through subsequent antenna patterns, the broadcast channel signal level of the subsequent cells may likewise be reduced.

In a preferred embodiment, the signal quality of the broadcast channels are established by SCS 28 (FIG. **1**) for all cells in communication system **10**. Preferably, signal quality levels are predetermined in advance for each planning interval and are based on the predicted demand each cell will experience during that planning interval. Each satellite stores a list of the broadcast channel signal quality for each cell under its jurisdiction and for each planning interval. In one preferred embodiment, a satellite will have a specified broadcast channel signal level for every thirty second planning interval of its orbit. At the appropriate time, the satellite individually changes the signal level of each of its broadcast channels according to this list.

Table I shows an example of a list of relative signal levels for which a broadcast channel associated with a particular cell may be changed during a planning interval. For example as shown in Table I, at the beginning of the first planning interval, the broadcast channel signal level may start at its nominal level (0dB) and by the end of the planning interval, be reduced by 1dB. During this planning interval, a high demand area may be predicted to move into the jurisdiction of the cell for which the signal level is being adjusted.

TABLE I

| PLANNING INTERVAL | START POWER | END POWER |
|---|---|---|
| 1 | 0dB | −1dB |
| 2 | −1dB | −2dB |
| 3 | −2dB | −1dB |
| 4 | −1dB | 0dB |
| 5 | 0dB | 0dB |
| 6 | 0dB | 0dB |
| . | . | . |
| . | . | . |

During the second planning interval, the signal level of the broadcast channel is further reduced by 1dB yielding a total reduction of 2dB. In this case, the second planning interval occurs as a high demand area approaches the center of the cell. During the third planning interval, the broadcast channel signal level is increased by 1dB as the high demand area begins to move out of the cell.

During the fourth planning interval, the signal level is increased back again to its nominal level as the high demand area has moved substantially out of the cell. The relative signal level for the broadcast channel would remain at the nominal level (for example during planning intervals **5**, **6** . . . ) until the cell approaches another predicted high demand area.

In one embodiment of the present invention, the signal level settings for the broadcast channel are retrieved by a satellite for each cell from TABLE I. The signal level in the broadcast channel is then varied from the start value to the stop value over the duration of the planning interval. Preferably, the signal level is varied at a linear rate during the planning interval.

FIG. **10** shows a flowchart of procedure **100** for adjusting the broadcast channel signal level of a cell suitable for use in a preferred embodiment of the present invention. Procedure **100** is desirably performed by satellite **12** (FIG. **1**) for each cell under the jurisdiction of the satellite. In another preferred embodiment, procedure **100** is performed by each satellite in communication system **10** (FIG. **1**).

Task **102** sets the signal level of the broadcast channel for the cell under consideration. The signal level is initially determined to prevent excessive overlap with cells of adjacent satellites. In the preferred embodiment where the satellites are in polar orbits and the amount of overlap increases as the satellites approach the poles, the broadcast channel signal level depends on the satellites orbital position. For example, as the satellites approach the poles, broadcast channel signal levels are reduced. In some situations, the broadcast channels for certain cells may be turned off completely to prevent subscriber unit access to those cells. A cell shutdown procedure described previously makes these determinations.

In one preferred embodiment, task **102** may also adjust the broadcast channel signal level by an amount based on a predicted demand for communication services during the planning interval under consideration. A table stored in the satellite similar to TABLE I, for example, may be used.

Task **104** measures the actual demand for communication services within the cell. Preferably the number of traffic channels issued to subscriber units is compared to the maximum number of traffic channels allocated to the cell. When a predetermined amount of traffic channels are issued, for example ninety or ninety-five percent of available traffic channels, it is desirable to limit access of new subscriber units and encourage subscriber units on the outer regions of the cell to transfer to adjacent cells.

When task **106** determines that the capacity of the cell is too low, task **108** reduces the broadcast channel signal level by a predetermined amount, for example 1dB or 2dB. In one embodiment, task **110** may reduce the broadcast channel signal level of the cell until the demand for communication services falls below some predetermined threshold, or a minimum broadcast channel signal level is reached. When task **106** determines that the capacity of the cell is not too low, and therefore there is no reason to discourage new subscriber units for requesting access to the cell, task **110** determines if the cell has excess capacity. Preferably, task **110** compares the number of traffic channels issued to subscriber units to the number of traffic channels available.

When there is excess capacity in the present cell, it may be desirable to increase the amount of subscriber units in the