PATENT APPLICATION
DOCKET # 1005-0019

WHAT IS CLAIMED IS:

1. A method in a cellular telecommunications network of optimizing a handoff border between a present cell and a neighbor cell, said method comprising the steps of:

determining a current hysteresis value utilized to ensure that a mobile station (MS) is receiving a stronger signal from the neighbor cell than the present cell before a handoff is performed from the present cell to the neighbor cell, said stronger signal being stronger by the hysteresis value;

collecting pairs of signal strength (SS) measurements from a plurality of MSs operating near the handoff border, each SS measurement pair including an SS measurement from the present cell prior to a handoff and an SS measurement from the neighbor cell following the handoff;

calculating a midpoint SS by determining an average SS measurement from the present cell, an average SS measurement from the neighbor cell, and an overall average of the average SS measurement from the present cell and the average SS measurement from the neighbor cell; and

optimizing the handoff border by subtracting from the current hysteresis value, an amount approximately equal to the difference between the midpoint SS and the average SS measurement from the present cell.

2. The method of optimizing a handoff border of claim 1 further comprising repeating the steps of claim 1 utilizing SS measurements from a greater number of MSs.

3. A method in a cellular telecommunications network of optimizing an outgoing hysteresis value utilized for controlling handoff of a mobile station from a present cell to a neighbor cell at a handoff border, said method comprising the steps of:

determining a current outgoing hysteresis value;

collecting a plurality of signal strength (SS) measurements taken by a plurality of mobile stations operating near the handoff border, said SS measurements including, for each mobile station, a first SS measurement of a signal received by the mobile station from a first base station serving the present cell prior to a handoff, and a second SS measurement of a signal received by the mobile station from a second base station serving the neighbor cell following the handoff;

calculating an average SS on the present cell side of the handoff border (CP);

calculating an average SS on the neighbor cell side of the handoff border (CN);

calculating a midpoint SS between the present cell and the neighbor cell by calculating an average of CP and CN;

calculating an expected signal strength on the present cell side of the handoff border following the handoff (EP) by subtracting a factor due to rounding errors from the midpoint SS; and

calculating a recommended hysteresis value for outgoing handoffs from the present cell to the neighbor cell by subtracting from the current outgoing hysteresis value, the difference between EP and CP.

4. The method of optimizing an outgoing hysteresis value of claim 3 further comprising updating the outgoing hysteresis value by repeating the steps of claim 1 utilizing the most recent SS measurements from MSs in the present cell.

5. The method of optimizing an outgoing hysteresis value of claim 3 further comprising fine tuning the outgoing hysteresis value by repeating the steps of claim 1 utilizing SS measurements from all of the MSs operating in the present cell.

6. The method of optimizing an outgoing hysteresis value of claim 3 further comprising the steps of:

determining whether the recommended hysteresis value is less than or equal to a default hysteresis value; and

upon determining that the recommended hysteresis value is less than or equal to the default hysteresis value, utilizing the default hysteresis value to control handoffs.

7. The method of optimizing an outgoing hysteresis value of claim 3 further comprising the steps of:

determining whether the SS for the present cell is below a predefined threshold for weak signal strength while the SS for the neighbor cell is above a predefined threshold for strong signal strength; and

adjusting the current hysteresis value based on the calculated midpoint SS, upon determining that the SS for the present cell is below the weak SS threshold and the SS for the neighbor cell is above the strong SS threshold.

8. The method of optimizing an outgoing hysteresis value of claim 7 further comprising adjusting the current hysteresis value based on the measured SS, upon determining that either the SS for the present cell is above the weak SS threshold or the SS for the neighbor cell is below the strong SS threshold.

9. A method in a cellular telecommunications network of optimizing an incoming hysteresis value utilized for controlling handoff of a mobile station from a neighbor cell to a present cell at a handoff border, said method comprising the steps of:

determining a current incoming hysteresis value;

collecting a plurality of signal strength (SS) measurements taken by a plurality of mobile stations operating near the handoff border, said SS measurements including, for each mobile station, a first SS measurement of a signal received by the mobile station from a first base station serving the present cell prior to a handoff, and a second SS measurement of a signal received by the mobile station from a second base station serving the neighbor cell following the handoff;

calculating an average SS on the present cell side of the handoff border (CP);

calculating an average SS on the neighbor cell side of the handoff border (CN);

calculating a midpoint SS between the present cell and the neighbor cell by calculating an average of CP and CN;

calculating an expected signal strength on the neighbor cell side of the handoff border following the handoff (EN) by adding a factor due to rounding errors, and adding an MS output-power step-size factor to the midpoint SS; and

calculating a recommended hysteresis value for incoming handoffs from the neighbor cell to the present cell by subtracting from the current incoming hysteresis value, the difference between EN and CN.

10. A method in a cellular telecommunications network of optimizing outgoing and incoming hysteresis values utilized for controlling when a mobile station is handed off between a present cell and a neighbor cell at a handoff border, said method comprising the steps of:

determining a current outgoing hysteresis value;

determining a current incoming hysteresis value;

collecting a plurality of signal strength (SS) measurements taken by a plurality of mobile stations operating near the handoff border, said SS measurements including, for each mobile station, a first SS measurement of a signal received by the mobile station from a first base station serving the present cell prior to a handoff, and a second SS measurement of a signal received by the mobile station from a second base station serving the neighbor cell following the handoff;

calculating an average SS on the present cell side of the handoff border (CP);

calculating an average SS on the neighbor cell side of the handoff border (CN);

calculating a midpoint SS between the present cell and the neighbor cell by calculating an average of CP and CN;

calculating an expected signal strength on the present cell side of the handoff border following the handoff (EP) by subtracting a factor due to rounding errors from the midpoint SS;

calculating an expected signal strength on the neighbor cell side of the handoff border following the handoff (EN) by adding the factor due to rounding errors, and adding an MS output-power step-size factor, to the midpoint SS;

calculating a recommended hysteresis value for outgoing handoffs from the present cell to the neighbor cell by subtracting from the current outgoing hysteresis value, the difference between EP and CP; and

calculating a recommended hysteresis value for incoming handoffs from the neighbor cell to the present cell by subtracting from the current incoming hysteresis value, the difference between EN and CN.