CLAIMS

What is claimed is:

1. A method for expanded cell search and selection in a mobile wireless communication device, the method comprising:

in a mobile wireless communication device,

searching for and locating cells in a first list of neighbor cells and a second list of stored cells;

evaluating the located cells using suitability criteria;

when locating a suitable first cell that uses a first radio access technology in the first list of neighbor cells, selecting the first cell; otherwise

when locating a suitable second cell that uses a second radio access technology in the first list of neighbor cells and not locating a suitable cell that uses the first radio access technology in the second list of stored cells, selecting the second cell; otherwise

when locating a suitable third cell that uses the second radio access technology in the first list of neighbor cells, and locating a suitable fourth cell that uses the first radio access technology in the second list of stored cells, and the fourth cell is more suitable than the third cell, selecting the fourth cell.

2. The method as recited in claim 1 further comprising:

when not locating a suitable cell that uses the first or second radio access technologies in the first list of neighbor cells, initiating an out of service recovery process.

3. The method as recited in claims 1 or 2, wherein the first radio access technology is preferred to the second radio access technology.

4. The method as recited in any of claims 1 - 3, wherein a radio access technology preference is determined by a maximum achievable data transfer rate.

5. The method as recited in an of the preceding claims, wherein the first list of neighbor cells is broadcast by a radio network subsystem in a wireless communication network, and the second list of stored cells is not broadcast by the radio network subsystem.

6. The method as recited in any of claims 3 - 5, wherein the second radio access technology is a 2G GSM technology and the first radio access technology is a 3G UMTS or later generation technology.

7. The method as recited in any of claims 3 - 6, wherein the fourth cell is a femto cell, and the radio network subsystem does not broadcast the primary scrambling code of the femto cell.

8. The method as recited in claim 1, wherein the mobile wireless device assembles the first list of neighbor cells based on information broadcast by one or more network subsystems in a wireless communication network, and the second list of stored cells includes information for at least one cell not broadcast by the wireless communication network.

9. An apparatus for expanded cell search and selection in a wireless communication network, the apparatus comprising:

an application processor configured to provide an application service; and

a transceiver configured to:

detect a loss of service condition;

search for and locate cells in a first of neighbor cells and a second list of stored cells;

evaluate the located cells using suitability criteria; and

select a suitable first cell that uses a first radio access technology in the second list of stored cells, when not locating a suitable cell that uses the first radio access technology in the first list of neighbor cells, and when locating a suitable second cell that uses a second radio access technology in the first list of neighbor cells, the second cell being inferior to the first cell.

10. The apparatus as recited in claim 9, wherein the transceiver is further configured to select a suitable cell that uses the first radio access technology in the first list of neighbor cells, irrespective of suitable cells located in the second list of stored cells.

11. The apparatus as recited in claims 9 or 10, wherein the transceiver is further configured to initiate an out of service recovery process when no located cell that uses the first or second radio access technology in the first list of neighbor cells satisfies the suitability criteria.

12. The apparatus as recited in any of claims 9 - 11, wherein the transceiver is further configured to select a suitable cell that uses the second radio access technology in the first list of neighbor cells when no located cell that uses the first

radio access technology in the first list of neighbor cells or in the second list of stored cells satisfies the suitability criteria.

13. The apparatus as recited in any of claims 9 - 12, wherein the first radio access technology is preferred to the second radio access technology.

14. The apparatus as recited in claim 13, wherein preference is based on a later generation radio access technology.

15. The apparatus as recited in any of claims 9 - 14, wherein information about the suitable first cell is the second list of stored cells is not broadcast by any of the located cells.

16. The apparatus as recited in any of claims 9 - 15, wherein the suitable first cell is a private cell having a limited transmission range of less than 20 meters coverage.

17. A non-transitory computer readable medium for storing non-transitory computer program code executable by a processor in a mobile wireless device for searching for and selecting a suitable cell, the non-transitory computer readable medium comprising:

non-transitory computer program code for locating and evaluating cells in a first list of neighbor cells and in a second list of stored cells using suitability criteria;

non-transitory computer program code for selecting a first suitable cell in the second list of stored cells, the first suitable cell using a first radio access technology, when no suitable cell that uses the first radio access technology is found from the first list of neighbor cells, and when the first suitable cell from the second list of stored cells outperforms all suitable cells found from the first list of neighbor cells.

18. The non-transitory computer readable medium as recited in claim 17, further comprising:

non-transitory computer program code for locating and selecting a suitable cell from the first list of neighbor cells, the suitable cell using the first radio access technology.

19. The non-transitory computer readable medium as recited in claims 17 or 18, further comprising:

non-transitory computer program code for initiating an out of service recovery process when no suitable cell is located from the first list of neighbor cells.

20. The non-transitory computer readable medium as recited in any of claims 17 - 19, further comprising:

non-transitory computer program code for selecting a suitable cell in the first list of neighbor cells that uses a second radio access technology when no suitable located cell that uses the first radio access technology is found in the first list of neighbor cells or in the second list of stored cells.

21. The non-transitory computer readable medium as recited in any of claims 17 - 20, wherein the first radio access technology provides a higher performing connection to the mobile wireless device than the second radio access technology.

22. The non-transitory computer readable medium as recited in any of claims 17 - 21, wherein the second list of stored cells includes information about the stored cells not broadcast by the located cells.

23. The non-transitory computer readable medium as recited in any of claims 17 - 22, wherein the first radio access technology uses a 3G or later generation communications protocol and the second radio access technology uses a 2G or earlier generation communication protocol.

24. The non-transitory computer readable medium as recited in any of claims 17 - 23, wherein the first suitable cell is a private cell with characteristics not broadcast by an overlapping macro cell, the private cell having limited transmission coverage range.

What is claimed is:

1. A method for expanded cell search and selection in a mobile wireless communication device, the method comprising:

in a mobile wireless communication device,

searching for and locating cells in a first list of neighbor cells and a second list of stored cells;

evaluating the located cells using suitability criteria;

when locating a suitable first cell that uses a first radio access technology in the first list of neighbor cells, selecting the first cell; otherwise

when locating a suitable second cell that uses a second radio access technology in the first list of neighbor cells and not locating a suitable cell that uses the first radio access technology in the second list of stored cells, selecting the second cell; otherwise

when locating a suitable third cell that uses the second radio access technology in the first list of neighbor cells, and locating a suitable fourth cell that uses the first radio access technology in the second list of stored cells, and the fourth cell is more suitable than the third cell, selecting the fourth cell,

wherein the mobile wireless device assembles the first list of neighbor cells based on information broadcast by one or more network subsystems in a wireless communication network, and the second list of stored cells includes information for at least one cell not broadcast by the wireless communication network.

2. The method as recited in claim 1 further comprising:

when not locating a suitable cell that uses the first or second radio access technologies in the first list of neighbor cells, initiating an out of service recovery process.

3. The method as recited in claims 1 or 2, wherein the first radio access technology is preferred to the second radio access technology.

4. The method as recited in any of claims 1 - 3, wherein a radio access technology preference is determined by a maximum achievable data transfer rate.

5. The method as recited in any of claims 3 – 4, wherein the second radio access technology is a 2G GSM technology and the first radio access technology is a 3G UMTS or later generation technology.

6. The method as recited in any of claims 3 – 4 or 5, wherein the fourth cell is a femto cell, and the radio network subsystem does not broadcast the primary scrambling code of the femto cell.

7. An apparatus for expanded cell search and selection in a wireless communication network, the apparatus comprising:

an application processor configured to provide an application service; and

a transceiver configured to:

detect a loss of service condition;

search for and locate cells in a first of neighbor cells and a second list of stored cells;

assemble the first list of neighbor cells based on information broadcast by one or more network subsystems in a wireless communication network, and the second list of stored cells includes information for at least one cell not broadcast by the wireless communication network;

evaluate the located cells using suitability criteria; and

select a suitable first cell that uses a first radio access technology in the second list of stored cells, when not locating a suitable cell that uses the first radio access technology in the first list of neighbor cells, and when locating a suitable second cell that uses a second radio access technology in the first list of neighbor cells, the second cell being inferior to the first cell.

8. The apparatus as recited in claim 7, wherein the transceiver is further configured to select a suitable cell that uses the first radio access technology in the first list of neighbor cells, irrespective of suitable cells located in the second list of stored cells.

9. The apparatus as recited in claims 7 or 8, wherein the transceiver is further configured to initiate an out of service recovery process when no located cell that uses the first or second radio access technology in the first list of neighbor cells satisfies the suitability criteria.

10. The apparatus as recited in any of claims 7 - 9, wherein the transceiver is further configured to select a suitable cell that uses the second radio access technology in the first list of neighbor cells when no located cell that uses the first radio access technology in the first list of neighbor cells or in the second list of stored cells satisfies the suitability criteria.

11. The apparatus as recited in any of claims 7 - 10, wherein the first radio access technology is preferred to the second radio access technology.

12. The apparatus as recited in claim 11, wherein preference is based on a later generation radio access technology.

13. The apparatus as recited in any of claims 7 – 12, wherein the suitable first cell is a private cell having a limited transmission range of less than 20 meters coverage.

14. A non-transitory computer readable medium for storing non-transitory computer program code executable by a processor in a mobile wireless device for searching for and selecting a suitable cell, the non-transitory computer readable medium comprising:

non-transitory computer program code for locating and evaluating cells in a first list of neighbor cells and in a second list of stored cells using suitability criteria;

non-transitory computer program code for selecting a first suitable cell in the second list of stored cells, the first suitable cell using a first radio access technology, when no suitable cell that uses the first radio access technology is found from the first list of neighbor cells, and when the first suitable cell from the second list of stored cells outperforms all suitable cells found from the first list of neighbor cells; and

non-transitory computer program code for assembling the first list of neighbor cells based on information broadcast by one or more network subsystems in a wireless communication network, and the second list of stored cells includes information for at least one cell not broadcast by the wireless communication network.

15. The non-transitory computer readable medium as recited in claim 14, further comprising:

non-transitory computer program code for locating and selecting a suitable cell from the first list of neighbor cells, the suitable cell using the first radio access technology.

16. The non-transitory computer readable medium as recited in claims 14 or 15, further comprising:

non-transitory computer program code for initiating an out of service recovery process when no suitable cell is located from the first list of neighbor cells.

17. The non-transitory computer readable medium as recited in any of claims 14 - 16, further comprising:

non-transitory computer program code for selecting a suitable cell in the first list of neighbor cells that uses a second radio access technology when no suitable located cell that uses the first radio access technology is found in the first list of neighbor cells or in the second list of stored cells.

18. The non-transitory computer readable medium as recited in any of claims 14 - 17, wherein the first radio access technology provides a higher performing connection to the mobile wireless device than the second radio access technology.

19. The non-transitory computer readable medium as recited in any of claims 14 - 18, wherein the second list of stored cells includes information about the stored cells not broadcast by the located cells.

20. The non-transitory computer readable medium as recited in any of claims 14 - 19, wherein the first radio access technology uses a 3G or later generation communications protocol and the second radio access technology uses a 2G or earlier generation communication protocol.

21. The non-transitory computer readable medium as recited in any of claims 14 - 20, wherein the first suitable cell is a private cell with characteristics not broadcast by an overlapping macro cell, the private cell having limited transmission coverage range.