CLAIMS

1. A method of auto-aligning a beam within a receiving electronically steered antenna system comprising a plurality of antenna elements, the method comprising:

providing a list of codes, wherein each code is embedded in signals transmitted by a transmitter of a plurality of transmitters, and identifies the transmitted signal as originating from the transmitter;

selecting a transmitter from among the plurality of transmitters and identifying a code corresponding to the selected transmitter; and

for each antenna element:

receiving a first communications signal;

receiving a second signal representative of the first communications signal received by the plurality of antenna elements;

correlating the first communications signal and the second signal with the identified code to respectively generate a first output signal and a second output signal;

comparing the first output signal and the second output signal, and determining an error signal that includes one or both of a phase error signal and a time error signal; and

minimizing a difference between the first output signal and the second output signal by applying the error signal to the first communications signal.

2. The method according to claim 1, wherein comparing the first and second output signals and determining the error signal is performed by executing an algorithm, and the algorithm is an iteratively converging algorithm.

3. The method according to claim 1, wherein the codes are orthogonal in order to minimise cross correlation.

4. The method according to claim 1, wherein the codes are embedded in the signals transmitted by a respective transmitting entity so that they are transmitted within a fixed framing structure.

5. The method according to claim 4, wherein the fixed framing structure is synchronised with a GPS tick.

6. The method according to claim 4, wherein the codes are embedded in the signals transmitted by the transmitter by superposing the code on the signals.

7. The method according to claim 4, wherein the codes are embedded in the signals transmitted by the respective transmitting entity by interleaving the codes with the signal.

8. The method according to claim 1, wherein the electronically steered antennae system includes a phased array antenna system.

9. The method according to claim 8, wherein the phased array antenna system includes a plurality of satellites.

10. The method according to claim 9, wherein the satellites are selected from a group including geostationary satellites and LEO satellites.

11. The method according to claim 8, wherein the phased array antenna system includes a plurality of vehicles capable of moving.

12. The method according to claim 11, wherein the vehicles are selected from a group including aircraft, automobiles, trains, and water craft.

13. The method according to claim 8, wherein the phased array antenna system includes a plurality of terrestrial base stations.

14. The method according to claim 1, wherein the system is configured to have a plurality of beam widths and gains which can be scanned in order to maximize a correlated power of the selected transmitter.

15. The method according to claim 8, wherein the phased array antenna system comprises a plurality of antenna elements and wherein the method further comprises executing an algorithm to maximise a correlated power of the code corresponding to the selected transmitter and aligns the beam to the selected transmitter within each element of the phased array antenna.

16. The method of claim 1, wherein applying the error signal to the first communications signal maximizes a correlated power of the code corresponding to the selected transmitter and thereby aligns the receiving beam of the antenna system to the selected transmitter.

17. A system comprising:

at least one transmitting entity, the at least one transmitting entity configured to embed an embedded code from a list of embedded codes into a signal, and to transmit the signal containing the embedded code; and

a receiving electronically steered antenna system comprising at least one receiving antenna and configured to carry out the method according to claim 1, wherein the list of embedded codes is identical to the list of codes provided to the receiving electronically steered antenna system, and wherein the embedded code identifies the transmitting entity.