6. A method of tracking time varying channels in a wireless packet based communication network comprising the steps of:

providing a CEDB update function and a FEC decode function in accordance with a pipeline processing algorithm.

7. A method as claimed in claim 6 wherein the pipeline processing algorithm comprises the following steps:

providing a first decoding of a received symbol i while predicting a channel estimate for symbol i using a second decoding of symbol i-1;

providing a second decoding of symbol i while predicting a channel estimate for symbol i+1 using the first decoding of symbol i.

wherein using a decoding of a symbol comprises updating of a Channel Estimate database using transmitted symbol estimates for the symbol determined by decoding the symbol.

8. A method as claimed in claim 7 wherein the Channel Estimate database is updated in the step of providing the first decoding.

9. A method of synchronizing packets arriving at a receiver in a wireless communication network the method comprising the steps of:

receiving a sampled packet input signal;

determining a complex representation of the sampled input signal

performing a delay and correlate calculation to form a first decision metric for a packet arrival time such that the correlation comprises a first arithmetic operation.

10. A method as claimed in claim 9 wherein the first arithmetic operation comprises an addition.

11. A method as claimed in claim 9 or 10 wherein the step of determining the complex representation comprises the complex phase of the sampled input signal.

12. A method of synchronizing packets arriving at a receiver in a wireless communication network the method comprising the steps of:

performing a first and a second calculation in accordance with a method as claimed in any one of claims 9 to 11;

determining a difference between the first and second calculations to form a second decision metric for a packet arrival time.

13. A method as claimed in claim 12 wherein the second calculation comprises a delay and correlate calculation where the delay is less than the corresponding delay of the first calculation.

14. A method of synchronizing packets arriving at a receiver in a wireless communication network the method comprising the steps of:

accumulating a set of decision metrics in accordance with a method as claimed in claim 9 or 12 such that each decision metric of the accumulated set exceeds a predetermined threshold value;

determining the earliest and latest decision metrics that are equal to a maximum value;

determining a packet arrival time corresponding to the midpoint between the earliest and latest decision metrics.

15. A method of correlating a received signal in a wireless packet based communication network comprising the steps of:

quantising at least a first and a second signal component such that the signal components are represented by a first and second one bit reference, respectively;

performing correlation operations on the first and second one bit references.

16. A method as claimed in claim 15 wherein the first and second signal components are, respectively, one of:

a) an I component of a test signal;

b) a Q component of a test signal;

c) an I component of a received signal;

d) a Q component of a received signal.

17. A method of communicating in a wireless packet based communication network comprising the steps of:

mixing a signal for transmission on the network into at least two distinct frequency bands so as to provide at least two transmission frequencies for the one signal.

18. A method as claimed in claim 17 further including the step of:

transmitting at least two signal components one for each transmission frequency from at least two antennae wherein each antenna corresponds to a respective transmission frequency.

19. A method as claimed in claim 17 or 18 further comprising the steps of:

receiving each transmitted signal component at a receiver comprising at least two separate antennae wherein each antenna corresponds to a respective transmission frequency.

20. A method as claimed in claim 17, 18 or 19 further comprising the steps of:

receiving each transmitted signal component at a receiver comprising at least two independent downconverters wherein each downconverter corresponds to a respective transmission frequency.

21. A method as claimed in claim 19 or 20 further comprising the step of:

combining the received signal components into a combined received signal;

demodulating the combined received signal.

22. A method as claimed in claim 21 wherein the step of demodulating comprises:

applying channel estimates and noise power estimates obtained from a Channel Estimate database for each receiving antenna to the combined received signal.

23. A method as claimed in any one of claims 17 to 22 wherein each transmitted signal component comprises a baseband signal component with the same frequency for each transmitted signal component.

24. A method as claimed in any one of claims 17 to 22 wherein each transmitted signal component comprises space time encoding for matching with a matching space time decoder in operatively associated with the receiver.

25. A method of communication in a wireless OFDM multiple access packet based communication network comprising the step of:

providing a redundant cyclic data field for a transmitted data packet wherein the data field is a non-contiguous string distributed about a data packet.

26. A method as claimed in claim 25 wherein the redundant cyclic data field comprises a prefix portion placed at the head or front of a packet and a suffix portion placed at the tail or rear of a packet.

27. A method of managing digital data processing resources comprising the steps of:

providing an interpretive shell for communicating between an embedded system device and a remote PC wherein the interpretive shell reads user input data and interprets said user input data in the context of a programming language so as to interface digital instructions between the embedded system device and the remote PC to enable the remote PC to delegate a portion of the PC computing resources to the functions of the embedded system device.

28. A method of receiving a signal transmitted in a wireless packet based communication network, the method comprising the steps of:

operating a receiver in a first mode;

monitoring received signal characteristics to determine whether the signal characteristics exceed a predetermined threshold condition;

switching the receiver to a second mode if the predetermined threshold condition is exceeded.

29. A method as claimed in claim 28 wherein the first mode is a substantially DC-coupled mode of operation and the second mode is a DC offset removal mode.

30. A method as claimed in claim 28 or 29 wherein the first mode is a narrow band mode and the second mode is a wideband mode.

31. A method as claimed in claim 28, 29 or 30 wherein the receiver is locked in one of the first or second modes when it is determined that a packet is being received.

32. A method of receiving a signal transmitted in a multiple access packet based communication network, the method comprising the steps of:

operating a RF receiver device in a substantially DC coupled mode.

tracking baseband DC offsets in the received signal;

initiating at least one DC offset removal strategy if the magnitude of DC offset exceeds a predetermined threshold.

33. A method as claimed in claim 32 further comprising the steps of:

tracking the received baseband signal power;

initiating at least one RF signal path gain change if the signal power falls outside of an upper and lower power limit.

34. A method as claimed in claim 33 further comprising the steps of:

concurrently estimating the DC offset and signal power in the baseband I/Q signals from the RF receiver device;

inhibiting RF device state changes when a demodulator of the receiver indicates that it is receiving a valid packet.

35. A method as claimed in claim 5 or 6, wherein phase offset is tracked separately.

36. A method as claimed in claim 35, further wherein a rotated CEDB state is combined with a new channel estimate.

37. Apparatus adapted to communicate in a wireless communication network, said apparatus comprising:

processor means adapted to operate in accordance with a predetermined instruction set,

said apparatus, in conjunction with said instruction set, being adapted to perform a method according to any one of claims 1 to 36.

38. A communications network including the apparatus as claimed in claim 37.

39. A computer program product comprising:

a computer usable medium having computer readable program code and computer readable system code embodied on said medium for communicating in a wireless communication network, said computer program product comprising:

computer readable code within said computer usable medium for performing the method steps according to any one of claims 1 to 36.

40. A method, apparatus and/or network as herein disclosed.

41. A method, apparatus and/or network as herein disclosed with reference to the accompanying drawings.

CLAIMS

The claims defining the invention are as follows:

1. A method of tracking time varying channels in a wireless packet based communication network comprising the steps of:

providing a Channel Estimate Data Base (CEDB) update function and a forward error correction (FEC) decode function in accordance with a pipeline processing algorithm, wherein FEC decode function outcome(s) are provided as an input to the CEDB update function,

wherein the pipeline processing algorithm comprises the following steps:

providing a first decoding of a received symbol i while predicting a channel estimate for symbol i using a second decoding of symbol i−1;

providing a second decoding of symbol i while predicting a channel estimate for symbol i+1 using the first decoding of symbol i;

wherein using a decoding of a symbol comprises updating of a Channel Estimate database using transmitted symbol estimates for the symbol determined by decoding the symbol.

2. The method as claimed in claim 1, wherein the CEBD is updated in the step of providing the first decoding.

3. The method as claimed in claim 1, wherein a phase offset is tracked separately.

4. The method as claimed in claim 3, further wherein a rotated CEDB state is combined with a new channel estimate.

5. An apparatus adapted to communicate in a wireless communication network, said apparatus comprising:

processor means adapted to operate in accordance with a predetermined instruction set,

said apparatus, in conjunction with said instruction set, being adapted to perform a method according to claim 1.

6. The apparatus according to claim 5, wherein said apparatus is included in a communications network.

7. The method as claimed in claim 1, further comprising the steps of:
tracking at least one channel parameter in the time domain in accordance with an auto regression algorithm.

8. The method as claimed in claim 1, wherein any one or, a combination of two or more parameters are tracked individually in accordance with an auto regression algorithm.

9. The method as claimed in claim 1, wherein parameters are tracked in a CEDB and such that at least three of the following parameters are tracked:

Complex Channel Amplitude (per subcarrier)

Phase offset per OFDM symbol

Noise Power

OFDM timing error/offset

Coherence time

Coherence frequency.

10. The method as claimed in claim 1, wherein tracking each parameter comprises the steps of:

modelling a parameter as a sum of three other parameters.

11. The method as claimed in claim 7, wherein the auto regression algorithm comprises the steps of:

updating a CEDB state upon decoding a received signal such that a fraction of a raw estimate, derived from a current received symbol and at least a subset of previous transmitted symbols, is added to a complimentary fraction of the CEDB state.

12. A computer comprising:

a non-transitory computer usable tangible medium having computer readable program code and computer readable system code embodied on said medium for

communicating in a wireless communication network, said computer further comprising:

a computer readable code within said medium for performing

a method of tracking time varying channels in a wireless packet based communication network comprising the steps of: providing a Channel Estimate Data Base (CEDB) update function and a forward error correction (FEC) decode function in accordance with a pipeline processing algorithm, wherein the pipeline processing algorithm comprises the steps of:

providing a first decoding of a received symbol i while predicting a channel estimate for symbol i using a second decoding of symbol i−1;

providing a second decoding of symbol i while predicting a channel estimate for symbol i+1 using the first decoding of symbol i;

wherein using a decoding of a symbol comprises updating of a Channel Estimate database using transmitted symbol estimates for the symbol determined by decoding the symbol.

13. The computer as claimed in claim 12, wherein the computer readable code within said medium performs any one of:

a method of tracking time varying channels in a wireless packet based communication network comprising the steps of: tracking at least one channel parameter in the time domain in accordance with an auto regression algorithm, wherein the auto regression algorithm comprises the step of updating a CEDB state upon decoding a received signal such that a fraction of a raw estimate, derived from a current received symbol and at least a subset of previous transmitted symbols, is added to a complimentary fraction of the CEDB state;

a method of synchronizing packets arriving at a receiver in a wireless communication network the method comprising the steps of: receiving a sampled packet input signal, determining a complex representation of the sampled input signal, performing a delay and correlate calculation to form a first decision metric for a packet arrival time such that the correlation comprises a first arithmetic operation;

a method of correlating a received signal in a wireless packet based communication network comprising the steps of: quantising at least a first and a second signal component such that the signal components are represented by a first and second one bit reference, respectively, and performing correlation operations on the first and second one bit references;

a method of communicating in a wireless packet based communication network comprising the steps of: mixing a signal for transmission on the network into at least two distinct frequency bands so as to provide at least two transmission frequencies for the one signal;

a method of communication in a wireless OFDM multiple access packet based communication network comprising the step of: providing a redundant cyclic data field for a transmitted data packet wherein the data field is a non-contiguous string distributed about a data packet;

a method of managing digital data processing resources comprising the steps of: providing an interpretive shell for communicating between an embedded system device and a remote PC wherein the interpretive shell reads user input data and interprets said user input data in the context of a programming language so as to interface digital instructions between the embedded system device and the remote PC to enable the remote PC to delegate a portion of the PC computing resources to the functions of the embedded system device;

a method of receiving a signal transmitted in a wireless packet based communication network, the method comprising the steps of: operating a receiver in a first mode, monitoring received signal characteristics to determine whether the signal characteristics exceed a predetermined threshold condition, and switching the receiver to a second mode if the predetermined threshold condition is exceeded; or

a method of receiving a signal transmitted in a multiple access packet based communication network, the method comprising the steps of: operating a RF receiver device in a substantially DC coupled mode, tracking baseband DC offsets in the received signal, and initiating at least one DC offset removal strategy if the magnitude of DC offset exceeds a predetermined threshold.