WHAT IS CLAIMED IS:

1. A method for performing orthogonal frequency division multiplexing-offset quantization amplitude modulation, OFDM-OQAM, the method comprising:

obtaining a data burst, wherein the data burst includes a sequence of OQAM symbols;

performing weighted circularly convolved filtering modulation on the data burst to produce an output signal, wherein a sequence of weighted OQAM symbols is used as an input for OFDM/OQAM modulation which includes linear convolution modulation followed by time shifts; and

transmitting, by a first wireless device to a second wireless device, the output signal.

2. The method of claim 1, wherein performing weighted circularly convolved filtering comprises:

performing linearly convolved filtering on the data burst to produce a linearly convolved signal; and

performing cropping and shifting on the linearly convolved signal to produce the output signal.

3. The method of any of claims 1-2, wherein performing weighted circularly convolved filtering modulation comprises:

multiplying a plurality of components of the data burst by a plurality of multiplication factors to produce a plurality of multiplied factors;

performing inverse fast Fourier transform (IFFT) of size 2M on the plurality of multiplied factors to produce a plurality of transformed components;

performing modulo-N weighted circular convolution on the plurality of transformed components to produce a plurality of filtered components;

expanding the plurality of filtered components to produce a plurality of expanded components;

delaying in time the filtered components by a plurality of modulo-NM weighted circular delays to produce a plurality of time shifted components; and

summing the plurality of time shifted components to produce the output signal.

4. The method of claim 1, wherein performing weighted circularly convolved filtering comprises:

multiplying a first waveform of the data burst by two or more coefficients to produce a plurality of multiplied waveforms;

shifting in time each of the plurality of multiplied waveforms by a respective time offset to produce a plurality of time shifted waveforms, wherein the respective time offset is one of a plurality of time offsets; and

summing the plurality of time shifted waveforms to produce an added waveform.

5. The method of claim 4, further comprising cropping the added waveform to produce the output signal, wherein the data burst has N OFDM-OQAM symbols, wherein N is an integer, and wherein a time spacing between OFDM-OQAM symbols is T/2.

6. The method of claim 5, wherein cropping the added waveform comprises cropping the added waveform with a time interval of N times T/2.

7. The method of claim 5, wherein shifting in time each of the plurality of multiplied waveforms by a respective time offset comprises shifting a first one of the plurality of multiplied waveforms by NT/2, shifting a second one of the plurality of multiplied waveforms by NT, and shifting any additional multiplied waveforms of the plurality of multiplied waveforms by a previous time offset plus NT/2, wherein the previous time offset is a time offset applied to a multiplied waveform immediately prior to a respective additional multiplied waveform.

8. The method of claim 5, wherein the data burst has N OFDM-OQAM symbols, wherein N is an integer, and wherein the two or more coefficients are 1and N is even, or wherein the two or more coefficients alternate between 1, -j, -1, and j and N is odd.

9. The method of any of claims 1-8, wherein performing weighted circularly convolved filtering comprises performing weighted time domain windowing.

10. The method of claim 9, wherein performing weighted time domain windowing comprises:

producing an appended waveform having a first appended portion and a second appended portion by:

appending a beginning portion of a waveform of the data burst after an end portion of the waveform to produce a first appended portion; and

appending the end portion of the waveform before the beginning portion of the waveform to produce a second appended portion; and

multiplying the first appended portion by a rolling-off window and the second appended portion by the rolling-off window to produce the output signal.

11. The method of claim 1, wherein the first wireless device is one of a communications controller and a user equipment, and wherein the second wireless device is the other of a communications controller and a user equipment.

12. The method of claim 1, further comprising reserving OQAM symbols at both edges of a transmission block as guard symbols when the first wireless device or the second wireless device is a high mobility user equipment, wherein transmitting the output signal comprises transmitting the output signal on the transmission block.

13. A method for performing orthogonal frequency division multiplexing-offset quantization amplitude modulation, OFDM-OQAM, the method comprising:

receiving, by a first wireless device from a second wireless device an input signal; and

performing weighted circularly convolved demodulation filtering on the input signal to produce a data burst, wherein the data burst includes a sequence of OQAM symbols, a sequence of weighted OQAM symbols is used as an input for OFDM/OQAM modulation which includes linear convolution modulation followed by time shifts.

14. The method of claim 13, wherein performing weighted circularly convolved filtering demodulation on the data burst comprises:

performing weighted appending to the input signal to produce an appended signal; and

performing linear convolution demodulation on the appended signal to produce the data burst.

15. The method of claim 14, wherein performing linear convolution demodulation comprises:

time shifting the appended signal to produce a plurality of time shifted signals;

downshifting the plurality of time shifted signals to produce a plurality of downshifted signals;

filtering the plurality of downshifted signals to produce a plurality of filtered signals;

performing inverse fast Fourier transform (IFFT) of size 2M on the plurality of filtered signals to produce a plurality of transformed signals;

multiplying the plurality of transformed signals by a plurality of multiplication factors to produce a plurality of multiplied signals; and

extracting real portions of the plurality of multiplied signals.

16. The method of claim 13, wherein performing weighted circularly convolved filtering on the data burst comprises:

delaying the input signal with modulo-NM weighted circular delays to produce a plurality of time shifted signals;

downshifting the plurality of time shifted signals to produce a plurality of downshifted signals;

performing modulo-N weighted circular convolution on the plurality of downshifted signals to produce a plurality of filtered signals;

performing inverse fast Fourier transform (IFFT) on the plurality of filtered signals to produce a plurality of transformed signals;

multiplying the plurality of transformed signals by a plurality of multiplication factors to produce a plurality of multiplied signals; and

extracting real portions of the plurality of multiplied signals.

17. A first wireless device comprising:

a processor; and

a computer readable storage medium storing programming for execution by the processor, the programming including instructions to

obtain a data burst, wherein the data burst includes a sequence of OQAM symbols,

perform weighted circularly convolved filtering modulation on the data burst to produce an output signal, wherein a sequence of weighted OQAM symbols is used as an input for OFDM/OQAM modulation which includes linear convolution modulation followed by time shifts, and

transmit, to a second wireless device, the output signal.