

WHAT IS CLAIMED IS:

1. A mobile device comprising:
 - a first antenna and a second antenna;
 - a first front end system configured to process a radio frequency receive signal from the first antenna;
 - a first transceiver configured to further process the radio frequency receive signal to generate a first digital baseband receive signal, the first transceiver including a discrete time cancellation circuit configured to compensate the first digital baseband receive signal for radio frequency signal leakage based on digital observation data;
 - a second front end system configured to process a radio frequency transmit signal for transmission on the second antenna, and to generate a radio frequency observation signal based on observing the radio frequency transmit signal; and
 - a second transceiver configured to process the radio frequency observation signal to generate the digital observation data, and to provide the digital observation data to the first transceiver.
2. The mobile device of claim 1 wherein the discrete time cancellation circuit includes a spectral regrowth modeling circuit configured to estimate an amount of aggressor spectral regrowth present in the radio frequency receive signal based on the digital observation data.
3. The mobile device of claim 2 wherein the spectral regrowth modeling circuit is configured to estimate the amount of aggressor spectral regrowth based on modeling adjacent channel leakage ratio using predistortion.
4. The mobile device of claim 1 wherein the second transceiver is configured to generate a digital observation signal based on the radio frequency observation signal, the second transceiver including a baseband sampling circuit configured to sample the digital observation signal to generate the digital observation data.

5. The mobile device of claim 4 wherein the baseband sampling circuit generates the digital observation data to reflect an amount of direct transmit leakage present in the radio frequency transmit signal.
6. The mobile device of claim 1 wherein the second front end system includes a directional coupler configured to generate the radio frequency observation signal.
7. The mobile device of claim 6 wherein the directional coupler generates the radio frequency observation signal based on a forward coupled path to the second antenna.
8. The mobile device of claim 1 wherein the first front end system is a cellular front end system and the second front end system is a WiFi front end system.
9. The mobile device of claim 1 wherein the first front end system is a WiFi front end system and the second front end system is a cellular front end system.
10. The mobile device of claim 1 wherein the second transceiver is configured to compensate a second baseband receive signal for radio frequency signal leakage based on additional digital observation data from the first transceiver.
11. The mobile device of claim 10 wherein the first transceiver is configured to receive a sensed radio frequency signal from a directional coupler of the first front end system, and to process the sensed radio frequency signal to generate the additional digital observation data provided to the second transceiver.
12. The mobile device of claim 11 wherein the first front end system includes a duplexer, the directional coupler positioned between an output of the duplexer and the first antenna.
13. The mobile device of claim 11 wherein the first front end system includes a duplexer and a power amplifier, the directional coupler positioned between an output of the power amplifier and an input to the duplexer.

14. A transceiver comprising:

- a receive channel configured to process a radio frequency receive signal to generate a digital baseband receive signal;
- an observation channel configured to process a radio frequency observation signal to generate a digital observation signal;
- a baseband sampling circuit configured to sample the digital observation signal to generate first digital observation data;
- an output configured to output the first digital observation data;
- an input configured to receive second digital observation data; and
- a discrete time cancellation circuit configured to compensate the digital baseband receive signal for radio frequency signal leakage based on the second digital observation data.

15. The transceiver of claim 14 wherein the discrete time cancellation circuit includes a spectral regrowth modeling circuit configured to estimate an amount of aggressor spectral regrowth present in the radio frequency receive signal based on the second digital observation data.

16. The transceiver of claim 15 wherein the spectral regrowth modeling circuit is configured to estimate the amount of aggressor spectral regrowth based on modeling adjacent channel leakage ratio using predistortion.

17. A method of coexistence management in a mobile device, the method comprising:

providing a radio frequency receive signal from a first front end system to a first transceiver;

processing the radio frequency receive signal to generate a first digital baseband receive signal using the first transceiver;

compensating the first digital baseband receive signal for radio frequency signal leakage based on digital observation data using a discrete time cancellation circuit of the first transceiver;

generating a radio frequency observation signal based on observing a radio frequency transmit signal using a second front end system; and

processing the radio frequency observation signal to generate the digital observation data using a second transceiver.

18. The method of claim 17 further comprising providing the digital observation data from the second transceiver to the first transceiver.

19. The method of claim 17 wherein compensating the first digital baseband receive signal includes estimating an amount of aggressor spectral regrowth present in the radio frequency receive signal based on the digital observation data using a spectral regrowth modeling circuit.

20. The method of claim 19 wherein estimating the amount of aggressor spectral regrowth includes modeling adjacent channel leakage ratio using predistortion.