WHAT IS CLAIMED IS:

1. A mobile device comprising:

a plurality of antennas including a first antenna and a second antenna;

a plurality of front end systems including a first front end system and a second front end system, the first front end system configured to receive a radio frequency receive signal from the first antenna, the second front end system configured to provide a radio frequency transmit signal to the second antenna and to generate a radio frequency observation signal based on observing the radio frequency transmit signal; and

a plurality of transceivers including a first transceiver and a second transceiver, the second transceiver configured to process the radio frequency observation signal to generate digital observation data for the first transceiver, the first transceiver configured to process the radio frequency receive signal to generate a baseband receive signal, and to compensate the baseband receive signal for an amount of radio frequency signal leakage indicated by the digital observation data, the first transceiver including 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.

2. The mobile device of claim 1 wherein the digital observation data indicates an amount of direct transmit leakage present in the radio frequency transmit signal.

~~3. The mobile device of claim 1 wherein the first transceiver 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.~~

~~4.~~3. The mobile device of claim ~~3~~ 1 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.

~~5.~~4. The mobile device of claim 1 wherein the second front end system includes a directional coupler configured to generate the radio frequency observation signal.

~~6.~~5. The mobile device of claim ~~5~~ 4 wherein the directional coupler generates the radio frequency observation signal based on a forward coupled path to the second antenna.

~~7.~~6. 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.

~~8.~~7. 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.

~~9.~~8. 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.

~~10.~~9. The mobile device of claim ~~9~~ 8 wherein the first transceiver receives a sensed radio frequency signal from a directional coupler of the first front end system, and processes the sensed radio frequency signal to generate the additional digital observation data.

~~11.~~10. The mobile device of claim ~~10~~ 9 wherein the first front end system includes a duplexer, the directional coupler positioned between an output of the duplexer and the first antenna.

~~12.~~11. The mobile device of claim ~~10~~ 9 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.

~~13.~~12. A radio frequency communication system comprising:

a first front end system configured receive a first incoming radio frequency receive signal and to output a first outgoing radio frequency transmit signal;

a second front end system configured to receive a second incoming radio frequency receive signal and to output a second outgoing radio frequency transmit signal, the second front end system further configured to generate a radio frequency observation signal based on observing the second outgoing radio frequency transmit signal;

a first transceiver configured to downconvert the first incoming radio frequency receive signal to generate a first baseband receive signal, and to compensate the first baseband receive signal for radio frequency signal leakage based on digital observation data, the first transceiver including a spectral regrowth modeling circuit configured to estimate an amount of aggressor spectral regrowth present in the first incoming radio frequency receive signal based on the digital observation data; and

a second transceiver configured to generate the digital observation data based on processing the radio frequency observation signal.

~~14. The radio frequency communication system of claim 13 wherein the first transceiver includes a spectral regrowth modeling circuit configured to estimate an amount of aggressor spectral regrowth present in the first incoming radio frequency receive signal based on the digital observation data.~~

~~15.~~13. The radio frequency communication system of claim ~~14~~ 12 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.

~~16.~~14. The radio frequency communication system of claim ~~13~~ 12 further comprising an antenna, the second front end system further including a directional coupler configured to generate the radio frequency observation signal based on a forward coupled path to the antenna.

~~17.~~15. 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;

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

generating digital observation data based on the radio frequency observation signal using a second transceiver;

downconverting the radio frequency receive signal to generate a baseband receive signal using the first transceiver; and

compensating the baseband receive signal for radio frequency signal leakage based on the digital observation data using the first transceiver, including processing the digital observation data using a spectral regrowth modeling circuit to estimate an amount of aggressor spectral regrowth present in the radio frequency receive signal.

~~18.~~16. The method of claim ~~17~~ 15 wherein the digital observation data indicates an amount of direct transmit leakage present in the radio frequency transmit signal.

~~19. The method of claim 17 wherein compensating the baseband receive signal includes processing the digital observation data using a spectral regrowth modeling circuit to estimate an amount of aggressor spectral regrowth present in the radio frequency receive signal.~~

~~20.~~17. The method of claim ~~19~~ 15 further comprising estimating the amount of aggressor spectral regrowth based on modeling adjacent channel leakage ratio using predistortion.