CLAIMS

What is claimed is:

1. A transceiver for communicating with a target device, the transceiver comprising:

a waveguide diplexer comprising a common port coupled to first and second individual ports, the first individual port associated with a transmit frequency range and the second individual port associated with a receive frequency range;

a transmitter coupled with the first individual port of the waveguide diplexer and configured to output a transmit signal to the first individual port within the transmit frequency range;

a bidirectional coupler having a coupled port coupled with the common port of the waveguide diplexer;

a loopback translator coupled with the coupled port and configured to obtain a loopback signal associated with the transmit signal via the coupled port, to translate the loopback signal from within the transmit frequency range to within the receive frequency range , and to output the translated loopback signal to the bidirectional coupler to couple the translated loopback signal into the common port of the waveguide diplexer; and

a receiver having an input port coupled with the second individual port of the waveguide diplexer and coupled with the loopback translator via a loopback path, wherein the loopback path includes a portion of the waveguide diplexer comprising the common port and the second individual port, wherein the receiver is configured to, in a first mode, obtain a received signal from the target device via the waveguide diplexer, and, in a second mode, obtain the translated loopback signal via the loopback path and compare the translated loopback signal to a representation of the transmit signal to generate a compensation signal,

wherein the transmitter is further configured to receive the compensation signal and adjust the transmit signal based at least in part on the compensation signal.

2. The transceiver of claim 1, further comprising:

a switch having a first input port coupled with the second individual port of the waveguide diplexer, a second input port coupled with the loopback translator via the loopback path, and an output port coupled with the input port of the receiver, the switch configured to output to the receiver, in the first mode, the received signal, and to output to the receiver, in the second mode, the translated loopback signal.

3. The transceiver of claim 1, wherein the waveguide diplexer is a first waveguide diplexer, the bidirectional coupler is a first bidirectional coupler, the receiver is a first receiver, and the received signal from the target device is a first received signal, further comprising:

a second waveguide diplexer comprising a common port coupled to third and fourth individual ports, the third individual port associated with the transmit frequency range and the fourth individual port associated with the receive frequency range;

a second bidirectional coupler having a coupled port coupled with the common port of the second waveguide diplexer

a second receiver; and

a receive signal switch matrix having a first input port coupled with the second individual port of the first waveguide diplexer, a second input port coupled with fourth individual port of the second waveguide diplexer, a first output port coupled with the first receiver, and a second output port coupled with the second receiver, and configured to output the first received signal or a second received signal from the target device on the first output port and the first received signal or the second received signal on the second output port.

4. The transceiver of claim 3, wherein the first receiver is configured to obtain, in the second mode, the translated loopback signal concurrently with the second receiver obtaining the first signal or the second signal via the receive signal switch matrix.

5. The transceiver of claim 3, wherein, in the second mode:

the loopback translator is configured to output the translated loopback signal to the second coupler to couple the translated loopback signal into the common port of the second waveguide diplexer, wherein the loopback path includes a portion of the second waveguide diplexer comprising the common port and the fourth individual port.

6. The transceiver of claim 3, further comprising:

a polarizer coupled with the common ports of the first and second waveguide diplexers, the polarizer configured to divide a received wave into the first and second signals according to respective polarizations of the first and second signals in the received wave.

7. The transceiver of claim 3, wherein the first receiver is configured to receive, in the second mode, the translated loopback signal from the loopback translator substantially continuously while the transceiver is communicating with the target device.

8. The transceiver of claim 1, further comprising a low noise amplifier between the second individual port of the waveguide diplexer and the receiver.

9. The transceiver of claim 1, wherein the receiver is configured to enter the second mode periodically to receive the translated loopback signal from the loopback translator.

10. The transceiver of claim 1, wherein the receiver is configured to enter the second mode to obtain the translated loopback signal from the loopback translator based at least in part on a scheduling of downlink communications from the target device.

11. The transceiver of claim 1, wherein the coupler comprises a coupling hole on a waveguide associated with the common port.

12. The transceiver of claim 11, wherein the coupler further comprises a microstrip spanning the coupling hole.

13. The transceiver of claim 12, wherein the microstrip is separated from the coupling hole by a dielectric layer.

14. The transceiver of claim 1, wherein the transmitter comprises:

a power amplifier coupled with the first individual port of the waveguide diplexer for amplifying the adjusted transmit signal.

15. The transceiver of claim 1, wherein the transmitter is configured to adjust the transmit signal by adjusting a frequency, a phase, a polarity, a symbol rate, a slew rate, a frequency-dependent gain slope, a frequency-dependent phase variation, a time-dependent transient amplitude, a time-dependent transient phase, a frequency and amplitude dependent amplitude-modulation, a frequency and amplitude dependent phase modulation, or a transmit power of the transmit signals.

16. A method for compensating transmit signals transmitted to a target device, the method comprising:

providing a first transmit signal to a first individual port of a waveguide diplexer, the waveguide diplexer comprising a common port coupled to the first individual port and a second individual port, the first individual port associated with a transmit frequency range and the second individual port associated with a receive frequency range;

coupling a loopback signal associated with the first transmit signal from the common port of the waveguide diplexer;

translating the loopback signal from within the transmit frequency range to within the receive frequency range;

inputting, to a receiver while in a first mode, a receive signal from the target device via the waveguide diplexer;

coupling the translated loopback signal into the common port of the waveguide diplexer;

inputting, to the receiver while in a second mode, the translated loopback signal via a loopback path, wherein the loopback path includes a portion of the waveguide diplexer comprising the common port and the second individual port;

comparing, in the second mode, the translated loopback signal with a representation of the first transmit signal;

adjusting a second transmit signal based at least in part on the comparison; and

providing the second transmit signal to the first individual port of the waveguide diplexer for transmission to the target device.

17. The method of claim 16, further comprising:

establishing, in the second mode, the loopback path via a switch configured to output to the receiver, in the first mode, the received signal, and to output to the receiver, in the second mode, the translated loopback signal.

18. The method of claim 16, wherein the inputting the signal to the receiver in the first mode is during a first time interval and the inputting the translated loopback signal to the receiver in the second mode is during a second time interval.

19. The method of claim 16, wherein the waveguide diplexer is a first waveguide diplexer, the receiver is a first receiver, and the received signal from the target device is a first received signal, the method further comprising:

receiving, from the target device, a receive wave at a common port of a second waveguide diplexer, the second waveguide diplexer having a third individual port associated with the transmit range and a fourth individual port associated with the receive frequency range, the second waveguide diplexer outputting a second receive signal within the receive frequency range at the fourth individual port of the second waveguide diplexer; and

inputting, to a second receiver, the second receive signal concurrently with inputting the translated loopback signal to the first receiver.

20. The method of claim 19, wherein the first transmit signal is transmitted during a first time interval, and wherein the loopback signal is a first loopback signal, the method further comprising:

providing a third transmit signal to the third individual port of the second waveguide diplexer during a second time interval, the third transmit signal within the first frequency range;

coupling a second loopback signal associated with the third transmit signal from the common port of the second waveguide diplexer;

translating the second loopback signal from within the first frequency range to within the second frequency range;

receiving, using the first receiver, the translated second loopback signal;

comparing, using the first receiver, the translated second loopback signal with a representation of the third transmit signal;

adjusting a fourth transmit signal based at least in part on the comparison; and

providing the adjusted fourth transmit signal to the second waveguide diplexer for transmission to the target device.

21. The method of claim 16, wherein the waveguide diplexer is a first waveguide diplexer, the receiver is a first receiver, the method further comprising:

receiving, from the target device, a receive wave within the receive frequency range at the common port of the first waveguide diplexer, the first waveguide diplexer outputting the receive signal at the second individual port based at least in part on the receive wave;

coupling the translated loopback signal into a common port of a second waveguide diplexer, the second waveguide diplexer having a third individual port associated with the transmit range and a fourth individual port associated with the receive frequency range, wherein the loopback path includes a portion of the second waveguide diplexer comprising the common port and the fourth individual port; and

inputting, to a second receiver, the receive signal concurrently with inputting the translated loopback signal to the first receiver.

22. The method of claim 16, wherein adjusting the second transmit signal comprises adjusting a frequency, a phase, a polarity, a symbol rate, a slew rate, a frequency-dependent gain slope, a frequency-dependent phase variation, a time-dependent transient amplitude, a time-dependent transient phase, a frequency and amplitude dependent amplitude-modulation, a frequency and amplitude dependent phase modulation, or a transmit power of the second transmit signal.

23. The method of claim 16, further comprising:

storing one or more calibration values based at least in part on the comparison.

24. The method of claim 16, further comprising:

entering the second mode in response to receiving a command.

25. The method of claim 16, further comprising:

determining an availability of the receiver for comparing the translated loopback signal to the representation of the first transmit signal based at least in part on a scheduling of communications from the target device; and

performing the comparing of the translated loopback signal to the representation of the first transmit signal based at least in part on the availability.