CLAIMS

1. A wireless communications system for transmitting an input signal, comprising:

an automatic gain adjuster (AGC) configured to adjust a gain of a feedback signal to generate a gain adjusted feedback signal;

a predistorter module configured to:

receive the gain adjusted feedback signal from the AGC;

compare the gain adjusted feedback signal to an input signal to detect existing distortion in the gain adjusted feedback signal; and

upon a determination that the existing distortion is greater than a predetermined distortion threshold, add inverse distortion to an output signal to generate a distorted output signal with added distortion, the inverse distortion added to the output signal being based on the existing distortion detected in the gain adjusted feedback signal;

an upconverter configured to upconvert the input signal to an intermediate frequency prior to the predistorter module comparing the input signal to the gain adjusted feedback signal;

a GaN power amplifier configured to amplify power of the distorted output signal to generate an amplified signal;

a coupler configured to provide the feedback signal to the AGC and sample the amplified signal from the GaN power amplifier to generate a new feedback signal to be provided to the AGC; and

an antenna configured to transmit the amplified signal.

2. The system of claim 1, wherein the GaN power amplifier adds amplifier distortion to the amplified signal, wherein at least some of the added distortion from the predistorter module cancels at least some of the amplifier distortion.

3. The system of claim 1, wherein the input signal is at the intermediate frequency.

4. The system of claim 1, further comprising a downconverter configured to downconvert the gain adjusted feedback signal to an intermediate frequency prior to the predistorter module comparing the input signal to the gain adjusted feedback signal.

5. The system of claim 1, further comprising an upconverter configured to upconvert the distorted output signal to a high frequency prior to the GaN power amplifier amplifying the power of the distorted output signal.

6. The system of claim 5, wherein the high frequency is a final frequency transmitted by the antenna.

7. The system of claim 1, further comprising a waveguide configured to receive the amplified signal from the GaN power amplifier and provide the amplified signal to the antenna.

8. The system of claim 7, wherein the wireless communications system is a microwave wireless communications system.

9. A method comprising:

receiving an input signal and a feedback signal;

adjusting a gain of the feedback signal to generate a gain adjusted feedback signal;

upconverting the input signal to an intermediate frequency;

after the upconverting of the input signal, comparing the input signal and the gain adjusted feedback signal to detect existing distortion in the gain adjusted feedback signal;

upon a determination that the existing distortion is greater than a predetermined distortion threshold, adding inverse distortion to an output signal to generate a distorted output signal with added distortion, the inverse distortion added to the output signal being based on the existing distortion detected in the gain adjusted feedback signal;

amplifying, with a GaN power amplifier, the distorted output signal to generate an amplified signal;

generating a new feedback signal based on the amplified signal; and

transmitting the amplified signal with an antenna.

10. The method of claim 9, wherein the GaN power amplifier adds amplifier distortion to the amplified signal, the amplifier distortion being cancelled at least in part by the added distortion added by a predistorter module.

11. The method of claim 9, wherein the input signal is at the intermediate frequency.

12. The method of claim 9, further comprising downconverting the gain adjusted feedback signal to an intermediate frequency prior to comparing the input signal and the gain adjusted feedback signal.

13. The method of claim 9, further comprising upconverting the output signal to a high frequency.

14. The method of claim 13, wherein the high frequency is a final frequency transmitted by the antenna.

15. The method of claim 9, further comprising filtering the amplified signal with a waveguide filter and propagating the amplified signal from the waveguide filter through a waveguide prior to transmitting the amplified signal with the antenna.

16. The method of claim 15, wherein the antenna is a part of a microwave wireless communications system.

17. A system comprising:

means for receiving an input signal and a feedback signal;

means for adjusting a gain of the feedback signal to generate a gain adjusted feedback signal;

means for upconverting the input signal to an intermediate frequency;

means for, after the means for upconverting the input signal upconverts the input signal to the intermediate frequency, comparing the gain adjusted feedback signal to the input signal to detect existing distortion in the gain adjusted feedback signal;

means for, upon a determination that the existing distortion is greater than a predetermined distortion threshold, adding inverse distortion to an output signal to generate a distorted output signal with added distortion, the inverse distortion added to the output signal being based on the existing distortion detected in the gain adjusted feedback signal;

a GaN power amplifier configured to amplify the distorted output signal to generate an amplified signal, wherein the GaN power amplifier adds amplifier distortion to the distorted output signal which is cancelled, at least in part, by the added distortion;

coupling means for providing the feedback signal to the means for adjusting the gain of the feedback signal and for generating a new feedback signal based on the amplified signal; and

an antenna configured to transmit the amplified signal.

18. The system of claim 1, further comprising:

a second AGC configured to adjust a gain of the input signal prior to providing the input signal to the predistorter module.

19. The method of claim 9, further comprising:

adjusting a gain of the input signal prior to comparing the input signal to the gain adjusted feedback signal.