

CLAIMS

1. An apparatus for wireless communications, comprising: a processing system configured to generate a plurality of first frames, each first frame comprising a preamble, a data field, and at least one beamforming training field; a first interface configured to output the first frames for transmission using a first transmit beamforming sector for the preambles and data fields of the first frames and different second transmit beamforming sectors for the beamforming training fields of the first frames; and a second interface configured to obtain a second frame comprising feedback generated based on the beamforming training fields of the plurality of first frames.
2. The apparatus of claim 1, wherein the first frames are output for transmission during a fragmented transmit beam refinement protocol.
3. The apparatus of claim 1, wherein each of the second transmit beamforming sectors is different than the first transmit beamforming sector.
4. The apparatus of claim 1, wherein: the feedback indicates one of the second transmit beamforming sectors; and the processing system is configured to use the indicated second transmit beamforming sector for subsequent transmissions.
5. The apparatus of claim 1, wherein: the processing system is further configured to generate an indication of at least one of a number of training fields to be included in each first frame or a number of the plurality of first frames; and the first interface is further configured to output the indication for transmission.
6. The apparatus of claim 1, wherein the processing system is configured to determine how many beamforming training fields to include in each first frame based, at least in part, on an amount of data to be transmitted and to include the determined number of beamforming training fields in each first frame.
7. The apparatus of claim 6, wherein the processing system is configured to include a single beamforming training field in each first frame if the amount of data to be transmitted is equal to or greater than a threshold value.
8. The apparatus of claim 1, wherein the processing system is configured to determine how many beamforming training fields to include in each first frame based, at least in part, on latency limits for data traffic between the apparatus and a wireless device and to include the determined number of beamforming training fields in each first frame.
9. The apparatus of claim 1, further comprising at least one antenna via which the first frames are output for transmission and the second frame is obtained, wherein the apparatus is configured as a wireless station.

10. An apparatus for wireless communications, comprising: a first interface configured to obtain a plurality of first frames, each first frame comprising a preamble, a data field, and at least one beamforming training field, wherein a same first transmit beamforming sector is used for transmitting the preamble and data field of each first frame and different second transmit beamforming sectors are used for the beamforming training fields of the first frames; a processing system configured to generate feedback based on the beamforming training fields in the plurality of first frames and generate a second frame with the feedback; and a second interface configured to output the second frame for transmission.
11. The apparatus of claim 10, wherein the first frames are obtained during a fragmented transmit beam refinement protocol.
12. The apparatus of claim 10, wherein each of the second transmit beamforming sectors is different than the first transmit beamforming sector.
13. The apparatus of claim 10, wherein: the processing system is configured to select one of the second transmit beamforming sectors based on the beamforming training fields in the plurality of first frames; and the feedback comprises an indication of the selected second transmit beamforming sector.
14. The apparatus of claim 10, wherein: the first interface is further configured to obtain an indication of at least one of a number of training fields to be included in each first frame or a number of the plurality of first frames; and the processing system is configured to process the plurality of first frames based on the indication.
15. The apparatus of claim 10, further comprising at least one antenna via which the first frames are obtained and the second frame is output for transmission, wherein the apparatus is configured as a wireless station.
16. An apparatus for wireless communications, comprising: a first interface configured to: obtain a plurality of first frames, each first frame comprising a preamble, a data field, and at least one beamforming training field, wherein a same transmit beamforming sector is used for transmitting the beamforming training fields of the first frames; and obtain a second frame having an indication of at least one of a number of training fields to be included in each first frame or a number of the plurality of first frames; and a processing system configured to: evaluate different receive beamforming sectors based on the beamforming training fields in the plurality of first frames and the indication in the second frame, and update antenna settings based on the evaluation.
17. The apparatus of claim 16, wherein the first frames are obtained during a fragmented receive beam refinement protocol.

18. The apparatus of claim 16, further comprising at least one antenna via which the first frames are obtained, wherein the apparatus is configured as a wireless station.
19. An apparatus for wireless communications, comprising: a processing system configured to: generate a plurality of first frames, each first frame comprising a preamble, a data field, and at least one beamforming training field; and determine how many beamforming training fields to include in each first frame based at least in part, on an amount of data to be transmitted and to include the determined number of beamforming training fields in each first frame; and a first interface configured to output the first frames for transmission using a same transmit beamforming sector for each beamforming training field.
20. The apparatus of claim 19, wherein the first frames are output for transmission during a fragmented transmit beam refinement protocol.
21. The apparatus of claim 19, wherein: the processing system is further configured to generate an indication of at least one of the number of beamforming training fields to be included in each first frame or a number of the plurality of first frames; and the first interface is further configured to output the indication for transmission.
22. The apparatus of claim 19, wherein the processing system is configured to include a single beamforming training field in each first frame if the amount of data to be transmitted is equal to or greater than a threshold value.
23. The apparatus of claim 19, wherein the processing system is further configured to determine how many beamforming training fields to include in each first frame based, at least in part, on latency limits for data traffic between the apparatus and a wireless device.
24. The apparatus of claim 19, further comprising at least one antenna via which the first frames are output for transmission, wherein the apparatus is configured as a wireless station.