

CLAIMS**WHAT IS CLAIMED:**

1. A method of antenna pointing, the method comprising:
providing a user terminal antenna assembly comprising an antenna and an auto-peak
5 device, wherein the antenna comprises a reflector, a subreflector coupled to the reflector via a
support boom, and a feed and a transceiver assembly on the support boom, the feed oriented
relative to the reflector and the subreflector to produce a beam, and wherein the antenna further
comprises a tilt assembly to tilt the subreflector relative to the reflector and the feed to move
the beam in a pattern in response to a control signal provided from the auto-peak device;
10 providing, by the auto-peak device, the control signal to the tilt assembly to tilt the
subreflector in a plurality of tilt positions, relative to the reflector, to move the beam while
measuring corresponding signal strength of a signal communicated via the antenna at each of
the plurality of tilt positions;
selecting, by the auto-peak device, a tilt position from the plurality of tilt positions
15 based on the measured signal strength; and
providing, by the auto-peak device, the control signal to tilt the subreflector to the
selected tilt position.
2. The method of claim 1, the tilt assembly further comprising:
20 connecting a base structure to the support boom;
connecting a central pivot between the base structure and a backside of the subreflector;
connecting a first actuator to the base structure, wherein the first actuator is in contact
with the backside of the subreflector at a first point; and
connecting a second actuator to the base structure, wherein the second actuator is in
25 contact with the backside of the subreflector at a second point, wherein movement of at least
one of the first and second actuators tilts the subreflector relative to the base structure and
provides both azimuth and elevation movement of the beam.
3. The method of claim 2, further comprising connecting a counter-force device to the
30 base structure, the counter-force device in contact with the backside of the subreflector.
4. The method of claim 3, wherein the counter-force device contacts the backside of the
subreflector at a third point, wherein the third point is located on a first portion of the backside

of the subreflector, and wherein the first and second points are located on a second portion of the backside of the subreflector opposite the first portion.

5. The method of claim 2, further comprising connecting a spring to the base structure,
5 the spring in contact with the backside of the subreflector.

6. The method of claim 2, wherein the first actuator and the second actuator each comprise
a motor to tilt the subreflector about the central pivot, and wherein providing the control signal
to the tilt assembly causes movement of the motors in the respective first and second actuators.
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7. The method of claim 1, further comprising transmitting an alert when the selected tilt
position is at a predetermined maximum tilt angle from a neutral tilt position of the subreflector.

8. The method of claim 7, wherein the alert provides notification that the subreflector is
15 near a tilt limit of the subreflector and that gross aiming of the user terminal antenna assembly
may be required.

9. The method of claim 1, further comprising periodically providing the control signal to
tilt the subreflector in the plurality of tilt positions and periodically selecting the tilt position.
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10. The method of claim 1, wherein providing the control signal to tilt the subreflector in
the plurality of tilt positions and selecting the tilt position is performed to verify an installation
of the user terminal antenna assembly.

25 11. The method of claim 1, further comprising providing the control signal and selecting
the tilt position when a determination is made that the antenna is mis-pointed.

12. The method of claim 1, wherein moving the beam comprises moving the beam in both
elevation and azimuth directions.
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13. A user terminal antenna assembly comprising:
a support boom;
a reflector coupled to a first end of the support boom;

a subreflector;

a feed and a transceiver assembly attached to the support boom, the feed oriented relative to the subreflector and the reflector to produce a user terminal beam;

5 a tilt assembly coupled to a second end of the support boom opposite the first end, the tilt assembly further coupled to the subreflector to tilt the subreflector, relative to the reflector and the feed, to move the user terminal beam in response to a control signal; and

an auto-peak device to:

provide the control signal to tilt the subreflector in a plurality of tilt positions to move the user terminal beam while measuring corresponding signal strength of a signal
10 communicated via the antenna assembly at each of the plurality of tilt positions;

select a tilt position from the plurality of tilt positions based on the measured signal strength; and

provide the control signal to tilt the subreflector to the selected tilt position.

15 14. The antenna assembly of claim 13, the tilt assembly further comprising:

a base structure connected to the support boom;

a central pivot connected between the base structure and a backside of the subreflector;

a first actuator connected to the base structure and in contact with the backside of the subreflector at a first point; and

20 a second actuator connected to the base structure and in contact with the backside of the subreflector at a second point, wherein movement of at least one of the first and second actuators tilts the subreflector relative to the base structure and provides both azimuth and elevation movement of the user terminal beam.

25 15. The antenna assembly of claim 14, further comprising a counter-force device connected to the base structure and in contact with the backside of the subreflector.

16. The antenna assembly of claim 15, wherein the counter-force device contacts the backside of the subreflector at a third point, wherein the third point is located on a first portion
30 of the backside of the subreflector, and wherein the first and second points are located on a second portion of the backside of the subreflector opposite the first portion.

17. The antenna assembly of claim 15, wherein the counter-force device comprises a spring.

18. The antenna assembly of claim 14, wherein the first actuator and the second actuator
5 each comprise a motor to tilt the subreflector about the central pivot.

19. The antenna assembly of claim 14, wherein the first actuator is in contact with the backside of the subreflector through a point contact, and wherein the second actuator is coupled to the subreflector through a sliding joint.

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20. The antenna assembly of claim 19, further comprising a counter-force device to maintain contact between the first actuator and the backside of the subreflector at the point contact.

15 21. The antenna assembly of claim 20, wherein the counter-force device comprises a spring.

22. The antenna assembly of claim 14, wherein the first and second actuators are connected to the backside of the subreflector through kinematic joint connections.

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23. The antenna assembly of claim 22, wherein the first actuator is connected to the backside of the subreflector through a spherical adapter connection and the second actuator is connected to the backside of the subreflector through a sliding joint connection.

25 24. The antenna assembly of claim 22, wherein the first and second actuators are each respectively connected to the backside of the subreflector through a snap-fit connection.

25. The antenna assembly of claim 22, further comprising a backlash spring to reduce backlash within at least one of the first actuator and the second actuator.

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26. The antenna assembly of claim 13, wherein moving between the plurality of tilt positions facilitates moving the user terminal beam in both elevation and azimuth directions.

27. The antenna assembly of claim 13, further comprising an alert device to transmit an alert, when the selected tilt position is at a predetermined maximum tilt angle from a neutral tilt position of the subreflector.

5 28. The antenna assembly of claim 13, wherein the auto-peak device periodically provides the control signal to the tilt assembly to tilt the subreflector in the plurality of tilt positions and periodically selects the tilt position.

29. The antenna assembly of claim 13, wherein the auto-peak device provides the control
10 signal to the tilt assembly to tilt the subreflector in the plurality of tilt positions and selects the tilt position to verify an installation of the antenna assembly.

30. The antenna assembly of claim 13, wherein the auto-peak device provides the control
15 signal to the tilt assembly to tilt the subreflector in the plurality of tilt positions and selects the tilt position when a determination is made that the antenna assembly is mis-pointed.

31. The antenna assembly of claim 13, wherein the feed is offset from a centerline of the reflector.

20 32. The antenna assembly of claim 13, wherein the auto-peak device is within the transceiver assembly.

33. The antenna assembly of claim 13, wherein the first end of the support boom connects
25 to a backside of the reflector that is opposite of the front side of the reflector, and wherein the front side of the reflector faces the subreflector.

34. The antenna assembly of claim 13, wherein the subreflector is cantilever supported by the support boom.

30 35. The antenna assembly of claim 13, wherein the support boom comprises a single support boom comprising an extruded element and the subreflector is only supported by the single support boom.