source; and transmit state information at a reporting rate set using the state of the aircraft identified from the sensor data, at least one of the crew command or the ground command when the at least one of the crew command or the ground command is received, and a policy defining priorities for reporting that are based on at least one of the crew command, the ground command, or the state of the aircraft identified from the sensor data.

Another embodiment of the present disclosure provides an aircraft tracking system comprising a housing that is tamper-resistant, a sensor system, a behavior analyzer, a state information reporter, and a communications system located in the housing. The sensor system is configured to generate sensor data about an aircraft. The behavior analyzer is configured to identify the state of the aircraft using the sensor data. The state information reporter is configured to report the state information at the reporting rate set using the state of the aircraft identified from the sensor data, at least one of a crew command or a ground command when the at least one of the crew command or the ground command is received, and a location of the aircraft. The communications system is configured to receive the ground command and send the state information transmitted by the state information reporter.

Yet another embodiment of the present disclosure provides a method for reporting state information for an aircraft. A state of the aircraft is identified using sensor data received from an aircraft sensor system in the aircraft. The state information is transmitted at a reporting rate set using the state of the aircraft identified from the sensor data, at least one of a crew command or a ground command when at least one of the crew command is received from a crew interface or the ground command is received from a ground source, and a policy defining priorities for reporting that are based on at least one of the crew command, the ground command, or the state of the aircraft identified from the sensor data.

An aspect of the present disclosure provides an apparatus that comprises an aircraft tracker that comprises: a behavior analyzer configured to generate a state of an aircraft based upon sensor data and a rule in policies configured to: define a priority between: a crew command from a crew interface, a ground command from a ground source, and an autonomous mode of the aircraft tracker; specify parameters considered from the sensor data, received from a sensor system, that determine the state of an aircraft; control a latch, in the behavior analyzer in the aircraft tracker, configured to hold

the state of the aircraft, output from the behavior analyzer and received by an aircraft state information reporter, to a worst state, identified by an aircraft state identifier, until a reset; and specify a priority that allows the reset in flight; and a rate identifier configured to set a reporting rate for the aircraft state information reporter based upon the state of the aircraft, and responsive to the priority based upon a reception of at least one of: the crew command from the crew interface; and the ground command from the ground source, such that an identification, by the aircraft tracker, of a distress state for the aircraft, precludes a compliance, by the rate identifier, with a command, received from at least one of the crew interface and the ground source, to change the reporting rate; and the aircraft state information reporter configured to transmit, state information that comprises the state of the aircraft, at the reporting rate.

Another aspect of the present disclosure provides an apparatus that comprises an aircraft tracker that comprises: a behavior analyzer configured to generate a state of an aircraft based upon sensor data and a rule in policies configured to: define a priority between: a crew command from a crew interface, a ground command from a ground source, and an autonomous mode of the aircraft tracker, the aircraft tracker configured to select a policy in the policies based on a selection received in the ground command; specify parameters considered from the sensor data, received from a sensor system, that determine a state of an aircraft, the parameters being specified from a group that comprises: an attitude, a bank angle, a roll rate, a persistence time, and a geofencing dependence, of the aircraft; control a latch, in the behavior analyzer in the aircraft tracker, configured to hold a state of the aircraft, output from the behavior analyzer and received by an aircraft state information reporter, to a worst state, identified by an aircraft state identifier, until a reset, such that a hierarchy of the worst state descends from distress to abnormal to normal; and specify a priority that allows the reset in flight; and an aircraft state information reporter that comprises a rate identifier configured to determine a reporting rate based upon the state of the aircraft, and responsive to the priority based upon a reception of at least one of: the crew command from the crew interface; and the ground command from the ground source, such that an identification, by the aircraft tracker, of a distress state for the aircraft, precludes a compliance, by the rate identifier, with a command, received from at least one of the crew interface and the ground source, to change the reporting rate; and the

aircraft state information reporter configured to transmit, in a tamper resistant manner, aircraft state information at the reporting rate.

Yet another aspect of the present disclosure provides an apparatus configured to secure a reporter in an aircraft against tampering, such that the apparatus comprises: an aircraft tracker that comprises: a transmit state identifier, policies, a behavior analyzer, and an aircraft state information reporter, such that: the transmit state identifier comprises: a crew command handler, a ground command handler, and a position handler; the policies being configured to: define a priority between: a crew command from a crew interface, a ground command from a ground source, and an autonomous mode of the aircraft tracker, the aircraft tracker configured to select a policy in the policies based on a selection received in the ground command; specify parameters considered from sensor data, received from a sensor system, that determine a state of an aircraft, the parameters being specified from a group that comprises: an attitude, a bank angle, a roll rate, a persistence time, and a geofencing dependence, of the aircraft; control a latch, in a behavior analyzer in the aircraft tracker; and specify a priority that allows a reset of the latch in flight; the behavior analyzer comprises: an aircraft state identifier, and the latch, the aircraft state identifier configured to generate the state of the aircraft based upon: a rule in the policies, and the sensor data; and the aircraft state information reporter comprises a rate identifier configured to set a reporting rate, and a reporter configured to transmit state information at the reporting rate.

The features and functions can be achieved independently in various embodiments of the present disclosure or may be combined in yet other embodiments in which further details can be seen with reference to the following description and drawings.

CLAIMS:

What is claimed is:

1. An apparatus that comprises an aircraft tracker that comprises: a behavior analyzer configured to generate a state of an aircraft based upon sensor data and a rule in policies configured to: define a priority between: a crew command from a crew interface, a ground command from a ground source, and an autonomous mode of the aircraft tracker; specify parameters considered from the sensor data, received from a sensor system, that determine the state of an aircraft; control a latch, in the behavior analyzer in the aircraft tracker, configured to hold the state of the aircraft, output from the behavior analyzer and received by an aircraft state information reporter, to a worst state, identified by an aircraft state identifier, until a reset; and specify a priority that allows the reset in flight; and a rate identifier configured to set a reporting rate for the aircraft state information reporter based upon the state of the aircraft, and responsive to the priority based upon a reception of at least one of: the crew command from the crew interface; and the ground command from the ground source, such that an identification, by the aircraft tracker, of a distress state for the aircraft, precludes a compliance, by the rate identifier, with a command, received from at least one of the crew interface and the ground source, to change the reporting rate; and the aircraft state information reporter configured to transmit, state information that comprises the state of the aircraft, at the reporting rate.

2. The apparatus of claim 1, further comprising: the state of the aircraft comprising one of: normal, abnormal, and distress; the parameters being specified from a group that comprises: an attitude, a bank angle, a roll rate, a persistence time, and a geofencing dependence, of the aircraft; and the aircraft tracker comprising: the behavior analyzer configured to identify, based upon a policy, in the policies, applied to the sensor data, the state of the aircraft; and the aircraft state information reporter being configured to, responsive to reception of at least one of: the crew command, or the ground command, and based upon the state of the aircraft identified from the sensor data and the at least one of the crew command or the ground command, transmit the state of the aircraft at the reporting rate.

3. The apparatus of claim 2 further comprising: a transmit state identifier configured to indicate whether the state of the aircraft should be transmitted; and the aircraft state information reporter comprising: the rate identifier configured to identify, responsive to reception of at least one of: the crew command, or the ground command, and based upon the state of the aircraft identified from the sensor data and the at least one of: the crew command, or the ground command, the reporting rate; and the aircraft state information reporter configured to: identify the state of the aircraft for transmission; and transmit, responsive to an indication in the transmit state identifier that the state of the aircraft should be transmitted, the state of the aircraft at the reporting rate.

4. The apparatus of claim 2, further comprising the behavior analyzer configured to identify the state of the aircraft based upon sensor data received from the sensor system and a policy that defines states of the aircraft based on the sensor data.

5. The apparatus of claim 1 further comprising: the aircraft state information reporter comprising the rate identifier; and the crew interface configured to generate the crew command and send the crew command to the aircraft tracker.

6. The apparatus of claim 1, further comprising the aircraft tracker configured to select a policy in the policies based on a selection received in the ground command that limits an ability to disable, via the crew interface, reporting by the aircraft tracker.

7. The apparatus of claim 1, wherein the sensor system comprises at least one of: a satellite navigation system; an inertial measurement unit; and an accelerometer system.

8. The apparatus of claim 1, further comprising the aircraft tracker configured to transmit the state of the aircraft at the reporting rate based upon a location of the aircraft.

9. The apparatus of claim 1, wherein the sensor data comprises: a location of the aircraft, altitude, attitude, power information, a number of parameters for a maneuver

performed by the aircraft, airspeed, roll angle, roll rate, pitch angle, pitch rate, pressure, temperature, and a fuel use.

10. The apparatus of claim 1 further comprising: a housing that comprises the aircraft tracker and the sensor system located inside the housing, and the housing being tamper-resistant.

11. The apparatus of claim 1, wherein the state of the aircraft comprises information that comprises at least one of: the state of the aircraft identified, the sensor data, and information derived from the sensor data.

12. An apparatus that comprises an aircraft tracker that comprises: a behavior analyzer configured to generate a state of an aircraft based upon sensor data and a rule in policies configured to: define a priority between: a crew command from a crew interface, a ground command from a ground source, and an autonomous mode of the aircraft tracker, the aircraft tracker configured to select a policy in the policies based on a selection received in the ground command; specify parameters considered from the sensor data, received from a sensor system, that determine a state of an aircraft, the parameters being specified from a group that comprises: an attitude, a bank angle, a roll rate, a persistence time, and a geofencing dependence, of the aircraft; control a latch, in the behavior analyzer in the aircraft tracker, configured to hold a state of the aircraft, output from the behavior analyzer and received by an aircraft state information reporter, to a worst state, identified by an aircraft state identifier, until a reset, such that a hierarchy of the worst state descends from distress to abnormal to normal; and specify a priority that allows the reset in flight; and an aircraft state information reporter that comprises a rate identifier configured to determine a reporting rate based upon the state of the aircraft, and responsive to the priority based upon a reception of at least one of: the crew command from the crew interface; and the ground command from the ground source, such that an identification, by the aircraft tracker, of a distress state for the aircraft, precludes a compliance, by the rate identifier, with a command, received from at least one of the crew interface and the ground source, to change the reporting rate; and the aircraft state information reporter configured to transmit, in a tamper resistant manner, aircraft state information at the reporting rate.

13. The apparatus of claim 12, further comprising the aircraft state identifier comprising: an on ground estimator, a behavior trigger, an altitude handler, and a power state handler.

14. The apparatus of claim 13, further comprising the on ground estimator configured to receive data from sensors that comprise a sensor of: an altitude, a ground speed, a vertical speed, a configuration of landing gear, an airspeed, and a cabin pressurization, respectively.

15. The apparatus of claim 12, further comprising the aircraft tracker configured to receive: the sensor data, the crew command, and the ground command.

16. The apparatus of claim 12, further comprising the aircraft tracker comprising a transmit state identifier configured to receive geofence data.

17. The apparatus of claim 12, further comprising the aircraft state identifier configured comprising: an on ground estimator, a behavior trigger, an altitude handler, and a power state handler, each responsive to the policies.

18. The apparatus of claim 12, further comprising the aircraft state identifier configured to identify the state of the aircraft based upon: an attitude, a current position, and an altitude, of the aircraft for a designated persistence time.

19. An apparatus configured to secure a reporter in an aircraft against tampering, such that the apparatus comprises: an aircraft tracker that comprises: a transmit state identifier, policies, a behavior analyzer, and an aircraft state information reporter, such that: the transmit state identifier comprises: a crew command handler, a ground command handler, and a position handler; the policies being configured to: define a priority between: a crew command from a crew interface, a ground command from a ground source, and an autonomous mode of the aircraft tracker, the aircraft tracker configured to select a policy in the policies based on a selection received in the ground command; specify parameters considered from sensor data, received from a sensor system, that determine a state of an aircraft, the parameters

being specified from a group that comprises: an attitude, a bank angle, a roll rate, a persistence time, and a geofencing dependence, of the aircraft; control a latch, in a behavior analyzer in the aircraft tracker; and specify a priority that allows a reset of the latch in flight; the behavior analyzer comprises: an aircraft state identifier, and the latch, the aircraft state identifier configured to generate the state of the aircraft based upon: a rule in the policies, and the sensor data; and the aircraft state information reporter comprises a rate identifier configured to set a reporting rate, and a reporter configured to transmit state information at the reporting rate.

20. The apparatus of claim 19, further comprising the latch configured to hold a state of the aircraft, output from the behavior analyzer and received by an aircraft state information reporter, to a worst state, identified by an aircraft state identifier, until a reset, such that a hierarchy of the worst state descends from distress to abnormal to normal.