**CLAIMS:**

What is claimed is:

1. A system for generating trajectory predictions for a flight, the system comprising:

a flight object manager (308) configured to generate flight information (318) using a number of flight plans (312), a number of flight schedules (314), and flight status information (316); and

a trajectory predictor (310) configured to receive flight information (318) from the flight object manager (308) and use the flight information (318) to generate trajectory predictions.

2. The system of claim 1, wherein the flight information (318) includes aircraft intent and aircraft position.

3. The system of claim 1, wherein the flight status information (316) includes at least one of position coordinates, speed, altitude, and time associated with an aircraft in flight.

4. The system of claim 1, wherein the trajectory predictor (310) further generates a number of segments (324) for a flight.

5. The system of claim 4, wherein the number of segments (324) represent a change in at least one of aircraft speed, flight direction, and vertical attitude along a trajectory.

6. The system of claim 4, wherein the trajectory predictor (310) selects an angle for each segment in the number of segments for the flight.

7. The system of claim 6, wherein the trajectory predictor (310) further adjusts a prediction of the angle for the each segment in the number of segments for the flight based on altitude winds.

8. The system of claim 1, wherein the trajectory predictor (310) is triggered by a clearance generator (306) of a tailored arrivals allocation system to generate the trajectory predictions.

9. A method for generating trajectory predictions, the method comprising:

retrieving flight information (1102) associated with an aircraft, wherein the flight information includes a flight plan;

determining (1104) whether a current heading for the aircraft is equal to an expected course of the flight plan;

responsive to a determination that the current heading for the aircraft is equal to the expected course of the flight plan, initializing (1108) trajectory integration.

10. The method of claim 9 further comprising:

responsive to a determination that the current heading for the aircraft is not equal to the expected course of the flight plan, identifying (1106) direct routing to adjust a lateral route for the flight plan; and

initializing (1108) trajectory integration.

11. The method of claim 9 further comprising:

generating (1110) a number of segments for the flight plan;

determining (1112) vertical angles for the number of segments; and

determining (1114) whether each of the number of segments is a geometric based segment.

12. The method of claim 11 further comprising:

responsive to a determination that a segment from the number of segments is a geometric based segment, calculating (1120) a vertical angle using a geometric based method; and

generating (1122) a geometric angle solution.

13. The method of claim 11 further comprising:

responsive to a determination that a segment from the number of segments is not a geometric based segment, calculating (1116) a vertical angle using a performance based method; and

generating (1118) a performance angle solution.

14. The method of claim 9 further comprising:

calculating (1124) horizontal and vertical speeds; and

integrating (1126) the number of segments for the flight plan using the horizontal and vertical speeds.

15. The method of claim 9 further comprising:

identifying (1128) passed waypoints using the trajectory integration;

determining (1130) whether an angle adjustment is needed;

responsive to a determination that the angle adjustment is needed, resetting (1132) integration to a start of a proper segment;

establishing (1134) an adjusted angle based on an actual position of an aircraft; and

calculating (1124) horizontal and vertical speeds.

16. The method of claim 9 further comprising:

determining (1138) whether a last waypoint is reached; and

responsive to a determination that the last waypoint is reached, generating (1142) a trajectory prediction.

17. An apparatus for generating trajectory predictions, the apparatus comprising:

a segment sequence manager (410) configured to generate the trajectory predictions using flight information; and

a plurality of databases (412) in communication with the segment sequence manager and configured to store the flight information and the trajectory predictions (452).

18. The apparatus of 17, wherein the segment sequence manager (410) generates a flight plan segment sequence (426) using the flight information.

19. The apparatus of 17, wherein the trajectory predictions (452) include a number of integrated segment predictions (454).

20. The apparatus of 17, wherein the plurality of databases (412) include a number of aircraft performance models (418) used by the segment sequence manager (410)

to calculate a number of angles (438) used to generate the trajectory predictions (452).

What is claimed is:

1. A system for generating trajectory predictions for a flight, the system comprising:

a flight object manager configured to generate flight information using a number of flight plans, a number of flight schedules, and flight status information; and

a trajectory predictor configured to receive flight information from the flight object manager and use the flight information to generate trajectory predictions, wherein the trajectory predictor is configured to:

generate altitude segments comprising waypoints with associated altitude constraints for the flight,

generate performance segments comprising points at which a speed of the flight changes and indicating vertical angles that the flight would follow,

generate a vertical trajectory for the flight by combining information from the altitude segments and the performance segments, and

generate vertical segments comprising speed acceleration factors or speed deceleration factors.

2. The system of claim 1, wherein the flight information includes aircraft intent and aircraft position.

3. The system of claim 1, wherein the flight status information includes at least one of position coordinates, speed, altitude, and time associated with an aircraft in flight.

4. The system of claim 1, wherein the trajectory predictor further adjusts a prediction of the segments for the flight based on altitude winds.

5. The system of claim 1, wherein the trajectory predictor is triggered by a clearance generator of a tailored arrivals allocation system to generate the trajectory predictions.

6. The system of claim 1, wherein the vertical angles that the flight would follow are the vertical angles that the flight would follow when a trajectory of an aircraft is unconstrained and wherein the flight status information is current flight status information.

7. The system of claim 1, wherein the vertical angles that the flight would follow when a trajectory of the aircraft is unconstrained are vertical descent angles.

8. The system of claim 1, wherein each flight schedule in the number of flight schedules comprises controlled time of arrival windows in which each flight in a plurality of flights must arrive.

9. The system of claim 1, wherein the trajectory predictor is configured to:

determine whether each of the segments is a geometric based segment comprising a fixed angle flown between the waypoints regardless of a performance of the aircraft and winds,

responsive to a determination that a segment is a geometric based segment, calculate a vertical angle using a geometric based method, wherein the geometric based method is a kinematic model using at least one of predefined descent angles or fixed descent angles,

calculate a target horizontal speed vector and a target vertical speed vector, and

integrate the segments using the target horizontal speed vector and the target vertical speed vector.

10. A method for generating trajectory predictions, the method comprising:

retrieving, by a trajectory predictor from a flight object manager, flight information associated with an aircraft, wherein the flight information includes a flight plan, a flight schedule, and current flight status information,

wherein the flight schedule comprises controlled time of arrival windows in which each flight in a plurality of flights must arrive;

determining, by the trajectory predictor, whether a current heading for the aircraft is equal to an expected course of the flight plan;

responsive to a determination that the current heading for the aircraft is equal to the expected course of the flight plan, initializing trajectory integration;

generating, by the trajectory predictor, altitude segments comprising waypoints with associated altitude constraints for the aircraft;

generating, by the trajectory predictor, performance segments comprising points at which a speed of the aircraft changes and indicating vertical descent angles that the aircraft would follow when a trajectory of the aircraft is unconstrained;

generating, by the trajectory predictor, vertical segments comprising speed acceleration factors or speed deceleration factors; and

generating, by the trajectory predictor, a vertical trajectory for the aircraft by combining information from the altitude segments and the performance segments.

11. The method of claim 10 further comprising:

responsive to a determination that the current heading for the aircraft is not equal to the expected course of the flight plan, identifying direct routing to adjust a lateral route for the flight plan; and

initializing trajectory integration.

12. The method of claim 10 further comprising:

determining whether each of the segments is a geometric based segment comprising a fixed angle flown between the waypoints regardless of a performance of the aircraft and winds.

13. The method of claim 10 further comprising:

responsive to a determination that a segment is a geometric based segment, calculating a vertical angle using a geometric based method, wherein the geometric based method is a kinematic model using at least one of predefined descent angles or fixed descent angles; and

generating a geometric angle solution.

14. The method of claim 10 further comprising:

responsive to a determination that a segment is not a geometric based segment, calculating a vertical angle using a performance based method; and

generating a performance angle solution.

15. The method of claim 10 further comprising:

calculating target horizontal speeds and target vertical speeds; and

integrating the segments using the target horizontal speeds and target vertical speeds.

16. The method of claim 10 further comprising:

identifying passed waypoints using the trajectory integration;

determining whether an angle adjustment is needed;

responsive to a determination that the angle adjustment is needed, resetting integration to a start of a proper segment;

establishing an adjusted angle based on an actual position of the aircraft; and

calculating target horizontal speeds and target vertical speeds.

17. The method of claim 10 further comprising:

determining whether a last waypoint is reached; and

responsive to a determination that the last waypoint is reached, generating a trajectory prediction.

18. An apparatus for generating trajectory predictions, the apparatus comprising:

a segment sequence manager configured to generate the trajectory predictions using flight information by generating altitude segments comprising waypoints with associated altitude constraints for a flight, generating performance segments comprising points at which a speed of the flight changes and indicating vertical angles that the flight would follow when a trajectory of an aircraft is unconstrained, generating a vertical trajectory for the flight by combining information from the altitude segments and the performance segments, and generating vertical segments comprising speed acceleration factors or speed deceleration factors; and

a plurality of databases in communication with the segment sequence manager and configured to store the flight information and the trajectory predictions, wherein the flight information includes current flight status information.

19. The apparatus of claim 18, wherein the plurality of databases include a number of aircraft performance models used by the segment sequence manager to calculate a number of angles used to generate the trajectory predictions.

20. The apparatus of claim 18, wherein the segment sequence manager is configured to generate the trajectory predictions using flight information by adjusting a prediction of the segments for the flight based on altitude winds.