

Assignment 6: Air Traffic, Operations and Runway Capacity

Date Due: March 30, 2020

Instructor: Trani

Problem 1

This is a continuation of Problem 1 in Assignment 5.

- a) If the aircraft has an engine failure at a point 500 nm from the TOC point, estimate the best altitude and Mach number to divert to an alternative airport. Explain your selection.
- b) Identify two feasible airports (along the US Coast) that can be used as alternate airports (other than the departure airport).
- c) Estimate the travel time to the two alternate airports selected in part (b) and state if the flights can be operated as an ETOPS 120 (minutes) flight.

Problem 2

Read Chapter 14 of the Pilot's Handbook of Aeronautical Knowledge (https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/pilot_handbook.pdf) and answer the following questions:

- a) Briefly explain the difference between Class B and C airspace.
- b) What is the equipment necessary to operate in Class A airspace.
- c) Explain the differences between Prohibited and Restricted areas.

Problem 3

The Organized North Atlantic Track System (OTS) is a system of tracks derived daily that optimize the routes to be flown every day between North America and Europe (and also the opposite direction). The Eastbound tracks for a typical day are shown in Figure 1. Each track is defined between flight levels 310 and 390 (inclusive).

- a) Estimate the hourly capacity (flights/hour) of one OTS track of the system of tracks shown in Figure 1 (6 Eastbound tracks). The distribution of times between arrivals to the track entry point (in the Canadian side) are shown in Figure 2. The average speed for flights Eastbound is estimated to be 490 knots ground speed.
- b) Find the average longitudinal separation (in nautical miles) between aircraft flying the OTS Eastbound. Comment on the results obtained and compare the separation with domestic separations used in domestic US airspace.
- c) An oceanic controller assigns a Boeing 767-200 (flying at Mach 0.80 and 38,000 feet) to track NAT-W. The controller assigns a Boeing 787-9 (flying at Mach 0.85 and 38,000 feet) to the same track NAT-W following the Boeing 767-200. If the minimum headway (i.e., time between two aircraft) equipped with FANS 1/A equipment using the same track and same flight level is 5

minutes, estimate the required headway at the oceanic track starting point. Controllers cannot assign operations to a track unless the two aircraft will be conflict free until the lead aircraft exits the tracks on the European side.

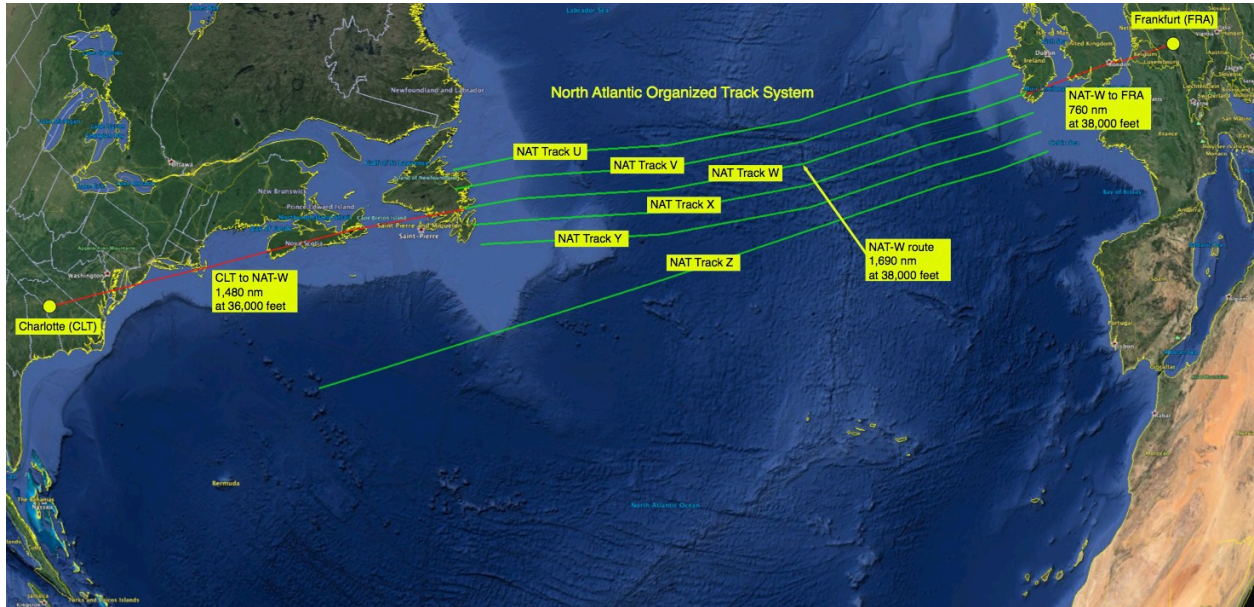


Figure 1. A Flight from CLT-FRA Using the Organized Track System.

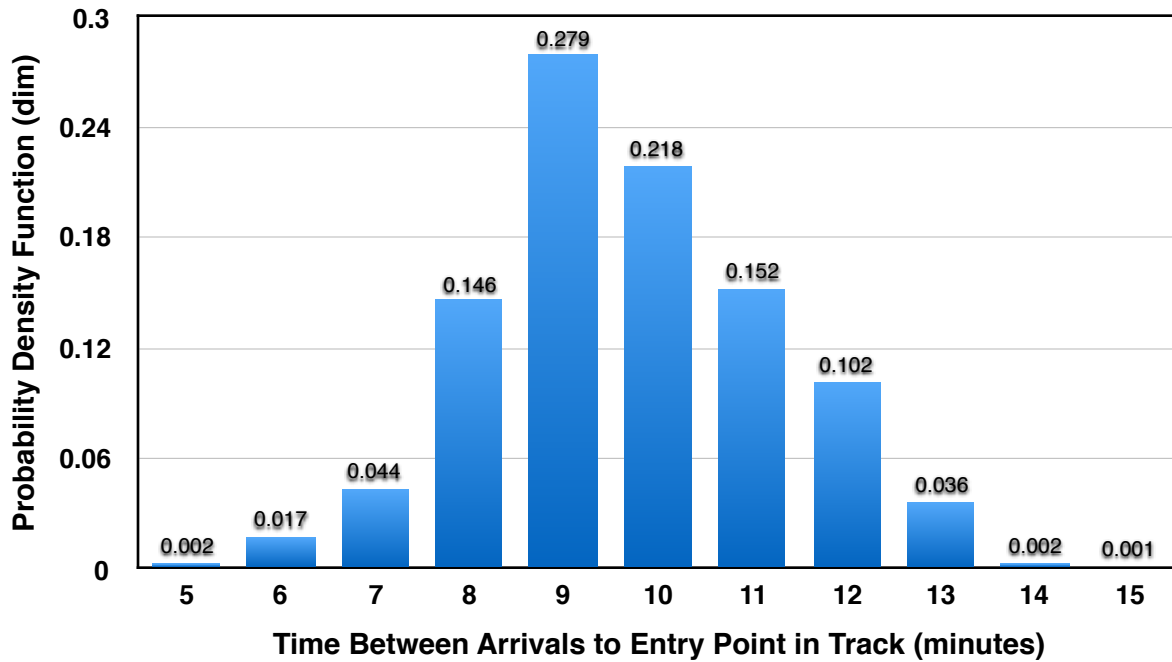


Figure 2. Typical Distribution of Time Between Arrivals to Tracks of the OTS.

Problem 4

Answer briefly the following ATC-related questions.

- a) A Boeing 757-300 flies from San Diego (SAN) to Chicago O'Hare airport (ORD). Name two possible flight levels that this flight could take while following ATC hemispherical rules for vertical separation.
- b) An Airbus A320 cruises at Mach 0.78 over Montana. Name the ATC service that the aircraft contacts to request a 10-mile deviation to the right to avoid weather.
- c) An Airbus A319 is 20 nm from Charlotte (CLT) airport. The aircraft is descending at 250 knots at 6,300 feet. Name the ATC service that handles this flight.
- d) Find the minimum separation between two runways able to operate simultaneous instrument landing procedure arrivals with a fast-scan radar.
- e) Use Google Earth or Google Maps and inspect the runway configuration of Chicago ORD airport. Can aircraft arrivals use runways 10R and 10C independently in IMC conditions? Comment.
- f) Use Google Earth or Google Maps and inspect the runway configuration of JFK airport. Can aircraft arrivals use runways 31L and 31R independently in IMC conditions? Comment.