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1 Introduction

A satellite communication system that will service aircraft flying in oceanic airspace (out of line of sight of land) is to be developed. This note will predict a conservative but reasonable Fermi estimate of the number of aircraft flying over the North Atlantic in the peak busy hour.

2 Assumptions

The estimation of the number of aircraft will utilize the principles of Fermi problems, which require justified assumptions based on little to no data. Several assumptions are considered in this scenario and are listed as follows:

- The number of aircrafts flying over to Europe equals the number of aircrafts flying back to the United States.
- Only international flights departing from major airports in the northern regions of the United States are considered; contributions from other airports are negligible.

The airports that are considered as major contributors are listed below:

ATL	BOS	CHT	DFW	IAD
JFK	LAX	NWK	ORD	PHL
SEA	SFX	STL		

The airports with minor contribution to the North Atlantic air traffic are listed below:

CLE	DEN	MIA
PAX	TOR	YUL

- Aircraft (not just international aircraft) depart busy airports about once every two minutes in the busy hour.
- There are more domestic than international flights in the United States.
- The large airports contribute to at least 80% of the total flights in the United States, and the selected airports at least 75%.
- Contributions to air traffic from flights between midnight and dawn are less significant when compared to daytime flights.
- Peak hour contains around 25% more traffic than usual.

3 Calculations

Data on air traffic were obtained from various sources. These statistics were used to generate the variations or the bounds of the estimate.

- There are 23,911 commercial flights every day. [1]
- There are almost 3 times more domestic flights than international in the United States. [2]

$$23,911 \frac{\text{flights}}{\text{day}} \times \frac{1}{20} \frac{\text{day}}{\text{busy hour}} \approx 1,200 \frac{\text{flights}}{\text{busy hour}}$$

25% more flights during peak hour:

$$25\% \times 1,200 \frac{\text{flights}}{\text{busy hour}} + 1,200 \frac{\text{flights}}{\text{busy hour}} = 1,500 \frac{\text{flights}}{\text{peak hour}}$$

$$\begin{aligned} 1,500 \frac{\text{flights}}{\text{peak hour}} \times \frac{1}{4} \frac{\text{international flights}}{\text{flights}} \times \frac{70 \text{ North Atlantic flights}}{100 \text{ international flights}} \\ \approx 265 \frac{\text{North Atlantic flights}}{\text{peak hour}} \end{aligned}$$

4 Conclusion

There can be around 250 - 300 flights flying in the North Atlantic region towards Europe expected during the peak hour.

References

- [1] Air Traffic By The Numbers,
https://www.faa.gov/air_traffic/by_the_numbers
- [2] 2016 Traffic Data for U.S Airlines and Foreign Airlines U.S. Flights,
https://www.rita.dot.gov/bts/press_releases/bts017_17
- [3] All Carriers - All Airports
<https://www.transtats.bts.gov/DataElements.aspx>