



## Queueing Systems

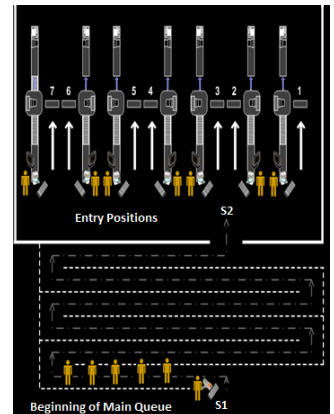
The *Borealian Aeronautic Security Agency* (BASA) runs pre-board screening of passengers and crew for all flights departing the nation's airfields.

There are 4 Major Airfields

- Auckland
- Chebucto
- Saint-François
- Queenston

The screening process (PBS) is structurally similar at each airfield:

1. Passengers arrive at the beginning of the main queue
2. Boarding passes may or may not be scanned at  $S_1$
3. Passengers enter the main queue
4. Boarding passes are scanned at  $S_2$
5. Passengers are directed to a server entry position
6. Passengers and carry-on luggage are screened by a server



Some factors influence the PBS wait time, including:

- schedule intensity of departing flights
- passenger volume on these flights
- number of servers and processing rates at a given airfield, etc.

There might also be

- yearly, seasonal, time-of-day, day-of-week interaction effects (among others) depending on the airfield, the flight destination, etc.
- trend level shifts in the number of passengers, flights, destinations, etc.

### Data:

4 datasets are available: *20262030.csv*, *BASA\_AUC\_2028\_g12.csv*, *dat\_F\_sub.csv*, *dat\_P\_sub\_c.csv*

### Tasks:

1. Build a data dictionary for the datasets [15 marks]
2. Explore and visualize the datasets [15 marks]
3. Perform a queueing model analysis to predict the wait times at each airfield for which you have data. [45 marks]

Use the accompanying documentation to inform your analysis.