Airport Gate and Ramp Capacity

Learning Objectives:
1. Terminology
2. Compute Static Capacity
3. Compute Dynamic Capacity

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Definitions

Aprons consist of areas reserved for remote and contact aircraft stands and taxi-lanes.

Stands categorized as:

1. Exclusive use – used by a single airline (or a group of airlines). Assignment of use and schedule is managed by the airline (or a contractor responsible for ramp handling in that part of the apron).
2. Shared (or Common) used by more than one airline. Assignment of use and schedule is managed by the airport (or a contractor responsible for ramp handling in that part of the apron).

Stands characterized by size – the dimensions of aircraft it can accommodate

Capacity of Aprons

Static Capacity =
- number of stands available.
- Number of aircraft that can occupy the apron at any given moment.
- Provides snapshot of instantaneous capacity of the apron.
- Note: Cannot be used for comparison with other parts of airport (e.g. runways) that are characterized by the number of units per unit time.

Dynamic Capacity =
- Number of aircraft per hour that can be accommodated by the stands
- Considers the time interval between successive occupancies by two different aircraft
  - Minimum interval = SOT + PT + Buffer Time
  - time aircraft scheduled to spend at stand = Scheduled Occupancy Time (SOT) = Schedule Turn-around Time (STT). SOT = 20 mins for quick turn or small aircraft SOT = 4 hours for large aircraft on inter-continental route
  - time to position aircraft into and out of stand Positioning Time (PT). PT = 2-4 minutes for remote stands. PT = 10 minutes for contact stands due to push-back maneuver
  - Buffer Time (BT) to ensure that there is sufficient time between scheduled departure time of the 1st aircraft and the scheduled arrival time of the 2nd aircraft to ensure with high probability that deviations in departure/arrival schedules will not necessitate a change in stand assignment.
    - Note last minute stand assignments are costly and disruptive for passengers and ground personnel
    - BT = 4 minutes for remote stand
    - BT = 1 hour for larger aircraft on contact stand
Example

Airport has 60 stands. All stands accommodate same size of aircraft. Average SOT = 50 minutes.

Analysis based on SOT: Number of aircraft per hour = number of stands/time per stand = 60/(50 mins * 1/60) = 72 aircraft per hour

Maximum Capacity (assuming aircraft arrive and depart exactly on schedule). Analysis based on SOT and PT

= 60/[(50+8)/60] = 62 aircraft per hour

Conservative capacity (BT = 30 minutes)

= 60/[(50+8+30)/60] = 41 aircraft per hour
Test your knowledge!

1. Define the following terms:
   
   - Stand ____________________________________________________________
   
   - Remote stand _______________________________________________________
   
   - Contact Stand _____________________________________________________
   
   - Common Use Stand _________________________________________________
   
   - Exclusive Use Stand ____________________________________________
   
   - Scheduled Occupancy Time (SOT) _________________________________
   
   - Positioning Time (PT) ___________________________________________
   
   - Buffer Time (BTT) _______________________________________________
2. Complete the following table:

<table>
<thead>
<tr>
<th></th>
<th>Scheduled Occupancy Time</th>
<th>Positioning Time</th>
<th>Buffer Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote Stand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact Stand – Regional Jet/Narrow Body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact Stand – Wide-body</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Compute Apron Capacity:

3-a) Calculate Maximum Apron Capacity AND Estimated Apron Capacity for an airport with the following characteristics:

[picture of airport with stands identified = 30 stands]

- SOT = 50 minutes
- PT = 8 minutes
- BT = 30 minutes

3-b) What is the benefit of adding an additional gate. Explain.