Passenger Management by Prioritization

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Topics

- Fast lane usage concepts
  - Prioritizing status group members
  - Prioritizing for passenger steering

- Operational scenarios and simulation
  - Reference scenario
  - Priority scenarios
Terminal queuing
Terminal queuing
Fast lane usage concepts

- Status group depending priorities

[Diagram showing two lanes: PLUS CLASS and ALL OTHERS]
Fast lane usage concepts

Status group depending priorities

Avg. number of persons in the system
Expl.: $\lambda=1.2; \mu=1.0;$
$c_i=1.0; c_S=0$

| Single queue | 1.55 |

$\mathbb{E}(N) \approx \frac{\rho}{1-\rho} \times \sqrt{\rho^{c_i}} \times \left(\frac{c_i^2 + c_S^2}{2}\right) + \rho \times c$

G/G/n approximation by Allen/Cunneen
Fast lane usage concepts

Status group depending priorities

<table>
<thead>
<tr>
<th>Avg. number of persons in the system</th>
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<td>Expl.: $\lambda=1.2$; $\mu=1.0$; $c_i=1.0$; $c_s=0$</td>
<td>Parallel queue</td>
<td>2.10</td>
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G/G/n approximation by Allen/Cunneen

$$E(N) \approx \frac{\rho}{1-\rho} \times \sqrt{\rho} \times \left(\frac{c_i^2 + c_s^2}{2}\right) + \rho \times c$$

Diagram:
- Single queue: $\lambda = 1.55$
- Parallel queue: $\lambda = 2.10$

$\lambda$: Input rate
$\mu$: Service rate
$\mu_i$: Individual service rate
$c_i$: Service cost
$c_s$: System cost

Erik Grunewald

Fast lane usage concepts

- Status group depending priorities

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<th>Queue Type</th>
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<td>Single queue</td>
<td>1.55</td>
</tr>
<tr>
<td>Parallel queue</td>
<td>2.10</td>
</tr>
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<td>Asymmetric queue (25% + 75%)</td>
<td>5.30</td>
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$G/G/n$ approximation by Allen/Cunneen:

$$E(N) \approx \frac{\rho}{1-\rho} \times \sqrt{\rho^{c_i} \times \left(\frac{c_i^2 + c_s^2}{2}\right)} + \rho \times c$$
Fast lane usage concepts

- Status group depending priorities
  - allocation of priority as part of the product class
  - paid priority
  - fast tracking *to be the first at gate*
  - may cause reduced infrastructure capacity efficiency due to idle running especially for prioritized requests
Fast lane usage concepts

- Prioritizing for passenger steering
  - allocation of priority as part of the AOP Airport Operations Plan stabilization process
  - Level of service driven priority
  - Fast tracking to maximise connectivity
The object of this study was to investigate the possibilities of influencing achievable boarding quotas through **targeted prioritisation** of flight passengers in order to limit the number of flights missed due to long queues at security control.

- *Local solutions only – “Intermodal Augmented Scheduling” with regional focus*
Simulation

- 1…10 security lines
- Priority security queue
- Boarding pass control
- Checkin counter blocks 1, 2, 3
- Main security queue
- Ext. Pax source
Simulation

- Passenger demand profile (sum per hour)

![Bar chart showing passenger demand profile per hour.](chart.png)
Simulation

- Scenarios
  - #1: Reference
  - #2: Priority for early passengers
  - #3: Priority for late passengers
  - #4: bunch access reference
  - #5: Indirect priority for bunch
  - #6: direct priority for bunch
Simulation

early pax prioritization

late pax prioritization
Simulation

indirect (4) & direct (5) prioritization
Simulation

indirect and direct prioritization: effect on selected flight
Conclusions

- Pax prioritization for terminal process optimization is very limited in effects
- Prioritization may lead to disadvantages for third parties – what-if simulation as decision support
- Prioritization causes costs (by dedicated capacities and/or due to reduced efficiency) and requires therefore additional benefits
- Prioritization should always be allocated in accordance with affected stakeholders → Rudolph et al.: “Intermodal Augmented Scheduling”