ANS Finland – Finnair
Update

Twenty-Seventh Cross Polar Trans-East ATM Providers’ Working Group (CPWG/27) Meeting,
Civil Aviation Authority of Singapore, Singapore
October 22-24, 2019
Revenue (EUR million) | Operating profit/revenue (%)
--- | ---
81.5 | 8.4

266,361 flights processed by area air traffic control

730 flights processed per day on average

0 minutes of delays attributable to ANS Finland

447 employees at the end of the year

The number of overflights increased by 4.7%
The traffic volume of Helsinki Airport increased by 10.3%
# HELSINKI FIR IFR TRAFFIC

## Results in Flight Numbers

<table>
<thead>
<tr>
<th>Month</th>
<th>Arrival</th>
<th></th>
<th></th>
<th>Departure</th>
<th></th>
<th></th>
<th>Internal</th>
<th></th>
<th></th>
<th>Overflight</th>
<th></th>
<th></th>
<th>Previous Year</th>
<th>Current Year</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Previous Year</td>
<td>Growth</td>
<td>Current Year</td>
<td>Previous Year</td>
<td>Growth</td>
<td>Current Year</td>
<td>Growth</td>
<td>Previous Year</td>
<td>Growth</td>
<td>Current Year</td>
<td>Growth</td>
<td>Previous Year</td>
<td>Current Year</td>
<td>Growth</td>
<td></td>
</tr>
<tr>
<td>January 2019</td>
<td>6,390</td>
<td>4.7%</td>
<td>6,918</td>
<td>6,390</td>
<td>6,399</td>
<td>4.8%</td>
<td>4,867</td>
<td>4,851</td>
<td>-0.3%</td>
<td>4,780</td>
<td>5,107</td>
<td>8.8%</td>
<td>23,227</td>
<td>23,144</td>
<td>4.1%</td>
</tr>
<tr>
<td>February 2019</td>
<td>5,942</td>
<td>3.3%</td>
<td>6,136</td>
<td>5,933</td>
<td>6,138</td>
<td>3.1%</td>
<td>4,029</td>
<td>4,008</td>
<td>-0.5%</td>
<td>4,449</td>
<td>4,316</td>
<td>2.0%</td>
<td>20,873</td>
<td>21,318</td>
<td>2.1%</td>
</tr>
<tr>
<td>March 2019</td>
<td>6,690</td>
<td>3.2%</td>
<td>6,901</td>
<td>6,713</td>
<td>6,903</td>
<td>2.8%</td>
<td>3,024</td>
<td>3,151</td>
<td>3.1%</td>
<td>5,127</td>
<td>5,124</td>
<td>-0.1%</td>
<td>23,654</td>
<td>24,109</td>
<td>2.4%</td>
</tr>
<tr>
<td>April 2019</td>
<td>6,877</td>
<td>1.4%</td>
<td>6,972</td>
<td>6,879</td>
<td>6,972</td>
<td>1.4%</td>
<td>4,249</td>
<td>4,262</td>
<td>-3.8%</td>
<td>5,138</td>
<td>5,061</td>
<td>-1.5%</td>
<td>23,323</td>
<td>23,267</td>
<td>-0.2%</td>
</tr>
<tr>
<td>May 2019</td>
<td>7,517</td>
<td>3.1%</td>
<td>7,753</td>
<td>7,506</td>
<td>7,705</td>
<td>3.3%</td>
<td>4,345</td>
<td>4,204</td>
<td>-3.2%</td>
<td>5,534</td>
<td>5,401</td>
<td>-2.4%</td>
<td>24,902</td>
<td>25,113</td>
<td>0.8%</td>
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<tr>
<td>June 2019</td>
<td>7,435</td>
<td>2.7%</td>
<td>7,634</td>
<td>7,431</td>
<td>7,638</td>
<td>2.8%</td>
<td>3,080</td>
<td>3,053</td>
<td>-0.8%</td>
<td>5,324</td>
<td>5,413</td>
<td>1.7%</td>
<td>23,771</td>
<td>24,236</td>
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<tr>
<td>July 2019</td>
<td>7,301</td>
<td>3.0%</td>
<td>7,572</td>
<td>7,365</td>
<td>7,564</td>
<td>2.7%</td>
<td>2,881</td>
<td>2,909</td>
<td>1.0%</td>
<td>5,413</td>
<td>5,358</td>
<td>-1.0%</td>
<td>23,011</td>
<td>23,403</td>
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<tr>
<td>August 2019</td>
<td>7,505</td>
<td>1.9%</td>
<td>7,647</td>
<td>7,501</td>
<td>7,555</td>
<td>2.1%</td>
<td>3,668</td>
<td>3,758</td>
<td>-2.6%</td>
<td>5,396</td>
<td>5,376</td>
<td>-0.3%</td>
<td>24,269</td>
<td>24,448</td>
<td>0.7%</td>
</tr>
<tr>
<td>September 2019</td>
<td>7,420</td>
<td>3.6%</td>
<td>7,690</td>
<td>7,412</td>
<td>7,686</td>
<td>3.7%</td>
<td>4,757</td>
<td>4,429</td>
<td>-6.5%</td>
<td>5,353</td>
<td>5,425</td>
<td>1.3%</td>
<td>24,942</td>
<td>25,230</td>
<td>1.2%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>63,128</td>
<td>3.0%</td>
<td>64,993</td>
<td>63,151</td>
<td>65,007</td>
<td>2.9%</td>
<td>38,080</td>
<td>37,465</td>
<td>-1.6%</td>
<td>46,513</td>
<td>46,803</td>
<td>0.6%</td>
<td>210,872</td>
<td>214,268</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

## Results in Flight Duration (min)

<table>
<thead>
<tr>
<th>Month</th>
<th>Arrival</th>
<th>Current Year</th>
<th>Growth</th>
<th>Departure</th>
<th>Current Year</th>
<th>Growth</th>
<th>Internal</th>
<th>Current Year</th>
<th>Growth</th>
<th>Overflight</th>
<th>Current Year</th>
<th>Growth</th>
<th>Previous Year</th>
<th>Current Year</th>
<th>Growth</th>
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</thead>
<tbody>
<tr>
<td>January 2019</td>
<td>153,423</td>
<td>53.1%</td>
<td>187,397</td>
<td>122,172</td>
<td>123,425</td>
<td>1.0%</td>
<td>239,870</td>
<td>249,260</td>
<td>3.9%</td>
<td>100,067</td>
<td>120,975</td>
<td>10.4%</td>
<td>625,032</td>
<td>661,057</td>
<td>5.8%</td>
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<td>February 2019</td>
<td>143,250</td>
<td>53.9%</td>
<td>156,003</td>
<td>112,475</td>
<td>113,067</td>
<td>0.5%</td>
<td>229,731</td>
<td>243,510</td>
<td>6.0%</td>
<td>97,243</td>
<td>108,686</td>
<td>11.7%</td>
<td>682,999</td>
<td>721,245</td>
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<tr>
<td>March 2019</td>
<td>160,463</td>
<td>53.8%</td>
<td>171,335</td>
<td>126,035</td>
<td>129,985</td>
<td>3.1%</td>
<td>267,265</td>
<td>277,259</td>
<td>7.8%</td>
<td>113,529</td>
<td>122,678</td>
<td>8.1%</td>
<td>667,312</td>
<td>701,267</td>
<td>5.7%</td>
</tr>
<tr>
<td>April 2019</td>
<td>164,226</td>
<td>53.9%</td>
<td>163,667</td>
<td>127,690</td>
<td>120,312</td>
<td>-5.3%</td>
<td>219,460</td>
<td>217,816</td>
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<td>115,738</td>
<td>123,457</td>
<td>6.7%</td>
<td>626,484</td>
<td>629,249</td>
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<tr>
<td>May 2019</td>
<td>177,085</td>
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<td>177,259</td>
<td>134,620</td>
<td>141,042</td>
<td>4.8%</td>
<td>221,648</td>
<td>211,228</td>
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<td>129,490</td>
<td>136,707</td>
<td>5.6%</td>
<td>663,014</td>
<td>666,205</td>
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<tr>
<td>June 2019</td>
<td>170,952</td>
<td>53.1%</td>
<td>177,905</td>
<td>132,156</td>
<td>131,150</td>
<td>-0.8%</td>
<td>160,495</td>
<td>182,756</td>
<td>1.3%</td>
<td>126,379</td>
<td>138,355</td>
<td>7.8%</td>
<td>611,992</td>
<td>630,200</td>
<td>3.0%</td>
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<tr>
<td>July 2019</td>
<td>159,764</td>
<td>54.2%</td>
<td>162,246</td>
<td>127,678</td>
<td>127,001</td>
<td>-0.7%</td>
<td>152,428</td>
<td>146,670</td>
<td>-3.8%</td>
<td>127,808</td>
<td>136,284</td>
<td>6.6%</td>
<td>567,879</td>
<td>575,219</td>
<td>1.5%</td>
</tr>
<tr>
<td>August 2019</td>
<td>172,121</td>
<td>54.2%</td>
<td>176,622</td>
<td>133,578</td>
<td>134,089</td>
<td>0.4%</td>
<td>194,071</td>
<td>185,370</td>
<td>-4.5%</td>
<td>123,747</td>
<td>146,408</td>
<td>12.8%</td>
<td>625,517</td>
<td>542,469</td>
<td>1.9%</td>
</tr>
<tr>
<td>September 2019</td>
<td>174,190</td>
<td>54.1%</td>
<td>180,467</td>
<td>155,139</td>
<td>156,999</td>
<td>2.6%</td>
<td>241,610</td>
<td>221,716</td>
<td>-8.9%</td>
<td>122,889</td>
<td>136,631</td>
<td>11.4%</td>
<td>673,828</td>
<td>677,802</td>
<td>0.6%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>1,475,505</td>
<td>53.9%</td>
<td>1,539,916</td>
<td>1,151,121</td>
<td>1,159,059</td>
<td>0.7%</td>
<td>1,306,980</td>
<td>1,355,629</td>
<td>-3.6%</td>
<td>1,074,181</td>
<td>1,170,160</td>
<td>8.9%</td>
<td>5,637,768</td>
<td>5,804,761</td>
<td>3.0%</td>
</tr>
</tbody>
</table>
Finnair 2018 in numbers

- 2018 revenue increased to 2,8 Billion €, comparable operating profit 169 M€
- 13,3 million passengers in 2018 - a million more than in 2017
- Customer satisfaction at an excellent level: NPS* 46 in Q418
- A total of 12 new A350 aircraft in use
- 1000 of new Finnair employees joined the team during 2018; recruitments continue

* Net promoter score

19 destinations in Asia, 8 in the Americas, and more than 100 in Europe
Growth continues

New destinations in 2019
• Los Angeles, Sapporo, Punta Cana
• Hannover, Trondheim, Bologna, Bordeaux, Porto

Capacity growth continues – new frequencies
• Hong Kong, Tokyo, Osaka
• Guangzhou as year-round route from winter 2019 onwards.
Flight Planning Basics

- **Flight planning tool:**
  - Lido Flight
- **Based on latest information about:**
  - Zero Fuel Weight
  - Weather (airport forecasts, enroute winds and temperature, SWC)
  - Notams and AIP restrictions
  - Fuel price and navigation charges
  - Overflight permits
- **Must have:**
  - IAL and enroute charts (OM-C)
  - FMS data
  - Take Off performance data from airports used
  - Oxygen escape routes/Drift Down procedures above high terrain
Optimized Objects in Flight Planning

70%  20%  10%

Fuel  Navigation Fees  Time

Optimizing fuel burn is also optimizing emissions:

1 kg JET A-1 = 3.15 kg CO₂ (EU ETS)
Not only distance matters
Effect of wind to optimization result

- Minimum fuel track
  - Wind component: +39kt
  - Trip time: 9:51
  - Fuel burn: 60507kg
  - CO2: 191000kg
  - Ground distance: 4924nm = 9119km

- Minimum distance track ("Great circle route")
  - Wind component: -13kt
  - Trip time: 10:11
  - Fuel burn: 61641kg
  - CO2: 194000kg
  - Ground distance: 4549nm = 8425km
Every possible route option within OPT AREA is calculated to find the optimized route. Selection criterias are Minimum Fuel, Minimum Cost, Minimum Time and Minimum Distance.
Items considered when selecting route of the day

- Operational need for the flight
  - Time, Fuel (payload), Cost $
- Overflight permit
- Notams and AIP restrictions
- ETOPS Scenario
- High Terrain/Need for oxygen escape procedures
- Enroute weather (Turbulence, FRQ CB’s, Volcanic Ash)
- Flow restrictions (If known)
Why flexible use of ENTRY/EXIT points brings benefits?

- Big monthly variations mainly due to prevailing upper air wind.
Flown tracks for Chinese destinations

Only one route allowed to use in China/HEL-PVG

Flexible use of ENTRY/EXIT points in China/HEL-HKG
Route dispersion between Helsinki and Miami

- Actual flown tracks in one IATA season
- Constantly changing wind patterns
- Almost no constraints to route selection
Wish for future flexible ENTRY/EXIT points

Europe-Japan:
- POLHO-AGAVO
- TELOK-VASRO

Korea-Europe:
- AGAVO-TELOK
- AGAVO-POLHO
Free Route Airspace Potential

- EFHK ARVEP L24 RATMU T73 INLOG N742 BLZ B210 PUNIT P983 ABESA A357 AKTAS R366 NOPUS Y478 MORIT B330 KWE W181 DUDIT A599 POU R473 SIERA VHHH
- EFHK ARVEP DCT INLOG DCT GIMUN/K0892F390 DCT NOPUS/K0902S1190 DCT MORIT DCT SIERA VHHH

Trip Fuel: -2841kg
CO2: 8949kg
Time: -32min
Ground Distance: -212nm
Cost: -2694$
European Functional Airspace Blocks (FABs)
NEFRA – Free Route Airspace

- Aircraft operators planning their route across NEFAB and DK/SE FAB are provided with Entry and Exit points to/from the FRA, located at the FRA boundary.

- It is now possible to select between **shortest distance** or **inserting intermediate points** and taking the benefit from prevailing wind conditions.
Free Route Airspace
–
Taking the benefit from prevailing wind conditions.
FREE ROUTE AIRSPACE
FLIGHT PLANNING

...DCT 64N000E DCT GIKOR/N0474F350 DCT DIGLO DCT INLOG/N0474F350 R30
SPB B964 NAMIN/N0370F170 NAM1E SW SW06A
Free Route Airspace—PROs

- User Preferred Route
- Shorter Flight Time
- Less Fuel
- Less CO₂
- Economically profitable
- Better Predictability

- Better Predictability
- Efficient Use of Airspace
- Diversification of conflicts

- Optimized Routes
- Shorter Flight Time
- Less Fuel
- Less CO₂
- On Schedule!
Real Life Example 03/2019:
Wind Optimization London (LHR) - Shanghai (PVG)

Single Company Route/City Pair

Fully Optimized Routes
Real Life Example 10.5.2019

London LHR-Shanghai PVG
The Results of Route Optimization

<table>
<thead>
<tr>
<th>Company route</th>
<th>Optimized route</th>
<th>Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>64432usd</td>
<td>63483usd</td>
</tr>
<tr>
<td>Time</td>
<td>10:37</td>
<td>10:23</td>
</tr>
<tr>
<td>Distance</td>
<td>5280Nm</td>
<td>5270Nm</td>
</tr>
<tr>
<td>Fuel</td>
<td>63979kg</td>
<td>62794kg</td>
</tr>
</tbody>
</table>

One way ~500usd savings
Return trip 1000usd
7 Flights / week equals to 7000usd
52 times 7000 is =364 000 USD savings per year

10 Daily Flights to Europe
3 640 000 Usd / 10 100 000 kg CO₂
Example of a learning process

CATHAY PACIFIC

• Cathay’s flights HKG-LHR
  February 2019 ~140 flights
Airspace Development in Finland

• Major reorganisation of Finnish airspace in 2014. The objective for this major change was the efficient use of airspace and to prepare future demands.

• 2015 – FRA operations were allowed in two separate volumes of NEFAB airspace – NEFAB EAST FRA (Finland, Estonia, Latvia) and NEFAB WEST FRA (Norway)

• 2016 - FRA operations were allowed between NEFAB and DK/SE FAB (Sweden - Denmark) except ”cross border“ to/from Norway

• Full “cross-border” Free Route Airspace with all NEFAB countries and DK/SE FAB (NEFRA) was launched in 2017.

• Planned: ATS – Route removal in Estonia, Finland and Norway in April 2020
ATS – route removal Airac Apr 2020

*All current fixes will remain
DYNAMIC AIRSPACE MANAGEMENT
https://aviamaps.com/
FINEST PROGRAMME – EANS / ANS FINLAND

• Programme provides economical benefit and promotional value for Airlines and Aviation Community
• Better integration, more harmonized services
• Service provision continuity
• The general objectives are:
  • Accommodate the future traffic flows the best and environmentally efficient way – not limited by FIR boundary
  • Cross-border air navigation service provision between ANS Finland and EANS by dynamic delegation
  • Efficient use of operational resources – en-route air navigation service provision with common rostering
• Supports the Airspace Architecture Study and „wise persons group“ recommendations
FINEST PROGRAMME – EANS / ANS FINLAND
FINEST airspace

- Airspace relevant to FINEST programme between the states are:
  - Finland FIR between FL095 until FL660 (excluding TMAs)
  - Tallinn FIR between FL095 until FL660 (excluding TMA)
  - Areas for which ATS services are dynamically provided by EANS and/or ANS Finland according to the traffic flows and available resources
FINEST Implementation Stages

Stage 1
Common DPR
9/2020

Stage 2
Common ATCO
Procedures & new ATC system
9/2021

Stage 3
FINEST airspace
4/2022

Stage 4+
Other identified cooperation areas

Development Phase
Start
1/2019

Airspace Design Ready
12/2019

All technical systems ready
9/2021

Publication & NSA approvals
9-10/2021

CAPAN Analysis Report
9/2021

Airspace Training
4/2022
MROT - Multi Remote Tower Concept

- Simultaneous operations
- On-going talks with airport company Finavia
- Roadmap
  - Q2 2019 Simulations
  - Q3 2019 Consultation Report
     - ConOPS ready
     - Safety Case Finalized
  - Q4 2019 Decision Making
  - 2021 Operational Capability