



# Data link Network Operational Status Report

May 2023 – Developed 12/06/2023

This report is the monthly 'Data link Network Operational Status Report' as identified in the DPMF Report Catalogue available from the [DPMF OneSky team web site](#). It provides a summary of the operational status and technical performance of data link in Europe covering a rolling 12 month period for monthly statistics ending in May 2023.

The report covers three main areas of the datalink operations in Europe:

1. Operational Status
2. Technical Performance
3. VDL Mode 2 Performance

For each of the three areas above different metrics are presented. A detailed definition of the metrics used in this report is available in the DPMF Report Catalogue. In this report, the identifier for each metric used in the DPMF Report Catalogue is shown in angled brackets e.g. <N-1>.

## Notes:

- When ANSPs are providing new LISAT logs to DPMF, the metrics are updated accordingly (retroactively, when data for previous periods are provided). Therefore, some values presented in this report might evolve from past reports.
- Due to a LISAT formatting issue from DSNA, statistics computed for LFBB, LFEE, LFFF, LFMM, LFRR are presented for information only, as statistics might not represent real performance.
- For the month of May there are partial data for EISN, EETT, LIBB, LIMM, LIPP (as shown in Appendix A).
- As from May 2023, this report includes data from LZBB (Slovakia).
- As from January 2023, this report includes data from EETT (Estonia).
- As from December 2022, this report includes data from EISN (Ireland).
- As from November 2022, this report includes data from LPPC (Portugal).
- This report assess the technical performance of data link above the level from which each ATSU provides the data link service, using a single level for each Centre as described in [https://ext.eurocontrol.int/WikiLink/index.php/Implementation\\_Status\\_Table](https://ext.eurocontrol.int/WikiLink/index.php/Implementation_Status_Table)

## 1. Operational Status

Figure 1-1 on the following page provides a status for each FIR/UIR covered by the DLS IR with a status as of the end of the reporting month. The top map shows the operational status of each centre (<N-4>). The map below shows which centres are providing LISAT data to NM. The table on the right shows per centre for the reporting month: i) the number of flights operating above FL285, ii) The Provider Abort rate (only for those centres providing LISAT data to NM), iii) what percentage of flights indicate that they are capable of performing CPDLC over the ATN (i.e. file 'J1') and iv) what percentage of the flights operating above FL285 are actually seen using CPDLC over the ATN (based on the available LISAT data).

### ANSPs with service limitations and operational restrictions

The table below identifies the current service limitations and operational restrictions. There are no changes in this table compared to previous reports.

| Centre                   | Datalink service operational restrictions                                                                                                                                                                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| France (LFFF, LFRR)      | All datalink services are provided but flight crew clearance requests are not supported and a systematic controller response "Unable" is uplinked.                                                                                                                                                                   |
| Germany (EDUU)           | Airspace control in the south-eastern part of Germany below FL315 is delegated to Munich ACC (EDMM). In this airspace, datalink services are available only after prior coordination (i.e., when EDUU agrees to take or maintain control of flight).<br><u>Datalink services are provided only to Logon-List a/c</u> |
| MUAC (EDYY)              | Datalink services are provided only to Logon-List a/c                                                                                                                                                                                                                                                                |
| Switzerland (LSAG, LSAZ) | Datalink services are provided only to Logon-List a/c                                                                                                                                                                                                                                                                |

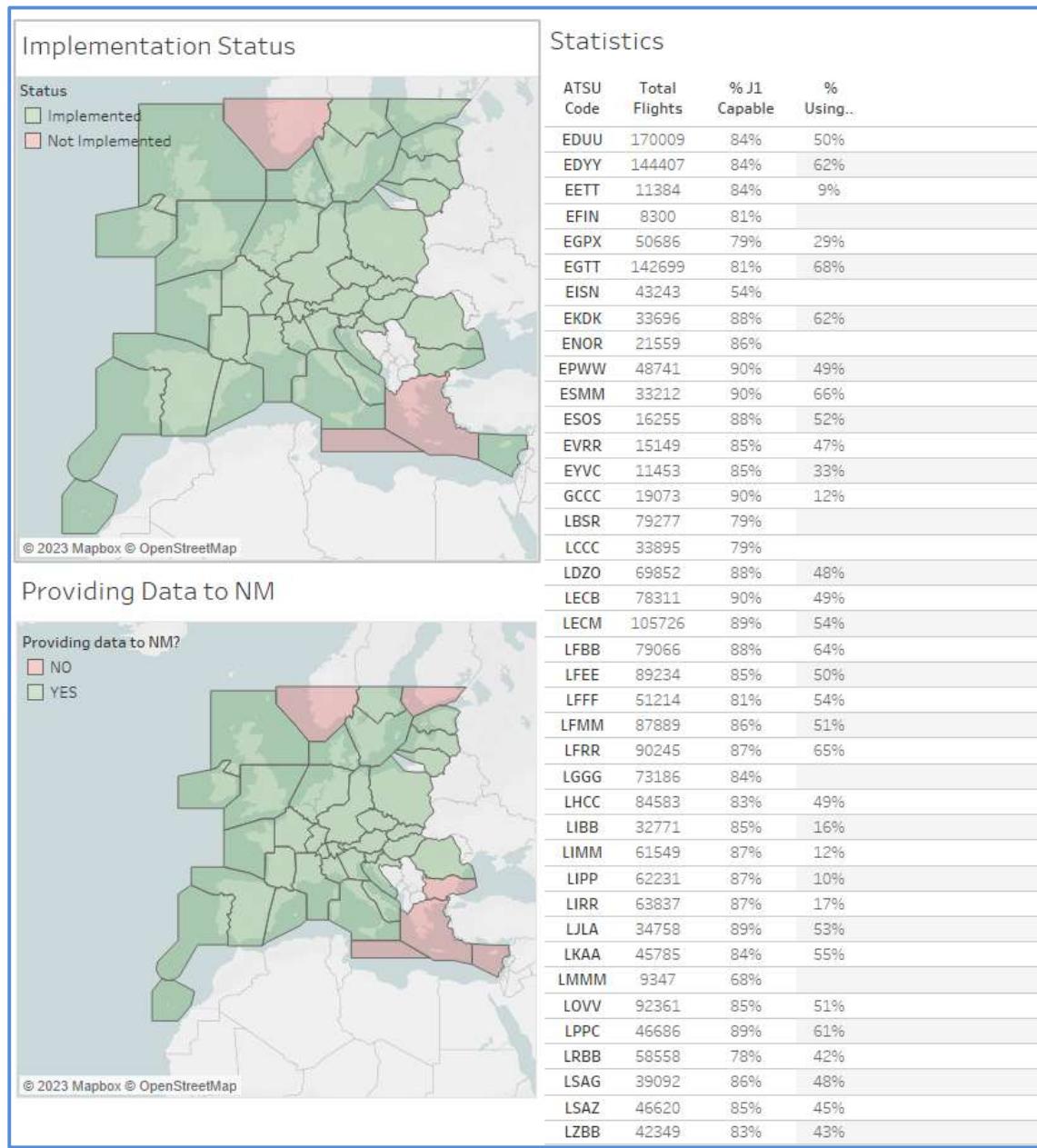


Figure 1-1: Current operational status of data link over the ATN

## CPDLC / ATN Flights

Figure 1-2 presents data only for flights operating above FL285 in the DLS airspace. It shows what percentage of flights in that airspace<sup>1</sup> file 'J1' in their flight plan <N-1> and what percentage indicate in the flight plan that the aircraft is exempt. For this month, 83,7% of flights indicated the capability to perform CPDLC over ATN/VDL Mode 2. 13,2 % (shown in red) indicate they are exempt. Considering the known exemptions, NM estimates that about 1.1% of the filed FPLs are likely contravening the DLS IR (shown in green).

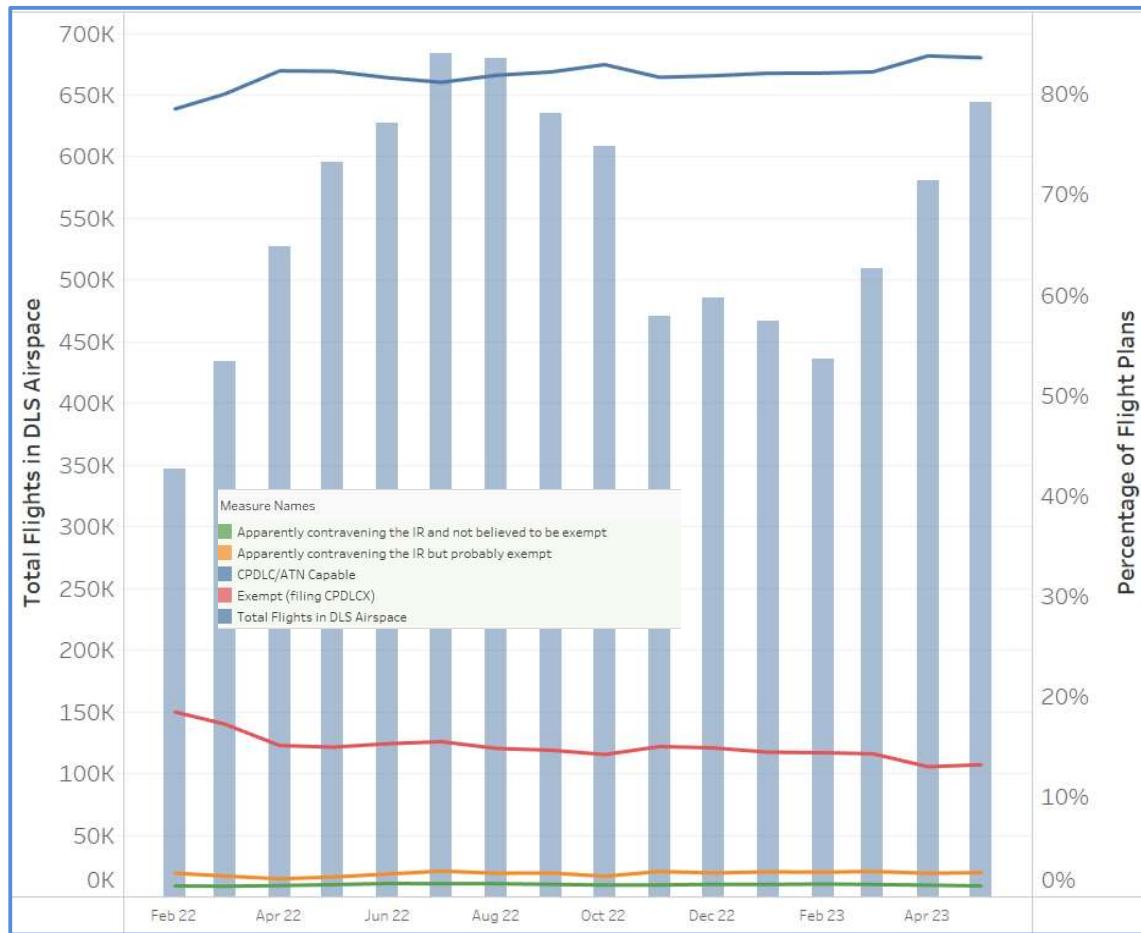


Figure 1-2: Proportion of flights capable of using CPDLC over ATN/ VDL Mode 2

<sup>1</sup> EHAAFIR, LOVVFIR, LECBUIR, LIBUIR, EBURUIR, GCCCUIRN, GCCCUIRS, LFFFUIR, EDVVUIR, LPPCFIR, EGTTUIR, LECMUIR, LIMMUIR, EDUUUIR, LIRRUIR, EGXPUIR, EISNUIR, LZBBFIR, LRBBFIR, LHCCFIR, EKDKFIR, LJLAFIR, LCCCFIR, LKAAFIR, LBSRFIR, EPWWFIR, EFINFIR, LGGGUIR, LMMMUIR, EVRRUIR, ESAAUIR, EETTUIR, EYVLUIR.

## 2. Technical Performance

### Overall Monthly Provider Abort Rate

Figure 2-1 below shows the monthly PA rate <0-23> aggregated for all ANSPs providing LISAT data to NM. The target value is 1 PA per 100 hours CPDLC (shown as a dashed line on the graph below). The overall average rate for the month was 4.5 PAs per 100 hours.

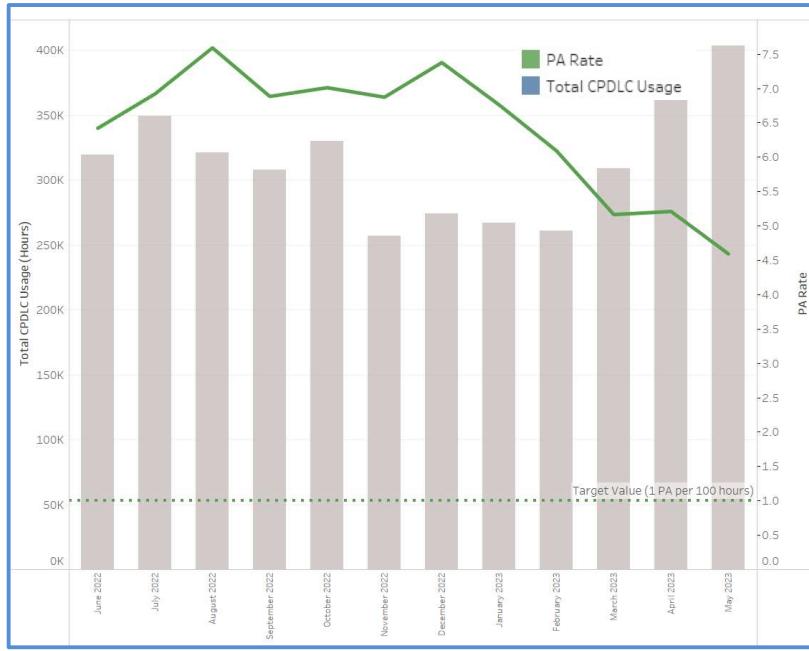


Figure 2-1: PA rate

Figure 2-2 below shows the monthly PA rate of aircraft on the [Logon List](#) against aircraft not on the Logon List, using only data from centers that do not support the Logon List<sup>2</sup>.



Figure 2-2: Logon Listed Aircraft PA rate

## Monthly PA rate per Centre

The PA rate for each of the centers providing data to NM is shown in the table in Figure 2-3 below for the last 12 month period for the months LISAT data are available.

| Atsu Code | June 2022 | July 2022 | August 2022 | September 2022 | October 2022 | November 2022 | December 2022 | January 2023 | February 2023 | March 2023 | April 2023 | May 2023 |
|-----------|-----------|-----------|-------------|----------------|--------------|---------------|---------------|--------------|---------------|------------|------------|----------|
| EDUU      | 2,6       | 2,5       | 2,0         | 2,4            | 1,9          | 1,4           | 1,6           | 1,1          | 1,5           | 2,0        | 2,5        | 2,4      |
| EDYY      | 3,7       | 3,0       | 2,7         | 3,2            | 2,8          | 2,4           | 2,7           | 1,9          | 2,1           | 2,1        | 3,0        | 3,7      |
| EETT      |           |           |             |                |              |               |               | 2,5          | 3,6           | 2,7        | 4,0        | 2,2      |
| EGPX      | 6,3       | 5,7       | 7,0         | 7,1            | 6,0          | 5,5           | 5,8           | 4,9          | 5,1           | 5,7        | 7,0        | 6,9      |
| EGTT      | 3,7       | 4,0       | 4,1         | 4,9            | 3,7          | 3,4           | 4,3           | 3,6          | 3,7           | 3,9        | 4,8        | 5,6      |
| EISN      |           |           |             |                |              | 41,2          | 55,2          | 51,8         | 57,2          | 73,5       |            |          |
| EKDK      | 7,0       | 6,3       | 6,6         | 6,6            | 7,8          | 7,3           | 7,7           | 8,4          | 8,6           | 9,7        | 8,4        | 7,4      |
| EPWW      | 4,8       | 3,6       | 2,6         | 3,1            | 2,7          | 3,6           | 3,3           | 5,7          | 3,2           | 4,0        | 4,1        | 3,7      |
| ESMM      | 3,3       | 2,8       | 2,4         | 2,2            | 2,8          | 2,5           | 2,7           | 2,3          | 2,8           | 3,1        | 2,6        | 2,0      |
| ESOS      | 4,5       | 3,8       | 4,1         | 5,9            | 8,9          | 4,9           | 5,2           | 3,6          | 4,2           | 4,5        | 4,2        | 3,8      |
| EVRR      | 3,6       | 2,8       | 4,5         | 3,3            | 3,5          | 3,5           | 5,3           | 3,2          | 3,0           | 3,2        | 4,5        | 3,4      |
| EYVC      | 1,9       | 3,4       | 1,8         | 2,8            | 2,2          | 3,3           | 2,3           | 2,4          | 1,5           | 1,6        | 3,0        | 1,2      |
| GCCC      | 49,1      | 45,1      | 47,6        | 44,0           | 18,2         | 40,3          | 44,9          | 48,1         | 49,0          | 46,7       | 43,6       | 53,1     |
| LDZO      | 11,8      | 19,3      | 12,2        | 11,4           | 10,6         | 7,3           | 6,5           | 5,2          | 5,3           | 5,7        | 7,4        | 7,2      |
| LECB      | 4,5       | 4,9       | 7,8         | 10,7           | 3,8          | 3,5           | 2,6           | 2,7          | 2,8           | 2,7        | 3,0        | 3,6      |
| LECM      | 4,9       | 4,9       | 5,3         | 5,4            | 4,8          | 7,3           | 6,5           | 4,9          | 6,6           | 5,9        | 5,6        | 5,2      |
| LFBB      | 1,4       | 1,6       | 2,8         | 3,7            | 1,4          | 1,5           | 1,9           | 1,2          | 1,3           | 1,5        | 2,0        | 1,8      |
| LFEE      | 0,0       | 0,0       | 0,0         | 0,0            | 0,0          | 0,0           | 0,0           | 0,0          | 0,0           | 0,0        | 0,0        | 0,0      |
| LFFF      | 3,5       | 2,9       | 4,2         | 4,3            | 4,7          | 4,5           | 4,7           | 4,2          | 4,4           | 4,0        | 6,5        | 5,0      |
| LFMM      | 8,3       | 13,1      | 10,3        | 7,5            | 7,1          | 6,3           | 1,0           | 0,0          | 0,0           | 0,0        | 0,0        | 0,0      |
| LFRR      | 1,5       | 1,4       | 1,7         | 1,4            | 1,6          | 1,7           | 1,9           | 1,9          | 1,8           | 2,0        | 2,6        | 2,5      |
| LHCC      | 4,8       | 4,9       | 4,0         | 4,2            | 3,2          | 3,7           | 3,8           | 4,6          | 4,0           | 4,2        | 4,7        | 3,4      |
| LIBB      | 82,1      | 143,1     | 167,5       | 156,3          | 122,3        | 76,9          | 74,1          | 65,1         | 49,2          | 31,6       | 32,0       | 32,6     |
| LIMM      | 86,8      | 158,4     | 216,9       | 181,3          | 319,8        | 204,1         | 237,0         | 234,8        | 105,9         | 18,1       | 63,1       | 57,6     |
| LIPP      | 155,7     | 95,3      | 425,6       | 357,4          | 518,8        | 311,4         | 429,0         | 442,1        | 270,1         | 76,6       | 72,2       | 63,7     |
| LIRR      | 53,2      | 152,0     | 61,2        | 52,3           | 66,0         | 51,3          |               | 56,4         | 29,5          | 29,1       | 40,5       | 45,5     |
| LJLA      | 7,7       | 7,6       | 8,6         | 7,9            | 9,8          | 4,2           | 5,2           | 5,2          | 5,1           | 5,4        | 8,8        | 10,1     |
| LKAA      | 5,9       | 5,2       | 4,2         | 3,8            | 4,1          | 4,2           | 4,4           | 5,0          | 4,6           | 5,4        | 5,0        | 4,5      |
| LOVV      | 6,1       | 7,0       | 6,1         | 5,3            | 5,2          | 4,3           | 4,2           | 4,3          | 4,5           | 6,7        | 6,2        | 5,8      |
| LPPC      |           |           |             | 25,1           | 33,8         | 50,6          | 31,9          | 24,7         | 14,8          | 1,6        | 2,0        |          |
| LRBB      | 3,7       | 4,1       | 3,9         | 4,5            | 3,1          | 3,7           | 3,4           | 3,5          | 3,8           | 3,6        | 3,8        | 3,1      |
| LSAG      | 6,1       | 16,2      | 5,0         | 4,6            | 4,4          | 4,7           | 2,3           | 3,4          | 3,2           | 3,2        | 3,1        | 3,7      |
| LSAZ      | 5,8       | 15,5      | 4,2         | 4,1            | 4,5          | 3,2           | 2,8           | 2,1          | 2,2           | 2,6        | 3,2        | 4,3      |
| LZBB      |           |           |             |                |              |               |               |              |               |            | 2,5        |          |

Figure 2-3: Monthly PA Rate per Centre

## PA Rate for Major Aircraft Operators

Figure 2-4 below shows the PA rate for the top 30 aircraft operators in terms of usage of CPDLC/ATN over the month. The column “Total CPDLC” displays the total CPDLC session duration in hours while the column “Total Flights” displays the total amount of flights performed during the month.

| Aircraft Operator<br>(from FL) | Total CPDLC<br>Usage | Total Flights | PA Rate<br>Top30<br>AOs |
|--------------------------------|----------------------|---------------|-------------------------|
| RYR                            | 53375,02             | 43.529        | 4,8                     |
| EZY                            | 18224,93             | 15.323        | 3,1                     |
| WZZ                            | 17497,76             | 14.060        | 3,9                     |
| BAW                            | 11830,87             | 9.625         | 6,3                     |
| DLH                            | 11718,84             | 12.727        | 2,8                     |
| EJU                            | 10593,89             | 11.896        | 5,0                     |
| THY                            | 10112,19             | 6.709         | 4,6                     |
| EXS                            | 9627,21              | 4.957         | 5,9                     |
| TAP                            | 8082,20              | 7.056         | 11,7                    |
| EWG                            | 8052,41              | 7.043         | 3,1                     |
| SAS                            | 8025,21              | 7.787         | 3,6                     |
| AFR                            | 7925,43              | 9.880         | 4,4                     |
| VLG                            | 7301,28              | 9.018         | 3,8                     |
| FIN                            | 5546,25              | 2.937         | 4,9                     |
| KLM                            | 5214,12              | 5.859         | 3,8                     |
| PGT                            | 4956,94              | 3.157         | 1,8                     |
| NOZ                            | 4189,02              | 2.821         | 3,1                     |
| NSZ                            | 4013,23              | 2.551         | 2,8                     |
| SWR                            | 4000,58              | 4.536         | 4,5                     |
| TRA                            | 3691,43              | 2.532         | 1,8                     |
| AUA                            | 3670,85              | 4.264         | 2,7                     |
| IBE                            | 3590,91              | 3.867         | 2,7                     |
| EIN                            | 3464,49              | 3.636         | 3,4                     |
| TOM                            | 3252,85              | 1.961         | 5,9                     |
| EZS                            | 3003,36              | 3.401         | 3,6                     |
| QTR                            | 2990,87              | 1.898         | 5,3                     |
| BEL                            | 2965,42              | 3.413         | 2,1                     |
| TVF                            | 2045,00              | 1.837         | 2,3                     |
| IBS                            | 1620,45              | 2.022         | 3,8                     |
| LOT                            | 1583,55              | 2.009         | 8,7                     |

Figure 2-4: PA Rate for the top 30 Aircraft Operators (CPDLC/ATN use)

## Monthly PA Rate for various avionics configurations

The figure below shows the monthly PA rate for various avionics configurations for aircraft on the logon list based on the information declared by the airline operators.

|                  |           |                  |           | May 22 | Jun 22 | Jul 22 | Aug 22 | Sept 22 | Oct 22 | Nov 22 | Dec 22 | Jan 23 | Feb 23 | Mar 23 | Apr 23 |
|------------------|-----------|------------------|-----------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|
| Vdr Make         | Vdr Model | Cmu Make         | Cmu Model |        |        |        |        |         |        |        |        |        |        |        |        |
| Garmin           | GDR66     | Garmin           | GIAG4E    | 9.94   | 13.45  | 17.18  | 14.44  | 15.77   | 8.58   | 6.03   | 6.94   | 3.32   | 2.75   | 8.18   | 7.42   |
|                  |           |                  | GIAG3W    | 11.61  | 12.19  | 18.90  | 14.65  | 12.27   | 8.57   | 7.08   | 9.58   | 7.69   | 8.92   | 9.53   | 13.20  |
| Honeywell        | EPIC VDR  | Honeywell        | EPIC CMF  | 10.58  | 11.45  | 12.27  | 11.04  | 9.38    | 7.23   | 4.91   | 4.47   | 4.88   | 5.18   | 4.79   | 6.82   |
|                  | KTR2280A  | Honeywell        | EPIC CMF  | 7.07   | 6.82   | 6.69   | 12.76  | 10.49   | 5.39   | 10.75  | 5.10   | 4.74   | 7.79   | 1.80   | 5.80   |
|                  | RTA44D    | Airbus           | FANS-B+   | 4.49   | 6.96   | 7.95   | 8.16   | 7.25    | 8.14   | 5.27   | 6.17   | 5.25   | 4.10   | 3.27   | 3.99   |
|                  |           | Honeywell        | Mk2+      | 1.76   | 2.63   | 2.83   | 1.66   | 1.68    | 1.60   | 2.65   | 4.96   | 3.09   | 3.30   | 2.34   | 2.59   |
|                  |           | Rockwell Collins | CMU900    | 6.46   | 9.08   | 13.12  | 7.39   | 7.10    | 3.39   | 4.75   | 5.67   | 4.04   | 3.59   | 4.72   | 4.02   |
|                  | RTA50D    | Airbus           | FANS-C    | 5.59   | 6.05   | 7.45   | 7.67   | 6.50    | 7.04   | 7.49   | 8.85   | 7.18   | 5.69   | 5.04   | 3.94   |
|                  |           |                  | FANS-B+   | 4.33   | 6.51   | 7.63   | 8.78   | 6.69    | 7.68   | 6.09   | 6.66   | 5.54   | 4.59   | 3.67   | 3.62   |
|                  |           |                  | FANS-A+B  |        |        |        |        | 2.14    | 0.83   | 0.00   | 5.37   | 3.36   | 9.35   | 18.40  |        |
|                  |           | Honeywell        | Mk2+      | 4.57   | 4.61   | 4.95   | 4.73   | 5.29    | 6.00   | 6.25   | 6.29   | 6.02   | 5.99   | 4.91   | 5.46   |
|                  |           |                  | 777 AIMS2 | 38.44  | 35.18  | 32.04  | 16.89  | 31.69   | 17.71  | 23.65  | 18.62  | 30.52  | 65.61  | 44.32  | 43.38  |
|                  |           | Rockwell Collins | CMU900    | 8.48   | 9.24   | 30.76  | 3.94   |         |        |        |        |        |        |        |        |
| Rockwell Collins | 920       | Airbus           | FANS-B+   | 5.36   | 9.44   | 9.07   | 11.51  | 8.84    | 8.29   | 6.78   | 7.98   | 7.82   | 7.25   | 5.25   | 4.92   |
|                  |           | Honeywell        | Mk2+      | 2.91   | 4.57   | 3.73   | 9.84   | 10.41   | 9.69   | 5.83   | 6.48   | 9.30   | 7.97   | 1.16   | 1.58   |
|                  |           | Rockwell Collins | CMU900    | 5.70   | 11.72  | 11.10  | 7.28   | 7.53    | 16.07  | 3.13   | 4.20   | 7.34   | 7.47   | 5.02   | 5.83   |
|                  | 2100      | Airbus           | FANS-C    | 4.19   | 3.77   | 6.29   | 2.40   | 2.46    | 3.11   | 4.79   | 7.89   | 5.55   | 4.93   | 4.91   | 5.16   |
|                  |           |                  | FANS-B+   | 4.79   | 6.59   | 7.26   | 9.60   | 7.54    | 8.01   | 6.34   | 6.21   | 5.47   | 4.35   | 2.88   | 3.50   |
|                  |           |                  | FANS-A+B  | 6.14   | 6.93   | 5.82   | 7.46   | 6.95    | 6.10   | 6.36   | 5.08   | 4.32   | 4.60   | 4.13   | 3.84   |
|                  |           | Honeywell        | Mk2+      | 1.87   | 2.25   | 2.83   | 1.57   | 1.48    | 1.26   | 1.91   | 2.20   | 2.26   | 2.07   | 1.77   | 2.63   |
|                  |           |                  | 787 CMF   | 5.34   | 5.67   | 5.89   | 5.44   | 5.83    | 4.52   | 5.03   | 6.09   | 9.50   | 9.47   | 10.22  | 9.62   |
|                  |           | Rockwell Collins | CMU900    | 3.93   | 4.02   | 4.04   | 3.82   | 4.05    | 3.93   | 7.10   | 8.44   | 7.20   | 5.69   | 4.82   | 4.22   |
|                  | 2200      | Airbus           | FANS-C    | 3.43   | 4.51   | 4.29   | 5.64   | 5.74    | 6.54   | 12.75  | 16.58  | 14.33  | 10.01  | 7.77   | 5.69   |
|                  |           |                  | FANS-B+   | 4.55   | 6.01   | 5.32   | 10.19  | 9.23    | 7.70   | 5.98   | 7.49   | 5.43   | 4.84   | 3.24   | 2.70   |
|                  |           |                  | FANS-A+B  | 3.75   | 3.60   | 3.92   | 4.72   | 5.25    | 3.99   | 4.22   | 5.07   | 5.09   | 4.94   | 3.84   | 3.59   |
|                  | 4000      | Rockwell Collins | RIU-4010  | 11.31  | 10.60  | 12.72  | 9.68   | 10.64   | 10.67  | 10.73  | 10.70  | 9.18   | 10.68  | 10.60  | 10.72  |
|                  |           |                  | RIU-4000  | 7.79   | 12.02  | 13.72  | 14.83  | 7.08    | 11.03  | 9.64   | 5.54   | 6.13   | 7.01   | 8.20   | 5.31   |
|                  |           |                  | CMU900    | 10.50  | 9.13   | 10.45  | 10.57  | 10.38   | 8.54   | 8.00   | 5.65   | 7.61   | 2.90   | 5.69   | 4.38   |
|                  |           |                  | CMU4000   | 5.28   | 6.49   | 10.26  | 5.65   | 4.72    | 5.99   | 3.99   | 3.40   | 4.32   | 3.47   | 4.28   | 5.14   |
| Spectralux       | Dlink+    | Spectralux       | Dlink+    | 11.82  | 9.78   | 9.10   | 11.22  | 11.49   | 12.31  | 17.68  | 20.81  | 22.17  | 18.41  | 15.59  | 11.38  |
| Thales           | EVR750    | Airbus           | FANS-B+   | 7.23   | 10.59  | 8.37   | 10.02  | 9.79    | 9.17   | 6.80   | 7.50   | 6.65   | 6.47   | 5.23   | 5.86   |
| UASC             | UL801     | UASC             | UL801     |        |        |        |        |         |        |        |        |        | 3.50   |        |        |
|                  |           |                  |           |        |        |        |        |         |        |        |        |        | 14.35  |        |        |

Figure 2-5: Monthly PA rate for various avionics configurations for aircraft on the logon list.

Note: A sample size of at least 250 hours of CPDLC use has been considered for recommendations/decisions for the Logon List aircraft. In the table above, PA rates computed from less than 250 hours of CPDLC session are displayed in grey.

## Overall Technical Round Trip Delay

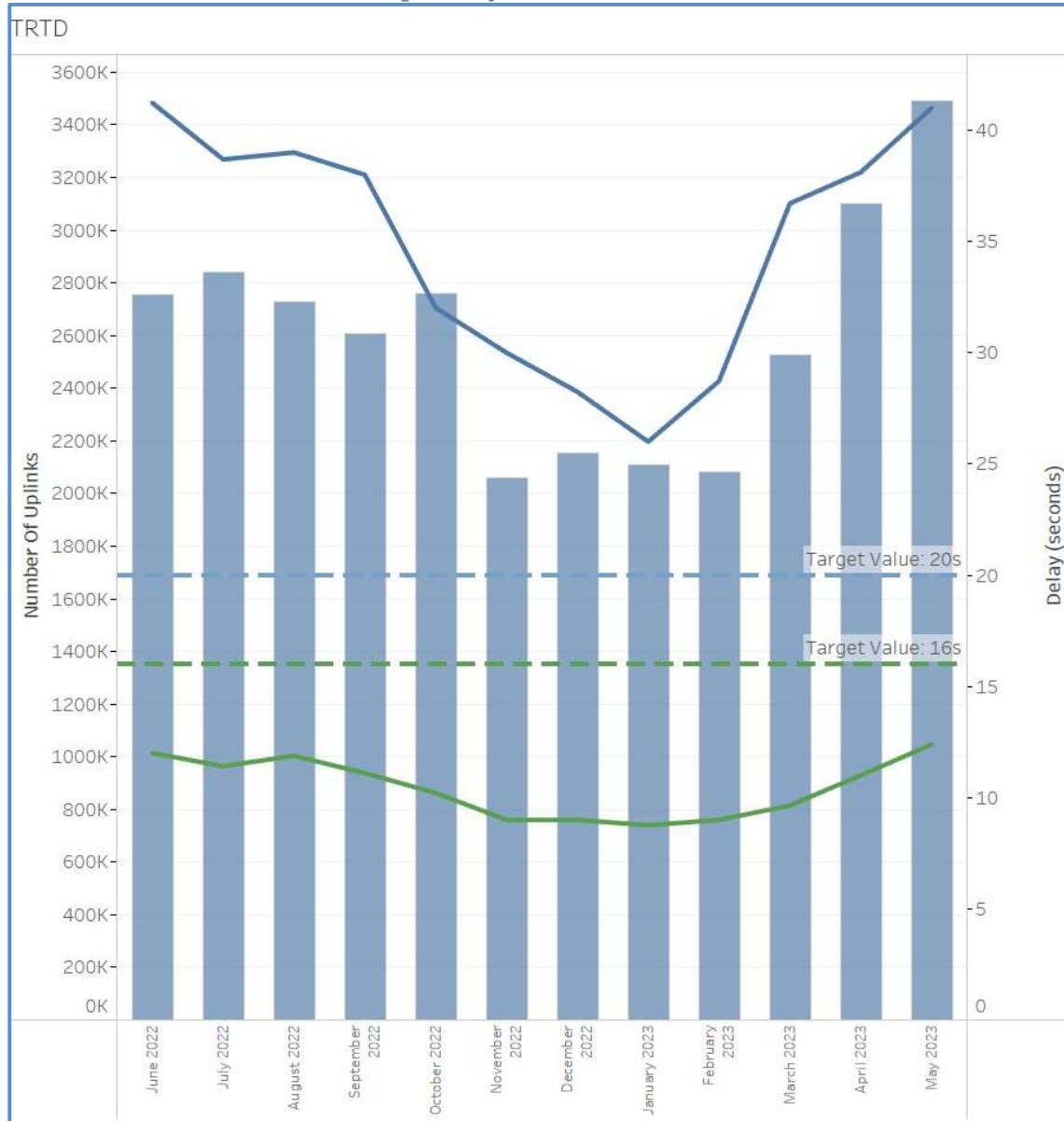


Figure 2-6 below shows the 95<sup>th</sup> and 99<sup>th</sup> percentiles of the technical round trip delay <0-2> and <0-3>. It represents the delay between the time when a message is uplinked and the time when the ground system receives the corresponding application level acknowledgement (aggregated for all systems providing data to LISAT). As agreed during DPMG8 (May 2020), the TRTD is now computed taking into account downlinked ERROR messages (DM62). This has resulted in an increase of the 99<sup>th</sup> percentile value.

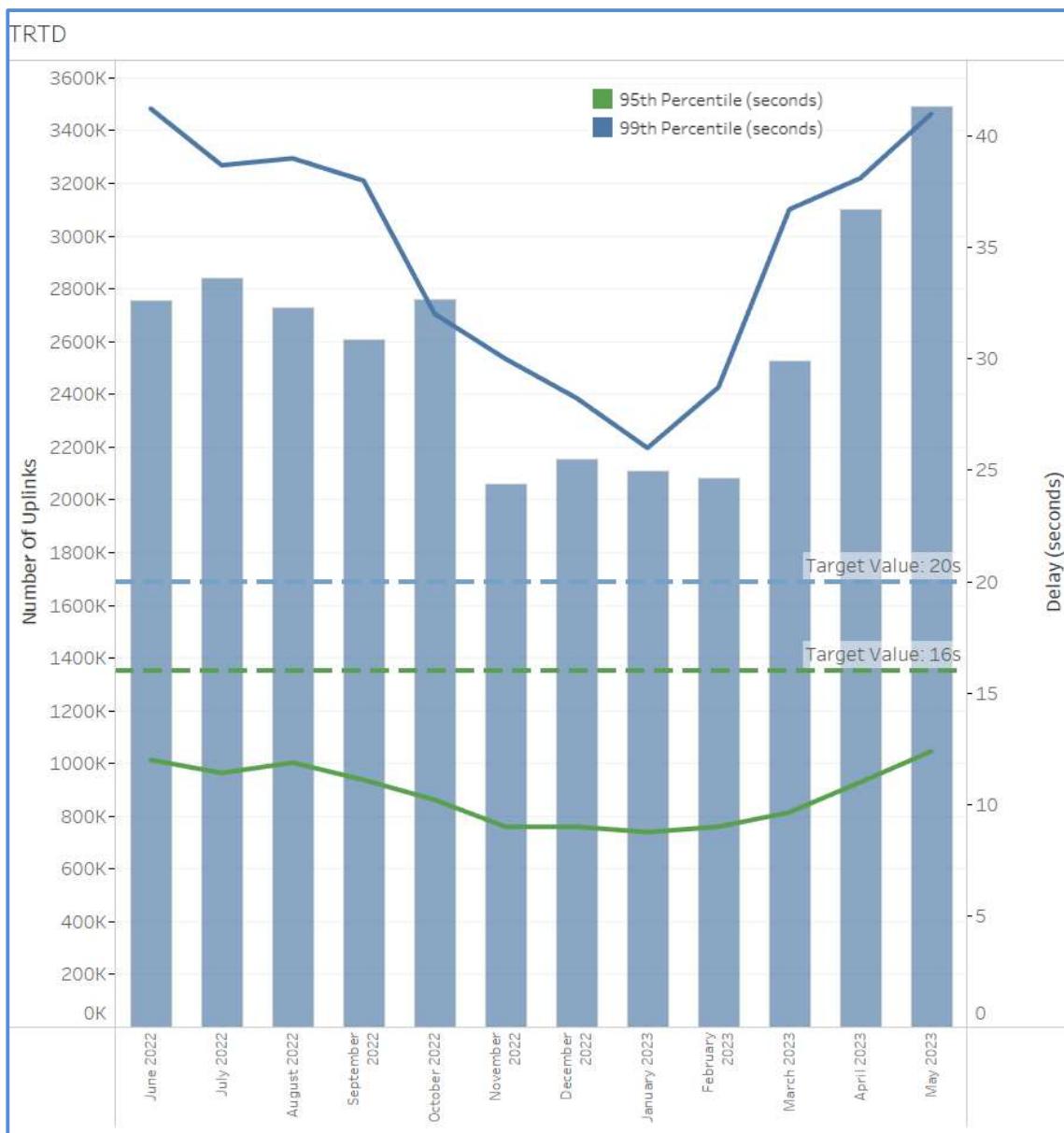


Figure 2-6: Technical Round Trip Delay

## Monthly 95<sup>th</sup> percentile of TRTD per Centre

| TRTD 95th |           |           |             |                |              |               |               |              |               |            |            |          |  |
|-----------|-----------|-----------|-------------|----------------|--------------|---------------|---------------|--------------|---------------|------------|------------|----------|--|
| Atsu Code | June 2022 | July 2022 | August 2022 | September 2022 | October 2022 | November 2022 | December 2022 | January 2023 | February 2023 | March 2023 | April 2023 | May 2023 |  |
| EDUU      | 11,2      | 11,3      | 11,1        | 10,8           | 10,2         | 8,3           | 8,4           | 8,1          | 8,4           | 9,6        | 11,1       | 12,8     |  |
| EDYY      | 10,3      | 10,2      | 10,1        | 10,2           | 9,9          | 8,2           | 8,3           | 7,9          | 8,3           | 8,8        | 10,2       | 12,4     |  |
| EETT      |           |           |             |                |              |               |               | 6,0          | 6,0           | 5,0        | 6,0        | 6,0      |  |
| EGPX      | 10,0      | 10,0      | 9,8         | 10,0           | 9,1          | 7,9           | 8,1           | 7,7          | 8,0           | 8,2        | 8,9        | 10,3     |  |
| EGTT      | 9,8       | 9,7       | 9,6         | 9,9            | 9,4          | 8,1           | 8,2           | 7,9          | 8,5           | 8,7        | 9,8        | 10,9     |  |
| EISN      |           |           |             |                |              |               | 38,0          | 19,6         | 20,7          | 18,2       | 18,6       |          |  |
| EKDK      | 10,0      | 10,0      | 10,0        | 10,0           | 10,0         | 9,0           | 9,0           | 9,0          | 8,0           | 9,0        | 10,0       | 11,0     |  |
| EPWW      | 6,8       | 6,8       | 6,8         | 7,2            | 6,7          | 6,6           | 6,4           | 6,6          | 6,4           | 6,5        | 6,9        | 7,4      |  |
| ESMM      | 6,0       | 6,0       | 6,0         | 6,0            | 6,0          | 6,0           | 6,0           | 6,0          | 6,0           | 6,0        | 6,0        | 7,0      |  |
| ESOS      | 7,0       | 6,0       | 6,0         | 6,0            | 6,0          | 6,0           | 6,0           | 6,0          | 6,0           | 6,0        | 6,0        | 6,0      |  |
| EVRR      | 9,0       | 9,0       | 9,0         | 8,0            | 8,0          | 7,0           | 7,0           | 7,0          | 7,0           | 7,0        | 7,0        | 7,0      |  |
| EYVC      | 5,0       | 5,0       | 5,0         | 5,0            | 5,0          | 5,0           | 5,0           | 5,0          | 5,0           | 5,0        | 5,0        | 5,0      |  |
| GCCC      | 37,6      | 22,8      | 31,1        | 22,4           | 7,9          | 12,2          | 14,2          | 14,2         | 11,6          | 11,6       | 11,3       | 14,6     |  |
| LDZO      | 13,0      | 13,0      | 14,0        | 14,0           | 12,0         | 11,0          | 10,0          | 10,0         | 10,0          | 11,0       | 13,2       | 14,1     |  |
| LECB      | 9,2       | 9,4       | 9,5         | 9,2            | 8,3          | 7,8           | 7,7           | 7,8          | 8,1           | 8,0        | 8,6        | 9,2      |  |
| LECM      | 8,4       | 8,3       | 8,4         | 8,2            | 8,2          | 8,8           | 8,5           | 8,5          | 9,0           | 8,6        | 9,0        | 9,2      |  |
| LFBB      | 8,0       | 8,0       | 8,0         | 8,0            | 7,0          | 7,0           | 7,0           | 6,0          | 7,0           | 7,0        | 8,0        | 8,0      |  |
| LFEE      | 10,0      | 10,0      | 10,0        | 10,0           | 9,0          | 8,0           | 8,0           | 8,0          | 8,0           | 8,0        | 10,0       | 12,0     |  |
| LFFF      | 14,0      | 15,0      | 15,0        | 15,0           | 14,0         | 12,0          | 12,0          | 11,0         | 11,0          | 12,0       | 15,0       | 18,0     |  |
| LFMM      | 10,0      | 11,0      | 11,0        | 10,0           | 9,0          | 8,0           | 6,0           | 6,0          | 6,0           | 6,0        | 8,0        | 9,0      |  |
| LFRR      | 9,0       | 9,0       | 9,0         | 9,0            | 8,0          | 7,0           | 8,0           | 7,0          | 8,0           | 8,0        | 9,0        | 10,0     |  |
| LHCC      | 10,0      | 10,0      | 11,0        | 10,0           | 9,0          | 8,0           | 9,0           | 9,0          | 8,0           | 9,0        | 10,0       | 11,2     |  |
| LIBB      | 24,4      | 17,9      | 24,6        | 29,8           | 23,7         | 14,9          | 14,0          | 13,6         | 13,6          | 14,3       | 18,7       | 21,9     |  |
| LIMM      | 78,7      | 87,6      | 79,6        | 54,6           | 73,5         | 41,6          | 37,6          | 29,8         | 37,7          | 82,5       | 85,3       | 85,4     |  |
| LIPP      | 83,9      | 85,4      | 67,5        | 49,7           | 59,0         | 40,9          | 37,7          | 36,8         | 84,9          | 86,5       | 73,8       | 53,6     |  |
| LIRR      | 37,5      | 39,5      | 45,7        | 37,6           | 24,5         | 15,7          |               | 14,6         | 15,5          | 19,0       | 30,2       | 35,3     |  |
| LJLA      | 18,2      | 18,9      | 18,9        | 17,9           | 16,3         | 13,4          | 12,9          | 12,8         | 13,4          | 14,5       | 17,0       | 19,2     |  |
| LKAA      | 11,7      | 12,0      | 11,0        | 11,0           | 11,0         | 10,0          | 10,0          | 9,0          | 9,0           | 10,0       | 10,0       | 11,0     |  |
| LOVV      | 13,0      | 13,0      | 13,0        | 13,0           | 12,0         | 10,0          | 10,0          | 10,0         | 10,0          | 10,0       | 12,0       | 13,7     |  |
| LPPC      |           |           |             |                | 33,5         | 37,9          | 56,4          | 33,6         | 19,2          | 36,9       | 19,5       | 20,3     |  |
| LRBB      | 7,9       | 8,2       | 8,3         | 8,4            | 7,5          | 7,3           | 7,1           | 7,6          | 7,3           | 7,5        | 8,0        | 8,5      |  |
| LSAG      | 13,8      | 13,8      | 15,1        | 14,3           | 11,9         | 10,2          | 10,5          | 10,5         | 10,5          | 11,1       | 14,1       | 17,0     |  |
| LSAZ      | 16,0      | 16,1      | 16,7        | 16,1           | 14,4         | 11,7          | 11,6          | 11,0         | 12,0          | 12,2       | 15,1       | 19,0     |  |
| LZBB      |           |           |             |                |              |               |               |              |               |            |            | 11,0     |  |

Figure 2-7: Monthly 95<sup>th</sup> percentile of TRTD per Centre

## Monthly 99<sup>th</sup> percentile of TRTD per Centre

| TRTD      |           |           |             |                |              |               |               |              |               |            |            |          |
|-----------|-----------|-----------|-------------|----------------|--------------|---------------|---------------|--------------|---------------|------------|------------|----------|
| Atsu Code | June 2022 | July 2022 | August 2022 | September 2022 | October 2022 | November 2022 | December 2022 | January 2023 | February 2023 | March 2023 | April 2023 | May 2023 |
| EDUU      | 45,4      | 42,2      | 40,5        | 39,6           | 27,7         | 21,3          | 21,7          | 21,5         | 21,6          | 27,8       | 43,8       | 55,1     |
| EDYY      | 30,1      | 27,1      | 27,1        | 27,2           | 25,5         | 21,5          | 21,8          | 20,9         | 21,2          | 22,0       | 27,0       | 48,5     |
| EETT      |           |           |             |                |              |               |               | 14,0         | 14,2          | 14,0       | 14,0       | 14,0     |
| EGPX      | 38,0      | 29,1      | 37,5        | 35,5           | 23,3         | 19,6          | 20,1          | 18,5         | 19,8          | 20,7       | 21,2       | 24,2     |
| EGTT      | 24,1      | 23,2      | 23,3        | 24,8           | 22,6         | 21,7          | 21,9          | 21,5         | 21,9          | 22,1       | 23,8       | 28,6     |
| EISN      |           |           |             |                |              |               | 184,7         | 152,4        | 108,6         | 96,0       | 100,3      |          |
| EKDK      | 24,0      | 21,0      | 21,0        | 21,0           | 20,0         | 18,0          | 19,0          | 18,0         | 18,0          | 18,0       | 21,0       | 23,0     |
| EPWW      | 21,6      | 21,9      | 21,3        | 22,0           | 16,0         | 21,1          | 16,6          | 21,4         | 15,2          | 17,9       | 21,1       | 22,0     |
| ESMM      | 14,0      | 13,0      | 14,0        | 14,0           | 13,0         | 13,0          | 13,0          | 13,0         | 12,0          | 13,0       | 13,0       | 14,0     |
| ESOS      | 15,0      | 13,0      | 15,0        | 14,0           | 13,0         | 12,0          | 13,0          | 12,0         | 12,0          | 12,0       | 13,0       | 13,0     |
| EVRR      | 38,0      | 31,0      | 37,0        | 36,1           | 17,0         | 16,0          | 15,0          | 16,0         | 16,0          | 14,0       | 15,0       | 16,0     |
| EYVC      | 14,0      | 17,2      | 11,9        | 12,0           | 9,0          | 9,0           | 10,0          | 9,0          | 10,0          | 9,0        | 9,0        | 10,0     |
| GCCC      | 86,5      | 64,1      | 91,7        | 89,2           | 35,5         | 88,0          | 107,6         | 65,9         | 87,1          | 116,3      | 62,4       | 81,1     |
| LDZO      | 35,0      | 34,0      | 37,0        | 37,0           | 32,0         | 28,0          | 27,0          | 25,0         | 28,0          | 27,0       | 32,5       | 33,7     |
| LECB      | 23,3      | 22,7      | 24,6        | 23,2           | 21,1         | 19,8          | 18,7          | 21,8         | 24,0          | 19,3       | 21,9       | 22,4     |
| LECM      | 38,8      | 29,0      | 28,3        | 29,7           | 27,8         | 43,4          | 39,8          | 38,6         | 44,3          | 39,7       | 38,7       | 38,2     |
| LFBB      | 16,0      | 18,0      | 18,0        | 17,0           | 15,0         | 14,0          | 14,0          | 14,0         | 15,0          | 15,0       | 18,0       | 20,0     |
| LFEE      | 21,0      | 22,0      | 21,0        | 22,0           | 20,0         | 17,0          | 17,0          | 17,0         | 17,0          | 20,0       | 26,0       | 33,0     |
| LFFF      | 34,0      | 39,0      | 37,0        | 38,0           | 34,0         | 30,0          | 29,0          | 25,0         | 26,0          | 31,0       | 38,0       | 56,0     |
| LFMM      | 29,0      | 37,0      | 38,0        | 36,0           | 30,0         | 24,0          | 15,0          | 15,0         | 17,0          | 16,0       | 21,0       | 24,0     |
| LFRR      | 19,0      | 23,0      | 21,0        | 21,0           | 20,0         | 18,0          | 18,0          | 18,0         | 18,0          | 20,0       | 24,0       | 29,0     |
| LHCC      | 23,0      | 26,0      | 26,0        | 26,0           | 19,0         | 16,0          | 17,0          | 18,0         | 17,0          | 17,0       | 20,0       | 21,9     |
| LIBB      | 98,8      | 87,1      | 133,7       | 181,6          | 106,0        | 86,4          | 85,7          | 78,4         | 85,1          | 86,5       | 97,9       | 119,3    |
| LIMM      | 185,5     | 194,2     | 191,7       | 185,5          | 190,1        | 184,2         | 182,3         | 181,0        | 182,2         | 181,8      | 183,9      | 186,0    |
| LIPP      | 191,0     | 187,6     | 191,9       | 183,2          | 189,4        | 183,9         | 186,4         | 181,8        | 184,6         | 186,5      | 199,6      | 184,3    |
| LIRR      | 181,8     | 182,5     | 185,8       | 181,8          | 181,5        | 94,0          |               | 90,7         | 100,5         | 120,3      | 181,4      | 181,5    |
| LJLA      | 60,5      | 60,5      | 64,1        | 57,6           | 55,2         | 35,2          | 28,3          | 31,4         | 37,6          | 41,5       | 51,7       | 74,0     |
| LKAA      | 37,0      | 38,0      | 33,0        | 35,0           | 32,0         | 29,0          | 26,2          | 29,0         | 25,0          | 26,0       | 28,0       | 30,0     |
| LOVV      | 38,0      | 37,0      | 37,0        | 37,0           | 32,0         | 23,0          | 28,0          | 28,0         | 25,0          | 27,0       | 33,0       | 35,5     |
| LPPC      |           |           |             |                | 181,1        | 183,0         | 186,8         | 181,9        | 112,2         | 181,0      | 115,4      | 107,8    |
| LRBB      | 22,8      | 25,0      | 29,9        | 35,9           | 21,9         | 22,4          | 22,7          | 22,8         | 25,1          | 23,0       | 27,4       | 22,7     |
| LSAG      | 46,5      | 43,5      | 52,3        | 46,1           | 32,7         | 26,5          | 28,5          | 27,3         | 28,3          | 32,1       | 44,4       | 68,9     |
| LSAZ      | 69,0      | 62,1      | 62,9        | 54,1           | 47,7         | 30,8          | 31,6          | 27,2         | 33,0          | 32,9       | 60,9       | 76,5     |
| LZBB      |           |           |             |                |              |               |               |              |               |            | 23,0       |          |

Figure 2-8: Monthly 99th percentile of TRTD per Centre

## Overall RCTP Technical Continuity

The graph below shows the Required Communications Technical Performance Technical Continuity [RCTP\_TC(32) and RCTP\_TC(20)]. This is the probability that a LACK/ERROR is received for an uplink message within 32 seconds or 20 seconds.

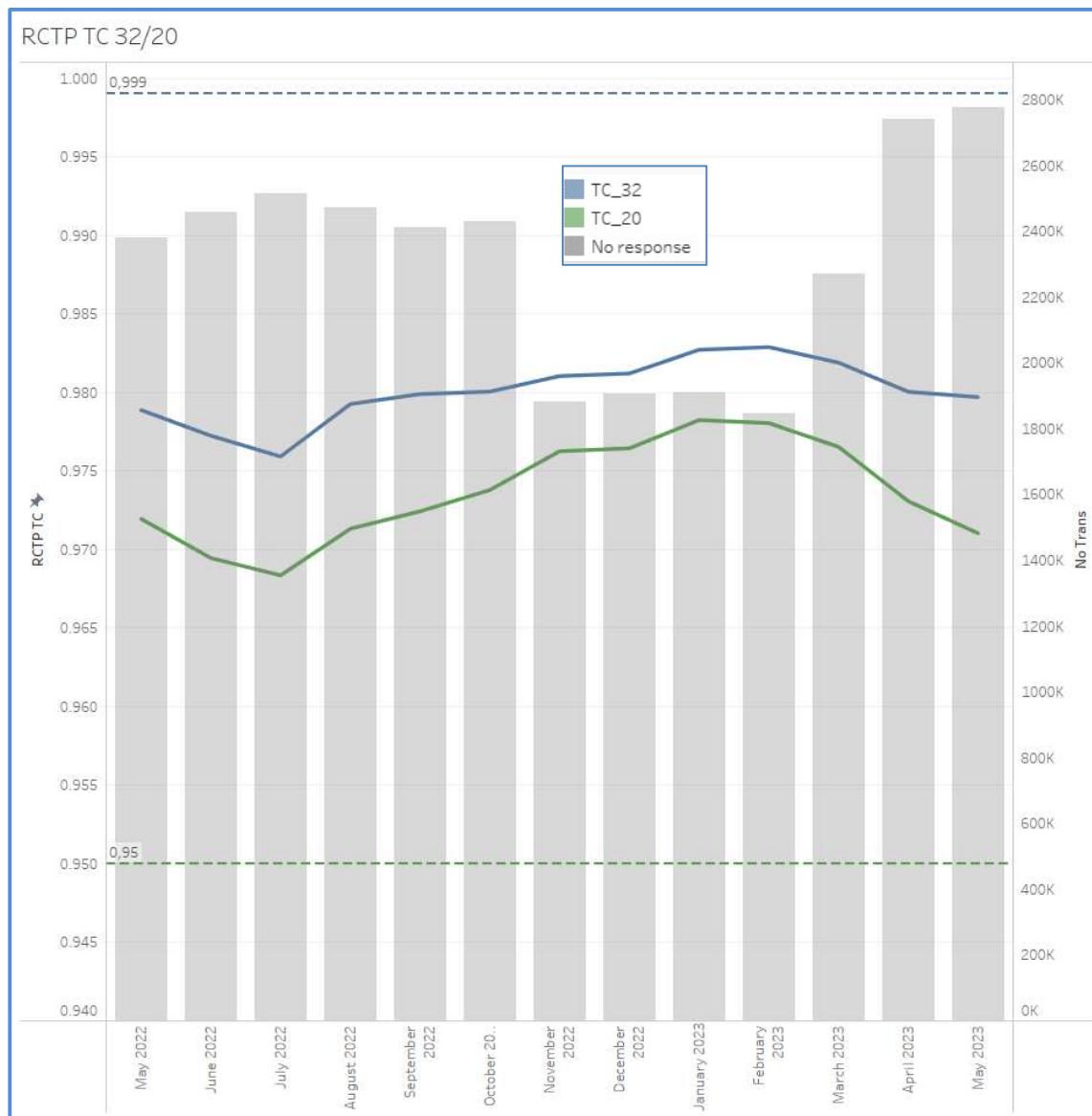


Figure 2-9: Technical Continuity

Note: the graph above does not include DSNA data due to LISAT format issues

## RCTP Technical Continuity per Centre

The table below shows the RTPC TC at 32s per Centre and per month.

RCTP TC 32 ANSP Table

| Atsu | May 2022 | June 2022 | July 2022 | August 2022 | September 2022 | October 2022 | November 2022 | December 2022 | January 2023 | February 2023 | March 2023 | April 2023 | May 2023 |
|------|----------|-----------|-----------|-------------|----------------|--------------|---------------|---------------|--------------|---------------|------------|------------|----------|
| EDUU | 0,985    | 0,984     | 0,984     | 0,985       | 0,985          | 0,989        | 0,993         | 0,992         | 0,993        | 0,992         | 0,988      | 0,984      | 0,981    |
| EDYY | 0,987    | 0,987     | 0,989     | 0,989       | 0,988          | 0,990        | 0,993         | 0,992         | 0,994        | 0,992         | 0,992      | 0,989      | 0,981    |
| EETT |          |           |           |             |                |              |               |               | 0,993        | 0,994         | 0,993      | 0,991      | 0,993    |
| EGPX | 0,984    | 0,986     | 0,987     | 0,985       | 0,985          | 0,989        | 0,992         | 0,992         | 0,993        | 0,992         | 0,992      | 0,991      | 0,987    |
| EGTT | 0,989    | 0,990     | 0,991     | 0,991       | 0,989          | 0,991        | 0,993         | 0,992         | 0,993        | 0,993         | 0,992      | 0,990      | 0,986    |
| EISN |          |           |           |             |                |              |               | 0,842         | 0,877        | 0,875         | 0,883      | 0,884      |          |
| EKDK | 0,988    | 0,987     | 0,989     | 0,988       | 0,988          | 0,989        | 0,990         | 0,989         | 0,991        | 0,989         | 0,988      | 0,988      | 0,985    |
| EPWW | 0,994    | 0,990     | 0,991     | 0,992       | 0,990          | 0,992        | 0,990         | 0,991         | 0,989        | 0,992         | 0,991      | 0,991      | 0,988    |
| ESMM | 0,992    | 0,992     | 0,993     | 0,993       | 0,992          | 0,994        | 0,994         | 0,993         | 0,994        | 0,994         | 0,994      | 0,994      | 0,993    |
| ESOS | 0,989    | 0,986     | 0,990     | 0,988       | 0,989          | 0,991        | 0,993         | 0,991         | 0,992        | 0,991         | 0,992      | 0,990      | 0,989    |
| EVRR | 0,976    | 0,977     | 0,980     | 0,981       | 0,978          | 0,986        | 0,988         | 0,988         | 0,987        | 0,990         | 0,985      | 0,984      | 0,984    |
| EYVC | 0,992    | 0,994     | 0,993     | 0,996       | 0,994          | 0,995        | 0,996         | 0,995         | 0,995        | 0,994         | 0,994      | 0,993      | 0,994    |
| GCCC | 0,888    | 0,898     | 0,918     | 0,910       | 0,907          | 0,974        | 0,938         | 0,930         | 0,929        | 0,934         | 0,927      | 0,928      | 0,914    |
| LDZO | 0,972    | 0,969     | 0,966     | 0,964       | 0,965          | 0,971        | 0,976         | 0,978         | 0,981        | 0,978         | 0,980      | 0,975      | 0,970    |
| LECB | 0,991    | 0,989     | 0,990     | 0,987       | 0,986          | 0,992        | 0,993         | 0,993         | 0,992        | 0,990         | 0,993      | 0,992      | 0,988    |
| LECM | 0,987    | 0,983     | 0,985     | 0,985       | 0,985          | 0,986        | 0,981         | 0,983         | 0,984        | 0,981         | 0,983      | 0,984      | 0,981    |
| LFBB | 0,975    | 0,914     | 0,869     | 0,866       | 0,863          | 0,870        | 0,867         | 0,873         | 0,873        | 0,864         | 0,873      | 0,877      | 0,875    |
| LFEE | 0,894    | 0,895     | 0,892     | 0,891       | 0,891          | 0,894        | 0,899         | 0,893         | 0,893        | 0,887         | 0,895      | 0,892      | 0,889    |
| LFFF | 0,950    | 0,851     | 0,774     | 0,778       | 0,780          | 0,778        | 0,818         | 0,890         | 0,889        | 0,887         | 0,889      | 0,887      | 0,886    |
| LFMM | 0,951    | 0,892     | 0,844     | 0,846       | 0,842          | 0,849        | 0,848         | 0,865         | 0,865        | 0,856         | 0,866      | 0,870      | 0,869    |
| LFRR | 0,970    | 0,908     | 0,867     | 0,868       | 0,870          | 0,875        | 0,876         | 0,885         | 0,886        | 0,882         | 0,883      | 0,884      | 0,881    |
| LHCC | 0,991    | 0,988     | 0,987     | 0,987       | 0,987          | 0,992        | 0,993         | 0,993         | 0,993        | 0,993         | 0,993      | 0,992      | 0,990    |
| LIBB | 0,955    | 0,938     | 0,903     | 0,946       | 0,942          | 0,946        | 0,961         | 0,965         | 0,962        | 0,968         | 0,971      | 0,962      | 0,956    |
| LIMM | 0,930    | 0,927     | 0,858     | 0,928       | 0,927          | 0,858        | 0,887         | 0,890         | 0,898        | 0,923         | 0,938      | 0,931      | 0,929    |
| LIPP | 0,924    | 0,913     | 0,881     | 0,913       | 0,922          | 0,827        | 0,844         | 0,812         | 0,804        | 0,893         | 0,922      | 0,930      | 0,933    |
| LIRR | 0,951    | 0,934     | 0,839     | 0,933       | 0,940          | 0,941        | 0,953         |               | 0,960        | 0,963         | 0,959      | 0,943      | 0,947    |
| LJLA | 0,971    | 0,965     | 0,963     | 0,962       | 0,965          | 0,971        | 0,985         | 0,985         | 0,986        | 0,983         | 0,981      | 0,972      | 0,961    |
| LKAA | 0,986    | 0,984     | 0,984     | 0,988       | 0,987          | 0,989        | 0,990         | 0,990         | 0,990        | 0,990         | 0,991      | 0,991      | 0,990    |
| LOVV | 0,968    | 0,967     | 0,969     | 0,970       | 0,969          | 0,976        | 0,982         | 0,980         | 0,979        | 0,978         | 0,978      | 0,974      | 0,970    |
| LPPC |          |           |           |             |                | 0,939        | 0,923         | 0,904         | 0,938        | 0,955         | 0,942      | 0,957      | 0,954    |
| LRBB | 0,989    | 0,987     | 0,987     | 0,987       | 0,986          | 0,990        | 0,989         | 0,989         | 0,988        | 0,987         | 0,989      | 0,987      | 0,988    |
| LSAG | 0,983    | 0,981     | 0,981     | 0,980       | 0,981          | 0,987        | 0,989         | 0,989         | 0,989        | 0,987         | 0,987      | 0,982      | 0,977    |
| LSAZ | 0,981    | 0,976     | 0,975     | 0,978       | 0,980          | 0,984        | 0,990         | 0,989         | 0,991        | 0,989         | 0,988      | 0,982      | 0,973    |
| LZBB |          |           |           |             |                |              |               |               |              |               |            |            | 0,988    |

Figure 2-10: RCTP Technical Continuity per Centre at 32s

RCTP TC 20 ANSP Table

|      | May 2022 | June 2022 | July 2022 | August 2022 | September 2022 | October 2022 | November 2022 | December 2022 | January 2023 | February 2023 | March 2023 | April 2023 | May 2023 |
|------|----------|-----------|-----------|-------------|----------------|--------------|---------------|---------------|--------------|---------------|------------|------------|----------|
| Atsu |          |           |           |             |                |              |               |               |              |               |            |            |          |
| EDUU | 0.9770   | 0.9745    | 0.9754    | 0.9768      | 0.9772         | 0.9817       | 0.9880        | 0.9871        | 0.9882       | 0.9874        | 0.9823     | 0.9759     | 0.9699   |
| EDYY | 0.9796   | 0.9792    | 0.9805    | 0.9806      | 0.9800         | 0.9820       | 0.9868        | 0.9861        | 0.9883       | 0.9861        | 0.9858     | 0.9803     | 0.9695   |
| EETT |          |           |           |             |                |              |               |               | 0.9906       | 0.9914        | 0.9905     | 0.9878     | 0.9903   |
| EGPX | 0.9778   | 0.9787    | 0.9793    | 0.9784      | 0.9787         | 0.9840       | 0.9883        | 0.9882        | 0.9890       | 0.9879        | 0.9876     | 0.9861     | 0.9797   |
| EGTT | 0.9817   | 0.9826    | 0.9831    | 0.9830      | 0.9815         | 0.9840       | 0.9865        | 0.9856        | 0.9867       | 0.9856        | 0.9850     | 0.9819     | 0.9759   |
| EISN |          |           |           |             |                |              |               | 0.8340        | 0.8712       | 0.8699        | 0.8781     | 0.8790     |          |
| EKDK | 0.9846   | 0.9832    | 0.9851    | 0.9846      | 0.9846         | 0.9854       | 0.9874        | 0.9864        | 0.9882       | 0.9863        | 0.9857     | 0.9844     | 0.9807   |
| EPWW | 0.9909   | 0.9860    | 0.9865    | 0.9879      | 0.9858         | 0.9891       | 0.9861        | 0.9882        | 0.9851       | 0.9896        | 0.9872     | 0.9872     | 0.9833   |
| ESMM | 0.9904   | 0.9903    | 0.9921    | 0.9913      | 0.9901         | 0.9934       | 0.9932        | 0.9919        | 0.9934       | 0.9929        | 0.9930     | 0.9927     | 0.9913   |
| ESOS | 0.9882   | 0.9854    | 0.9889    | 0.9869      | 0.9879         | 0.9907       | 0.9917        | 0.9901        | 0.9907       | 0.9898        | 0.9912     | 0.9897     | 0.9886   |
| EVRR | 0.9734   | 0.9736    | 0.9756    | 0.9771      | 0.9753         | 0.9844       | 0.9859        | 0.9869        | 0.9856       | 0.9867        | 0.9839     | 0.9823     | 0.9820   |
| EYVC | 0.9896   | 0.9910    | 0.9899    | 0.9939      | 0.9927         | 0.9951       | 0.9946        | 0.9942        | 0.9940       | 0.9939        | 0.9931     | 0.9930     |          |
| GCCC | 0.8807   | 0.8882    | 0.9100    | 0.9039      | 0.8949         | 0.9696       | 0.9323        | 0.9252        | 0.9227       | 0.9275        | 0.9196     | 0.9185     | 0.9048   |
| LDZO | 0.9635   | 0.9585    | 0.9559    | 0.9525      | 0.9549         | 0.9622       | 0.9702        | 0.9731        | 0.9765       | 0.9737        | 0.9740     | 0.9655     | 0.9594   |
| LECB | 0.9855   | 0.9835    | 0.9840    | 0.9807      | 0.9799         | 0.9872       | 0.9880        | 0.9879        | 0.9871       | 0.9839        | 0.9882     | 0.9866     | 0.9821   |
| LECM | 0.9828   | 0.9786    | 0.9804    | 0.9796      | 0.9799         | 0.9810       | 0.9756        | 0.9776        | 0.9784       | 0.9753        | 0.9779     | 0.9780     | 0.9757   |
| LFBB | 0.9726   | 0.9111    | 0.8661    | 0.8630      | 0.8610         | 0.8675       | 0.8650        | 0.8708        | 0.8712       | 0.8629        | 0.8715     | 0.8744     | 0.8714   |
| LFEE | 0.8894   | 0.8892    | 0.8859    | 0.8852      | 0.8854         | 0.8887       | 0.8953        | 0.8896        | 0.8898       | 0.8840        | 0.8915     | 0.8870     | 0.8814   |
| LFFF | 0.9420   | 0.8418    | 0.7647    | 0.7699      | 0.7716         | 0.7698       | 0.8117        | 0.8839        | 0.8837       | 0.8816        | 0.8823     | 0.8784     | 0.8737   |
| LFMM | 0.9449   | 0.8866    | 0.8382    | 0.8411      | 0.8373         | 0.8450       | 0.8449        | 0.8631        | 0.8633       | 0.8540        | 0.8641     | 0.8670     | 0.8648   |
| LFRR | 0.9660   | 0.9046    | 0.8623    | 0.8644      | 0.8656         | 0.8719       | 0.8726        | 0.8815        | 0.8834       | 0.8790        | 0.8793     | 0.8796     | 0.8752   |
| LHCC | 0.9864   | 0.9827    | 0.9810    | 0.9813      | 0.9813         | 0.9876       | 0.9901        | 0.9892        | 0.9884       | 0.9896        | 0.9892     | 0.9872     | 0.9844   |
| LIBB | 0.9464   | 0.9274    | 0.8954    | 0.9357      | 0.9328         | 0.9367       | 0.9560        | 0.9613        | 0.9588       | 0.9638        | 0.9674     | 0.9550     | 0.9482   |
| LIMM | 0.9204   | 0.9163    | 0.8469    | 0.9171      | 0.9164         | 0.8505       | 0.8810        | 0.8856        | 0.8933       | 0.9174        | 0.9308     | 0.9195     | 0.9161   |
| LIPP | 0.9112   | 0.8995    | 0.8689    | 0.8959      | 0.9081         | 0.8179       | 0.8381        | 0.8065        | 0.7998       | 0.8871        | 0.9123     | 0.9187     | 0.9191   |
| LIRR | 0.9438   | 0.9252    | 0.8284    | 0.9213      | 0.9306         | 0.9348       | 0.9485        |               | 0.9557       | 0.9583        | 0.9525     | 0.9346     | 0.9359   |
| LJLA | 0.9599   | 0.9496    | 0.9462    | 0.9450      | 0.9498         | 0.9587       | 0.9783        | 0.9785        | 0.9803       | 0.9748        | 0.9719     | 0.9572     | 0.9434   |
| LKAA | 0.9836   | 0.9815    | 0.9805    | 0.9851      | 0.9845         | 0.9873       | 0.9887        | 0.9887        | 0.9886       | 0.9885        | 0.9890     | 0.9885     | 0.9870   |
| LOVV | 0.9609   | 0.9581    | 0.9610    | 0.9619      | 0.9608         | 0.9695       | 0.9785        | 0.9756        | 0.9755       | 0.9743        | 0.9732     | 0.9671     | 0.9607   |
| LPPC |          |           |           |             |                | 0.9331       | 0.9161        | 0.8962        | 0.9326       | 0.9494        | 0.9358     | 0.9513     | 0.9486   |
| LRBB | 0.9844   | 0.9823    | 0.9821    | 0.9819      | 0.9809         | 0.9854       | 0.9841        | 0.9846        | 0.9830       | 0.9828        | 0.9845     | 0.9816     | 0.9827   |
| LSAG | 0.9736   | 0.9715    | 0.9714    | 0.9688      | 0.9695         | 0.9792       | 0.9830        | 0.9832        | 0.9839       | 0.9819        | 0.9806     | 0.9721     | 0.9633   |
| LSAZ | 0.9705   | 0.9636    | 0.9634    | 0.9647      | 0.9677         | 0.9739       | 0.9831        | 0.9828        | 0.9856       | 0.9820        | 0.9807     | 0.9716     | 0.9575   |
| LZBB |          |           |           |             |                |              |               |               |              |               |            |            | 0.9812   |

Figure 2-11: RCTP Technical Continuity per Centre at 20s

### 3. VDL Mode 2 Performance

The following metrics are computed based on the available data from the VGS logs provided to NM by ARINC and SITA. ENAV is currently evaluating how to also provide to NM their VGS logs.

Before April 2022, the logs contained the AVLC traffic recorded at each VGS during the 24hrs of the first Friday<sup>3</sup> of each month (one dataset per month).

From April 2022, the logs now contain AVLC traffic recorded at each VGS during the 24hrs of each Fridays<sup>4</sup> (one dataset per week). The aggregated number of AVLC frames taken into account per month for the metrics below has then increased compared to the data provided before April 2022. The increase in the number of AVLC frames used to compute the metrics improves the confidence in the metric value (narrower confidence interval) and any possible observed changes in the metric values before/after April 2022 should not be accounted to the increase of data.

To keep the trend of the AVLC traffic volume comparable with previous reports (prior to April 2022) it is now expressed as a daily average traffic volume for each month.

From April 2022, the statistics are no longer filtered on aircraft on the logon-list. This filtering measure was set up before April 2021 when VGS logs from ACSPs were incomplete.

---

<sup>3</sup> Friday is observed to have the highest flight traffic of the week.

<sup>4</sup> The frequency of log provision has been increased from one day per month to one day per week.

## AVLC Round Trip Time

The graph below shows the cumulative distributions per frequency (and per CSP) for the AVLC Round Trip Time (RTT) of acknowledged AVLC INFO frames conveying ATN packet considering all the VGS logs. The 95<sup>th</sup> and the 99.9<sup>th</sup> percentile of CSP allocation from ED-120 and ED-228A are also provided for information (red and blue dashed lines). Please note the logarithmic scale of the delays.

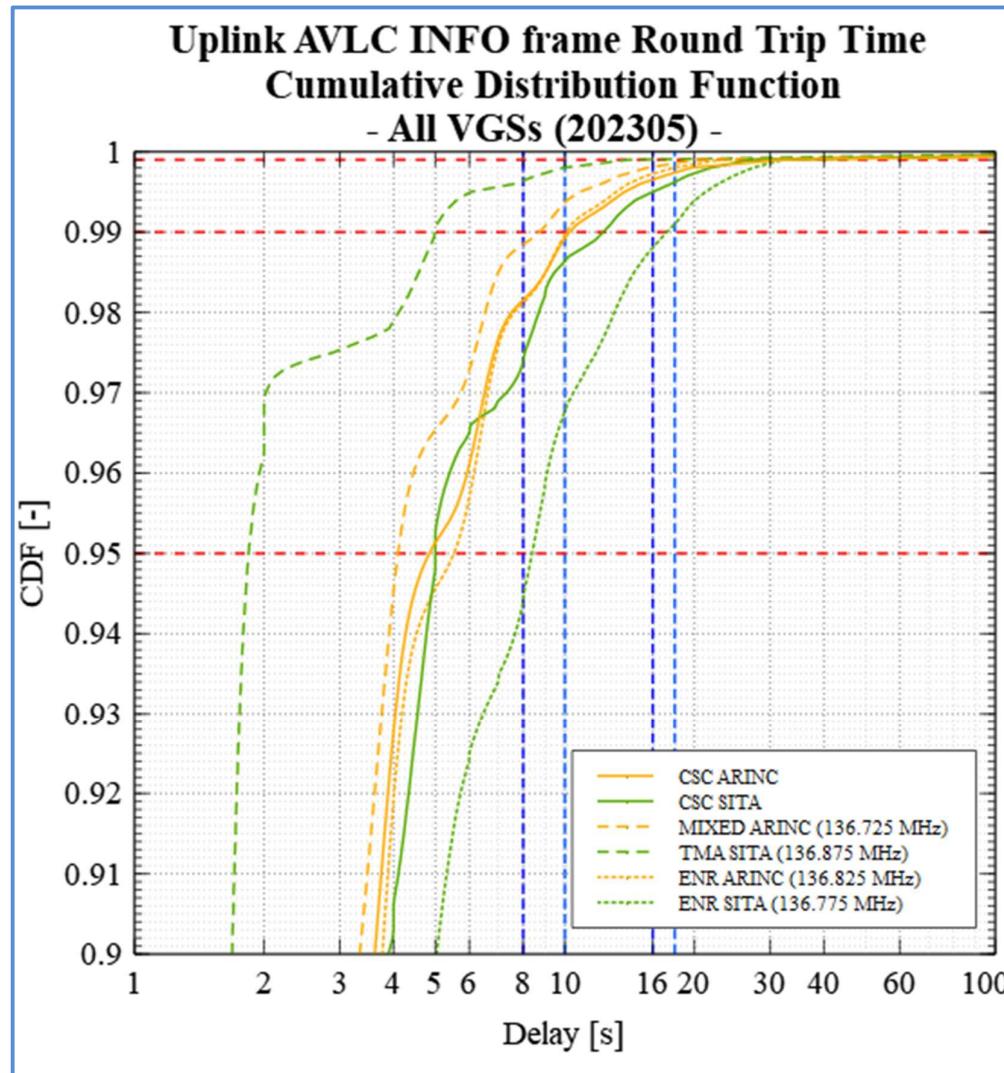


Figure 3-1: AVLC Round Trip Time

## AVLC Reliability

The graph below shows the cumulative distributions per frequency (and per CSP) for the AVLC Reliability<sup>5</sup> of AVLC INFO frames conveying ATN packet considering all the VGS logs. The 95<sup>th</sup> and the 99.9<sup>th</sup> percentile of CSP allocation from ED-120 and ED-228A are also provided for information (red and blue dashed lines). Please note the logarithmic scale of the delays.

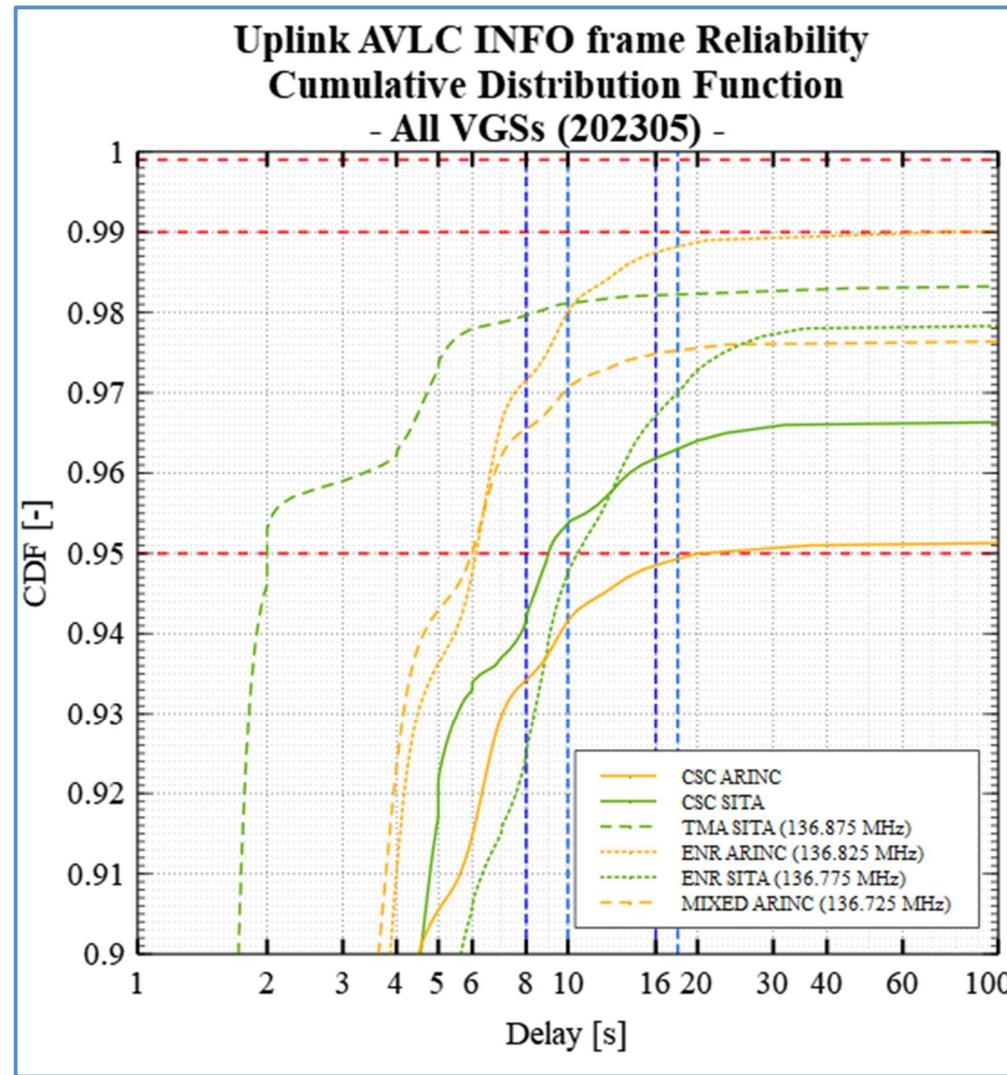


Figure 3-2: AVLC Reliability

Note: AVLC RTT and Reliability are related to each other in the following way: AVLC RTT only consider acknowledged AVLC frames while Reliability consider non-acknowledged ones (lost frames).

<sup>5</sup> Reliability is defined as the probability that an AVLC frame is acknowledged before a specific time. An "infinite" duration is taken for AVLC frames not acknowledged.

## Number of retransmissions

The graph below shows the cumulative distributions per frequency (and per CSP for the CSC) for the number of retransmissions needed before acknowledgement of uplink AVLc INFO frames conveying ATN packet considering all the VGS logs. N=0 represents successes on the first attempt, N=1 to N=5 represent successes on the first to the fifth retransmissions and N>5 represents N2T1 events.

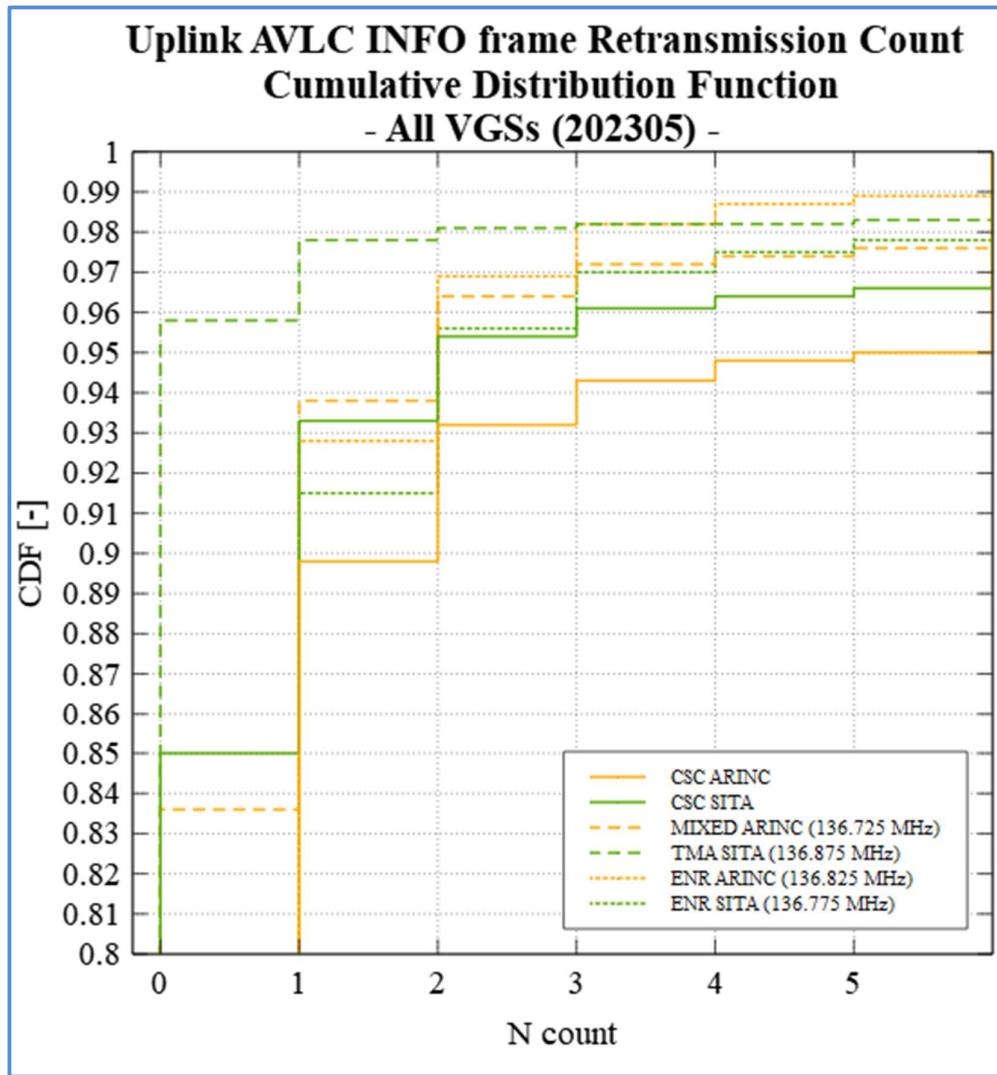


Figure 3-3: AVLc Uplink INFO frame retransmission count

## AVLC Round Trip Time per frequency trend

The following set of graphs show the 95<sup>th</sup>, 99<sup>th</sup> and the 99.9<sup>th</sup> percentiles of the AVLC RTT (in seconds) of acknowledged AVLC INFO frames conveying ATN packet for each month and for each frequency with the CSC split over the two CSPs. The RTT axis has a logarithmic scale with the same range for the different frequencies. The graphs also shows the number of AVLC frames taken into account in the percentiles calculations (Frame count in linear scale) and the 95% confidence interval (gray area).

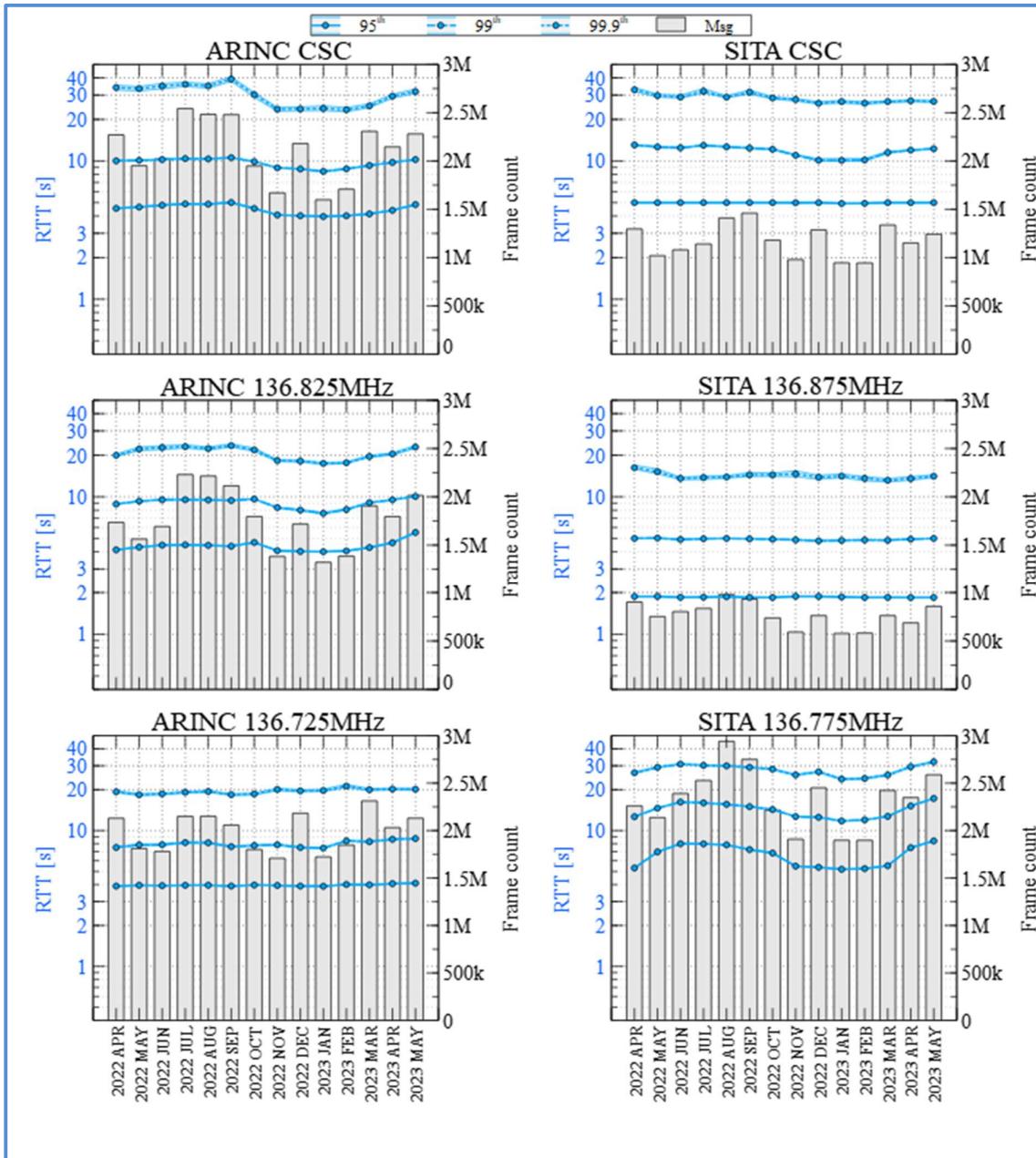


Figure 3-4: AVLC Uplink INFO Round Trip Time per Frequency

## Uplink delivery success rate

The following set of graphs show the uplink delivery rate of AVLC INFO frames conveying ATN packet for each month and for each frequency with the CSC split over the two CSPs. It is the probability that an AVLC uplink INFO frame is correctly delivered to the aircraft (ACK received). The graphs also show the number of AVLC frames taken into account in the calculations (Msg count in linear scale = AVLC frame count sent on first attempt) and the 95% confidence interval (gray area).

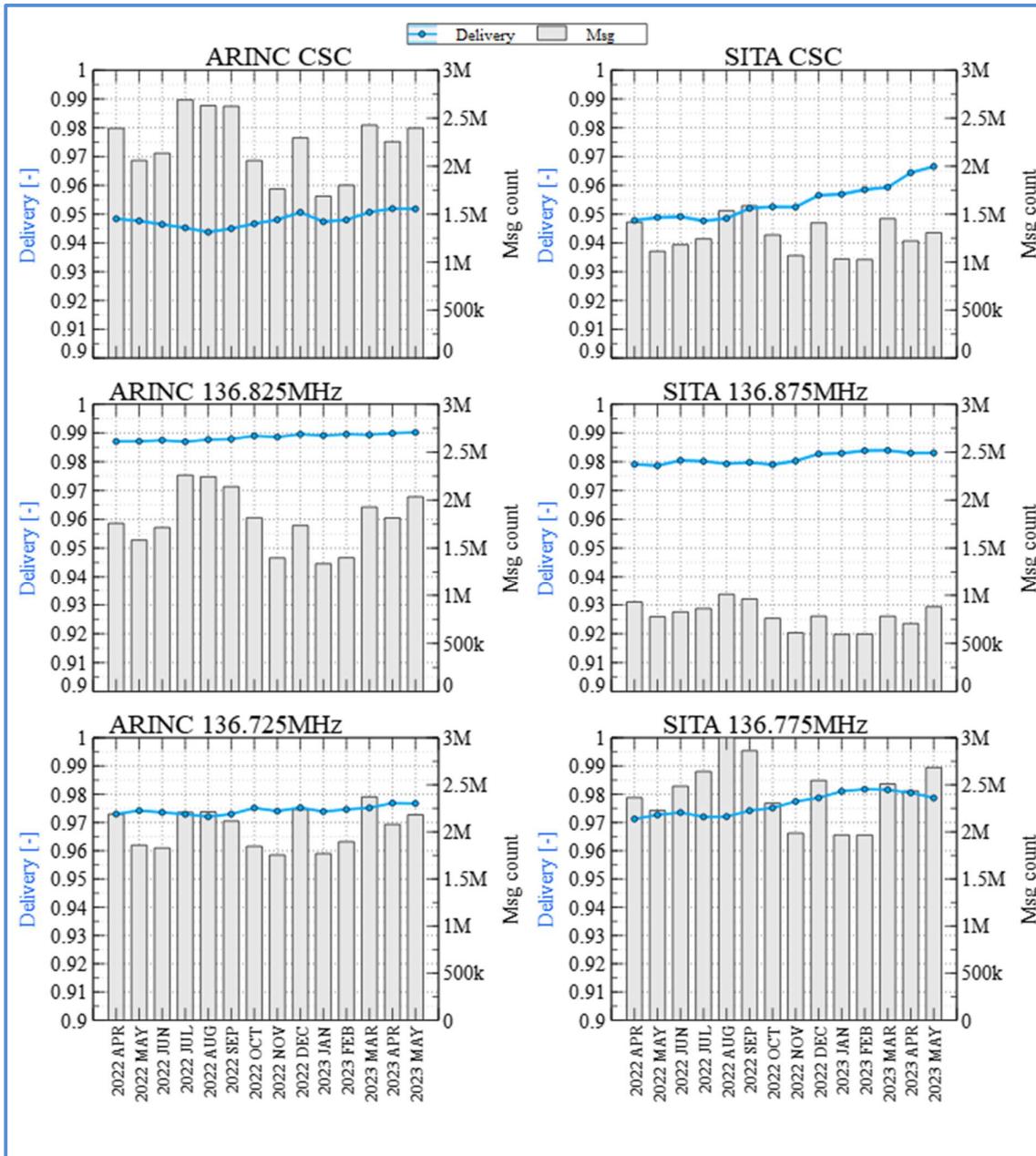


Figure 3-5: AVLC successful delivery rate per frequency

## Reliability

The following set of graphs show the uplink reliability of AVLC INFO frames conveying ATN packet for each month and for each frequency with the CSC split over the two CSPs. It is the probability that an AVLC uplink INFO frame is correctly delivered to the aircraft (ACK received) within a specific duration (10 and 18 seconds). The graphs also show the number of AVLC frames taken into account in the calculations (Msg count in linear scale = AVLC frame count sent on first attempt) and the 95% confidence interval (gray area).

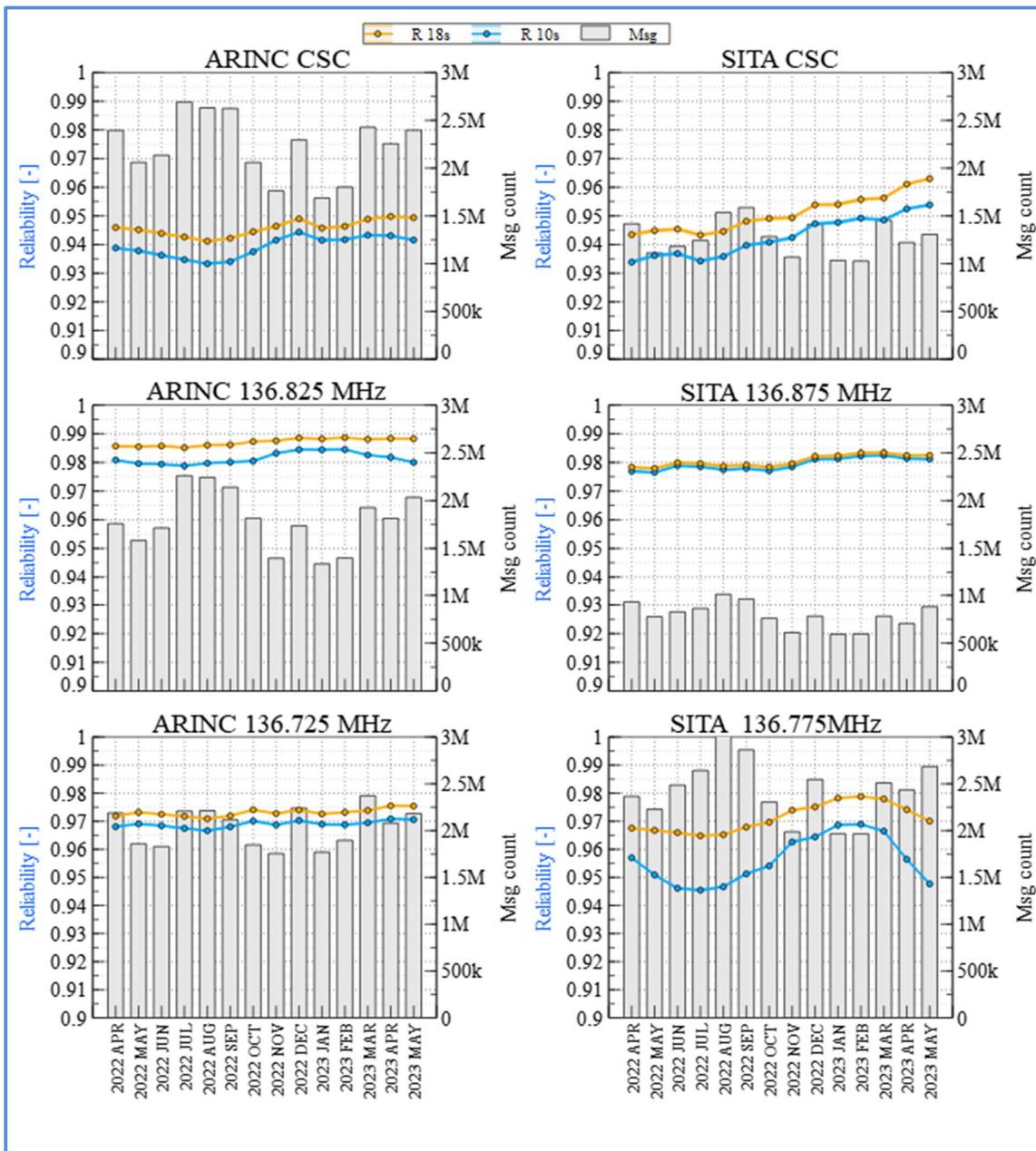


Figure 3-6: AVLC Reliability per frequency

## Daily average channel load per frequency trend

The following set of graphs show the daily average channel load per AVLC payload type (ATN, AOA and AVLC protocol related frames<sup>6</sup>) for each month and for each frequency. An additional graph split the traffic on the CSC between ACSPs. The channel load is expressed in megabytes with the same range for the different frequencies.

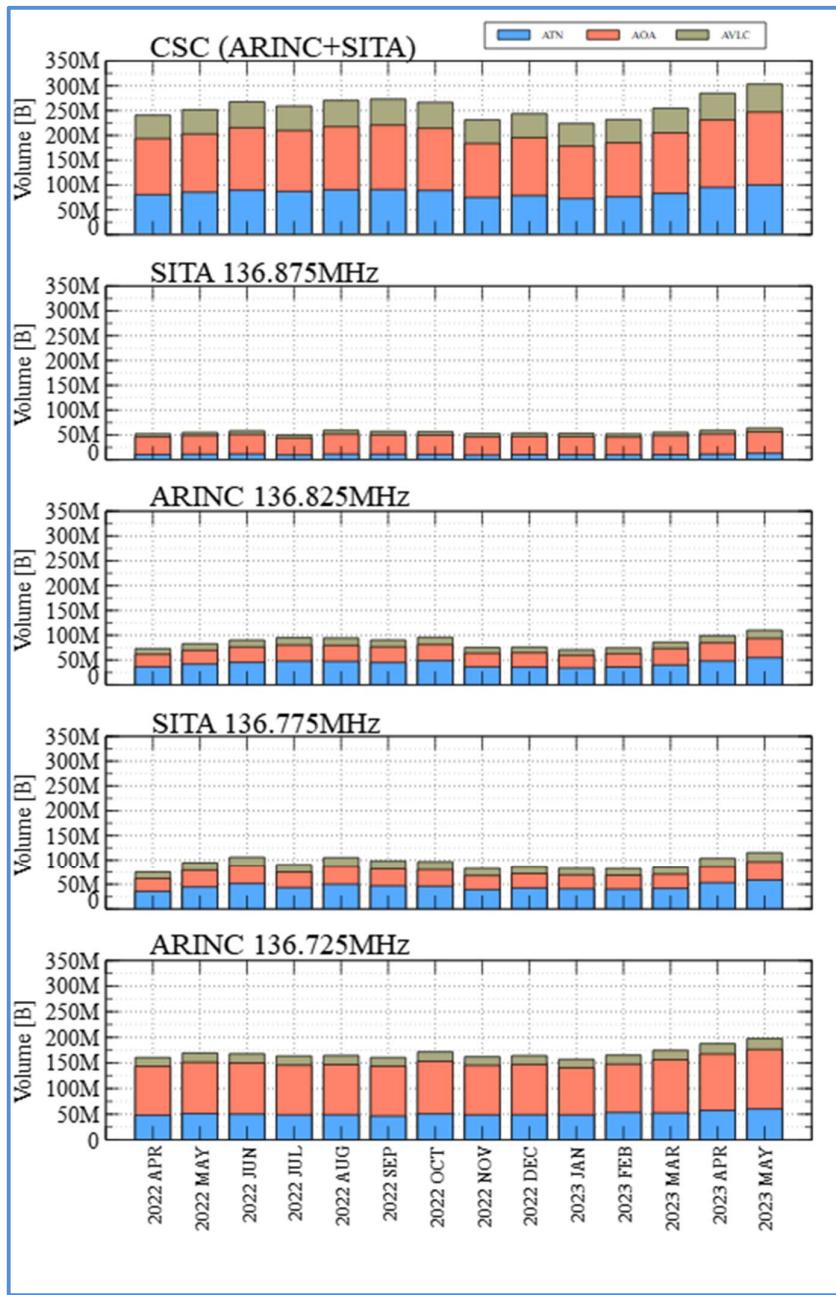


Figure 3-7: Daily average AVLC Channel load per frequency

<sup>6</sup> i.e. RR, SREJ, XID, ...

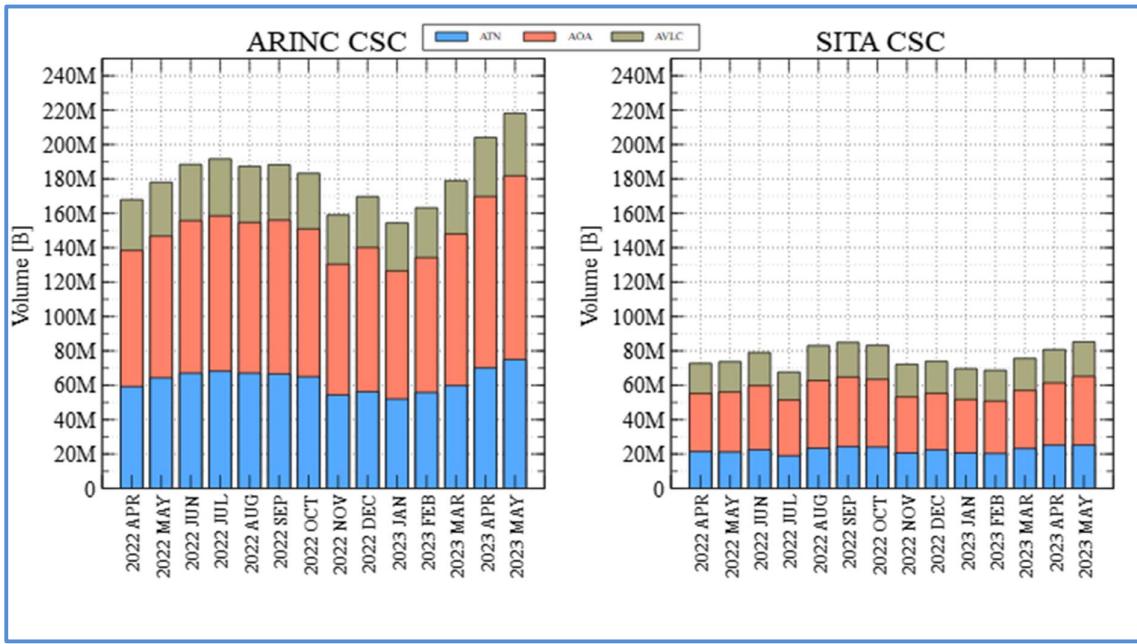


Figure 3-8: Daily average AVLC load on the CSC

## Appendix A: LISAT Data Available

The table below shows the number of CPDLC flights in the LISAT database per day, per Centre for the month when this report was created. The data available for this month, computed on the 09 June 2023, may be different in subsequent months if additional data is uploaded by the ANSPs.

| Null | 01/05/23 | 02/05/23 | 03/05/23 | 04/05/23 | 05/05/23 | 06/05/23 | 07/05/23 | 08/05/23 | 09/05/23 | 10/05/23 | 11/05/23 | 12/05/23 | 13/05/23 | 14/05/23 | 15/05/23 | 16/05/23 | 17/05/23 | 18/05/23 | 19/05/23 | 20/05/23 | 21/05/23 | 22/05/23 | 23/05/23 | 24/05/23 | 25/05/23 | 26/05/23 | 27/05/23 | 28/05/23 | 29/05/23 | 30/05/23 | 31/05/23 |  |  |  |  |  |  |  |
|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|--|--|--|--|--|
| EDUU | 3,292    | 2,956    | 2,860    | 3,005    | 2,978    | 2,995    | 3,044    | 3,012    | 2,914    | 3,017    | 2,973    | 3,125    | 3,197    | 3,174    | 3,106    | 2,951    | 3,108    | 3,070    | 2,958    | 3,139    | 3,126    | 3,004    | 2,925    | 3,162    | 3,073    | 3,148    | 3,110    | 3,154    | 3,172    | 3,080    | 3,125    |  |  |  |  |  |  |  |
| EDYY | 3,206    | 3,056    | 3,153    | 3,105    | 3,189    | 3,061    | 3,135    | 3,197    | 3,093    | 3,094    | 3,103    | 3,282    | 3,219    | 2        | 3,273    | 3,127    | 3,242    | 3,234    | 3,163    | 3,165    | 3,314    | 3,228    | 3,150    | 3,293    | 3,264    | 3,273    | 3,192    | 3,241    | 3,310    | 3,187    | 3,201    |  |  |  |  |  |  |  |
| EETT | 146      | 154      | 138      | 148      | 154      | 168      | 164      |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |
| EFIN |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |
| EGPX | 838      | 762      | 771      | 797      | 927      | 756      | 831      | 834      | 726      | 733      | 802      | 831      | 870      | 819      | 800      | 764      | 773      | 903      | 872      | 755      | 875      | 835      | 875      | 824      | 911      | 853      | 831      | 767      | 859      | 802      | 892      |  |  |  |  |  |  |  |
| EGTT | 3,792    | 3,989    | 3,958    | 4,099    | 4,017    | 3,801    | 3,995    | 4,057    | 3,842    | 3,960    | 4,083    | 4,180    | 3,949    | 4,110    | 4,126    | 4,077    | 4,090    | 4,113    | 4,108    | 4,002    | 4,143    | 4,237    | 4,057    | 4,066    | 4,178    | 4,313    | 4,095    | 3,765    | 4,214    | 4,143    | 4,204    |  |  |  |  |  |  |  |
| EISN |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |
| EKDK | 844      | 844      | 855      | 866      | 849      | 792      | 880      | 909      | 908      | 862      | 880      | 891      | 818      | 937      | 925      | 905      | 857      | 906      | 798      | 796      | 867      | 919      | 851      | 887      | 847      | 836      | 783      | 834      | 871      | 881      | 852      |  |  |  |  |  |  |  |
| ENOR |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |
| EPWW | 961      | 941      | 938      | 1,006    | 992      | 1,115    | 1,146    | 1,027    | 968      | 976      | 1,015    | 1,048    | 1,156    | 1,176    | 1,050    | 999      | 1,014    | 1,071    | 1,085    | 1,185    | 1,210    | 1,095    | 1,000    | 1,015    | 1,010    | 1,128    | 1,182    | 1,229    | 1,093    | 996      | 1,046    |  |  |  |  |  |  |  |
| ESMM | 733      | 675      | 728      | 756      | 750      | 685      | 788      | 764      | 730      | 730      | 759      | 762      | 737      | 839      | 812      | 758      | 775      | 761      | 751      | 762      | 797      | 805      | 725      | 735      | 746      | 769      | 749      | 792      | 753      | 719      | 728      |  |  |  |  |  |  |  |
| ESOS | 357      | 345      | 362      | 366      | 356      | 280      | 379      | 400      | 376      | 375      | 406      | 408      | 314      | 433      | 399      | 323      | 382      | 362      | 351      | 332      | 404      | 408      | 349      | 352      | 362      | 377      | 315      | 381      | 380      | 365      | 377      |  |  |  |  |  |  |  |
| EVRR | 233      | 227      | 237      | 237      | 256      | 232      | 237      | 240      | 242      | 226      | 228      | 243      | 240      | 257      | 255      | 239      | 230      | 245      | 254      | 258      | 271      | 249      | 244      | 251      | 262      | 268      | 261      | 265      | 245      | 246      | 244      |  |  |  |  |  |  |  |
| EVVC | 207      | 194      | 185      | 196      | 213      | 203      | 219      | 201      | 190      | 185      | 202      | 224      | 217      | 223      | 216      | 196      | 189      | 199      | 213      | 226      | 243      | 210      | 200      | 226      | 210      | 235      | 227      | 247      | 224      | 207      | 205      |  |  |  |  |  |  |  |
| GCCC | 76       | 96       | 99       | 102      | 89       | 126      | 92       | 66       | 94       | 93       | 85       | 102      | 114      | 92       | 85       | 109      | 117      | 103      | 95       | 170      | 97       | 78       | 127      | 112      | 111      | 127      | 147      | 111      | 84       | 108      | 99       |  |  |  |  |  |  |  |
| LBSR |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |
| LCCC |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |
| LDZO | 1,072    | 1,053    | 1,029    | 1,099    | 1,108    | 1,290    | 1,154    | 1,105    | 1,082    | 1,058    | 1,054    | 1,170    | 1,424    | 1,263    | 1,112    | 1,096    | 1,171    | 1,187    | 1,228    | 1,430    | 1,297    | 1,180    | 1,172    | 1,125    | 1,117    | 1,239    | 1,448    | 1,390    | 1,218    | 1,247    |          |  |  |  |  |  |  |  |
| LECB | 1,672    | 1,674    | 1,613    | 1,746    | 1,809    | 1,871    | 1,775    | 1,762    | 1,755    | 1,638    | 1,743    | 1,771    | 1,875    | 1,818    | 1,762    | 1,805    | 1,657    | 1,852    | 1,814    | 1,957    | 1,860    | 1,813    | 1,805    | 1,661    | 1,747    | 1,873    | 2,022    | 1,787    | 1,845    | 1,832    | 1,813    |  |  |  |  |  |  |  |
| LECM | 2,121    | 2,192    | 2,209    | 2,295    | 2,307    | 2,426    | 2,300    | 2,223    | 2,190    | 1,755    | 2,244    | 2,189    | 2,355    | 2,261    | 2,277    | 2,199    | 2,257    | 2,305    | 2,207    | 2,408    | 2,382    | 2,223    | 2,172    | 2,198    | 2,241    | 2,154    | 2,334    | 2,195    | 2,239    | 2,160    | 2,291    |  |  |  |  |  |  |  |
| LFBB | 1,418    | 1,661    | 1,598    | 1,650    | 1,746    | 1,833    | 1,651    | 1,700    | 1,614    | 1,577    | 1,625    | 1,707    | 1,724    | 1,716    | 1,684    | 1,707    | 1,600    | 1,761    | 1,740    | 1,898    | 1,831    | 1,744    | 1,675    | 1,658    | 1,765    | 1,713    | 1,928    | 1,706    | 1,761    | 1,748    | 1,634    |  |  |  |  |  |  |  |
| LFEE | 1,001    | 1,395    | 1,511    | 1,402    | 1,516    | 1,613    | 1,493    | 1,512    | 1,425    | 1,437    | 1,436    | 1,505    | 1,535    | 1,594    | 1,490    | 1,494    | 1,514    | 1,538    | 1,548    | 1,639    | 1,646    | 1,542    | 1,482    | 1,508    | 1,526    | 1,555    | 1,674    | 1,612    | 1,621    | 1,480    | 1,514    |  |  |  |  |  |  |  |
| LFFF | 918      | 1,132    | 1,158    | 1,250    | 1,272    | 1,104    | 1,224    | 1,263    | 1,202    | 1,110    | 1,284    | 1,272    | 1,095    | 1,230    | 1,245    | 1,208    | 1,175    | 1,308    | 1,277    | 1,147    | 1,282    | 1,305    | 1,172    | 1,233    | 1,285    | 1,261    | 1,219    | 1,161    | 1,280    | 1,208    | 1,213    |  |  |  |  |  |  |  |
| LFMM | 1,469    | 1,533    | 1,512    | 1,582    | 1,682    | 1,758    | 1,807    | 1,663    | 1,594    | 1,533    | 1,647    | 1,639    | 1,753    | 1,698    | 1,678    | 1,626    | 1,624    | 1,688    | 1,673    | 1,757    | 1,767    | 1,658    | 1,655    | 1,608    | 1,677    | 1,754    | 1,836    | 1,729    | 1,732    | 1,628    | 1,633    |  |  |  |  |  |  |  |
| LFRR | 1,359    | 1,888    | 1,785    | 1,907    | 1,972    | 2,039    | 1,959    | 1,941    | 1,903    | 1,859    | 1,977    | 1,947    | 2,042    | 2,027    | 1,923    | 2,024    | 1,826    | 2,019    | 1,970    | 1,953    | 1,943    | 1,992    | 2,199    | 1,941    | 1,962    | 1,921    | 2,007    |          |          |          |          |  |  |  |  |  |  |  |
| LGGS |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |
| lhcc | 1,390    | 1,362    | 1,294    | 1,394    | 1,385    | 1,525    | 1,504    | 1,413    | 1,307    | 1,421    | 1,395    | 1,448    | 1,607    | 1,559    | 1,400    | 1,385    | 1,291    | 1,451    | 1,431    | 1,648    | 1,603    | 1,455    | 1,386    | 1,450    | 1,488    | 1,592    | 1,679    | 1,606    | 1,495    | 1,406    | 1,492    |  |  |  |  |  |  |  |
| LIBB | 235      | 221      | 211      | 253      | 242      | 236      | 232      | 293      | 311      | 239      | 250      | 212      | 209      | 283      | 230      | 253      | 245      | 268      | 199      | 220      | 195      | 239      | 227      | 244      | 240      | 267      |          |          |          |          |          |  |  |  |  |  |  |  |
| LIMM | 363      | 331      | 240      | 339      | 381      | 366      | 363      | 347      | 318      | 342      | 335      | 360      | 180      | 144      | 148      | 253      | 351      | 330      | 363      | 385      | 398      | 350      | 332      | 349      | 372      | 337      | 367      | 378      | 439      |          |          |  |  |  |  |  |  |  |
| LIPP | 291      | 287      | 182      | 296      | 304      | 300      | 299      | 292      | 276      | 284      | 307      | 319      | 303      | 328      | 318      | 344      | 330      | 330      | 311      | 348      | 299      | 309      | 311      | 297      | 340      | 352      |          |          |          |          |          |  |  |  |  |  |  |  |
| LIRR | 494      | 455      | 321      | 476      | 488      | 471      | 434      | 483      | 427      | 386      | 453      | 410      | 400      | 434      | 422      | 393      | 402      | 453      | 397      | 431      | 451      | 415      | 349      | 423      | 534      | 476      | 465      | 466      | 156      | 391      |          |  |  |  |  |  |  |  |
| LJLA | 624      | 572      | 575      | 631      | 569      | 697      | 633      | 612      | 637      | 556      | 577      | 632      | 769      | 698      | 585      | 589      | 636      | 628      | 746      | 676      | 539      | 626      | 614      | 594      | 678      | 789      | 708      | 703      | 660      | 690      |          |  |  |  |  |  |  |  |
| LKAA | 836      | 777      | 791      | 834      | 825      | 835      | 886      | 842      | 733      | 767      | 833      | 835      | 965      | 943      | 852      | 813      | 855      | 871      | 820      | 885      | 927      | 867      | 777      | 851      | 868      | 863      | 907      | 941      | 874      | 835      | 826      |  |  |  |  |  |  |  |
| LMM  |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |
| LOVV | 1,862    | 1,847    | 1,789    | 1,842    | 1,775    | 1,905    | 1,882    | 1,857    | 1,803    | 1,814    | 1,779    | 1,918    | 2,030    | 2,013    | 1,807    | 1,834    | 1,828    | 4        | 1,877    | 2,067    | 2,023    | 1,835    | 1,820    | 1,966    | 1,935    | 1,969    | 2,115    | 2,060    | 2,020    | 1,910    | 1,977    |  |  |  |  |  |  |  |
| LPPC | 1,015    | 1,038    | 1,092    | 1,131    | 1,138    | 1,254    | 1,189    | 1,041    | 1,028    | 1,117    | 1,131    | 1,110    | 1,241    | 1,157    | 1,099    | 1,096    | 1,097    | 1,140    | 1,095    | 1,116    | 1,127    | 1,091    | 1,062    | 1,135    | 1,142    | 1,035    | 1,200    | 1,087    | 1,102    | 1,015    | 1,132    |  |  |  |  |  |  |  |
| LRBB | 992      | 982      | 910      | 902      | 948      | 1,115    | 1,009    | 962      | 934      | 1,009    | 956      | 1,022    | 1,075    | 1,101    | 991      | 964      | 886      | 1,042    | 965      | 1,081    | 1,094    | 969      | 1,030    | 1,012    | 1,094    | 1,135    | 1,149    | 1,043    | 1,014    | 1,070    |          |  |  |  |  |  |  |  |
| LSAG | 765      | 795      | 798      | 838      | 949      | 950      | 931      | 850      | 807      | 828      | 837      | 929      | 920      | 892      | 868      | 845      | 844      | 877      | 839      | 882      | 910      | 862      | 810      | 820      | 816      | 903      | 879      | 865      | 831      | 771      | 805      |  |  |  |  |  |  |  |
| LSAZ | 875      | 900      | 967      | 988      | 1,035    | 1,103    | 1,021    | 962      | 865      | 971      | 924      | 1,021    | 1,031    | 1,037    | 952      | 1,060    | 1,028    | 1,011    | 1,098    | 1,139    | 1,065    | 990      | 1,019    |          |          |          |          |          |          |          |          |  |  |  |  |  |  |  |

©2023 The European Organisation for the Safety of Air Navigation (EUROCONTROL). This document is published by EUROCONTROL for information purposes. It may be copied in whole or in part, provided that EUROCONTROL is mentioned as the source and the extent justified by the non-commercial use (not for sale). The information in this document may not be modified without prior written permission from EUROCONTROL.