Network Manager
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EUROCONTROL

# Data link Network Operational Status Report

**July 2021**

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 and a 15 week period for weekly statistics, ending in July 2021.

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 the following report, the identifier for each metric used in the DPMF Report Catalogue is shown in angled brackets e.g. <N-1>.

**Notes:**

- As soon as new ANSPs are providing LISAT logs to DPMF, the metrics are updated accordingly (sometimes retroactively) and the values presented in this report might evolve from a report to another.
- No data from DSNA since July 2021.
- As from Mid May 2021 this report now includes data from LDZO (Croatia).
- As from April 2021 Collins Aerospace (ARINC) is providing VGS logs for all their users and no longer filter the data provided for specific airlines.
- The performance reports from 2021 onwards 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
- As from December 2020 this report now includes data from DSNA (LFEE, LFFF, LFMM, LFRR and LFBB) with data since January 2020.
- As from September 2020 this report now includes data from EVRR (Latvia).
- As from August 2020 this report now includes data from LEBC, LEBM and GCCC (Spain) with data since March 2020

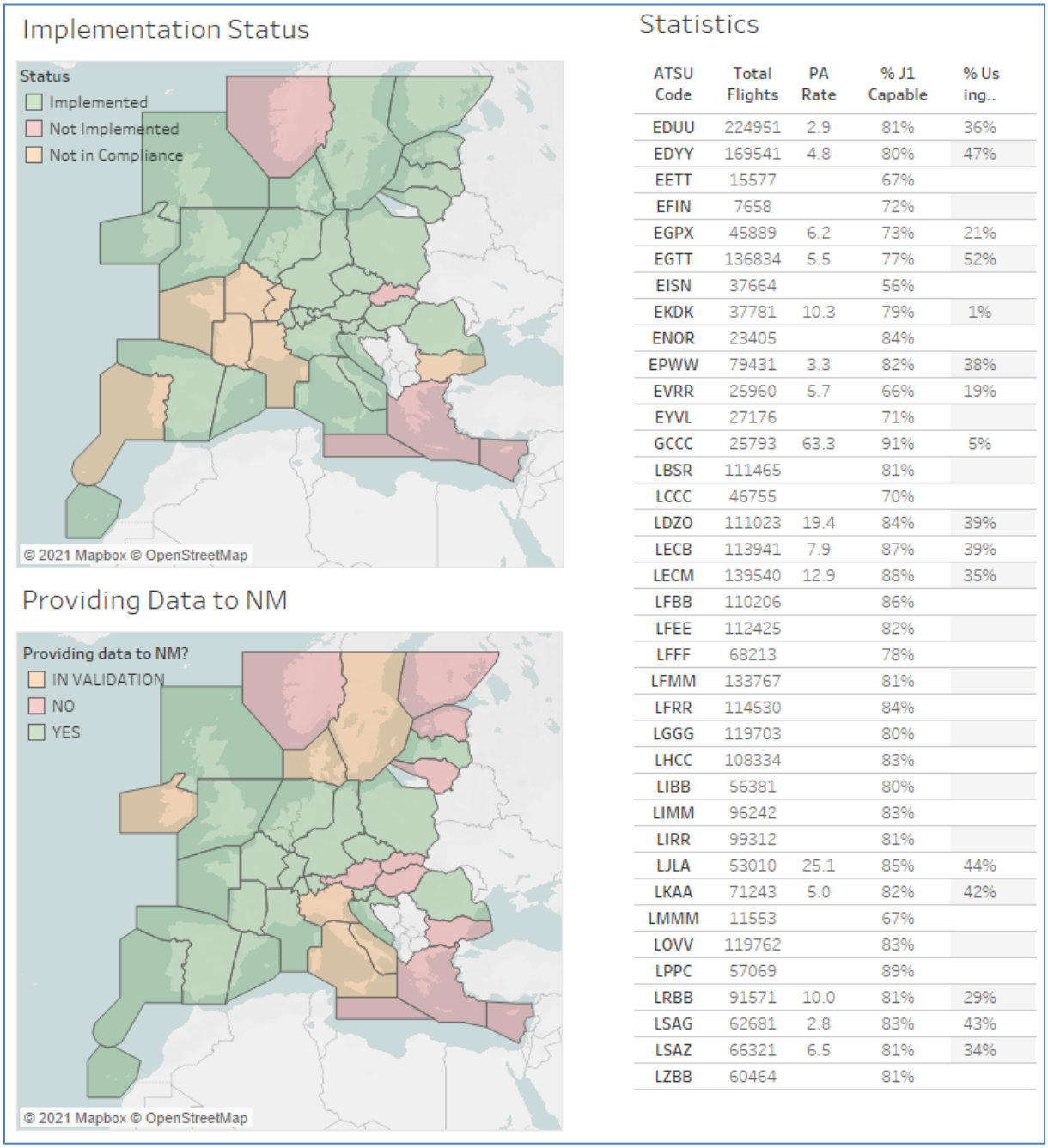
# 1. Operational Status

Figure 1-1 on the following page provides a status for each FIR/UIR covered by the DLS IR. The top map shows the operational status of each centre (<N-4>) as of end of June 2021. The map below shows which centres are providing LISAT data to NM as of end of July. The table on the right shows per centre for the month of July: 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

## ANSPs with service limitations and operational restrictions

The table below identifies the current service limitations and operational restrictions.

| Centre | Current datalink service operational restrictions |
|---|---|
| Portugal (LPPC) | DLIC service is provided, but ACM, AMC and ACL services are not provided. |
| France (LFEE, LFFF, LFMM) | DLIC, ACM and AMC services are provided, but the ACL service is not provided. |
| France (LFRR, LFBB) | DLIC, ACM, AMC and ACL services are provided, but downlink messages of ACL are not supported. |
| Bulgaria (LBSR) | DLIC, ACL, ACM and AMC services are provided, but only over the SITA network. |
| 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>Datalink services are provided only to Logon-List a/c |
| 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 |




| ATSU Code | Total Flights | PA Rate | % J1 Capable | % Using.. |
|---|---|---|---|---|
| EDUU | 224951 | 2.9 | 81% | 36% |
| EDYY | 169541 | 4.8 | 80% | 47% |
| EETT | 15577 | | 67% | |
| EFIN | 7658 | | 72% | |
| EGPX | 45889 | 6.2 | 73% | 21% |
| EGTT | 136834 | 5.5 | 77% | 52% |
| EISN | 37664 | | 56% | |
| EKDK | 37781 | 10.3 | 79% | 1% |
| ENOR | 23405 | | 84% | |
| EPWW | 79431 | 3.3 | 82% | 38% |
| EVRR | 25960 | 5.7 | 66% | 19% |
| EYVL | 27176 | | 71% | |
| GCCC | 25793 | 63.3 | 91% | 5% |
| LBSR | 111465 | | 81% | |
| LCCC | 46755 | | 70% | |
| LDZO | 111023 | 19.4 | 84% | 39% |
| LECB | 113941 | 7.9 | 87% | 39% |
| LECM | 139540 | 12.9 | 88% | 35% |
| LFBB | 110206 | | 86% | |
| LFEE | 112425 | | 82% | |
| LFFF | 68213 | | 78% | |
| LFMM | 133767 | | 81% | |
| LFRR | 114530 | | 84% | |
| LGGG | 119703 | | 80% | |
| LHCC | 108334 | | 83% | |
| LIBB | 56381 | | 80% | |
| LIMM | 96242 | | 83% | |
| LIRR | 99312 | | 81% | |
| LJLA | 53010 | 25.1 | 85% | 44% |
| LKAA | 71243 | 5.0 | 82% | 42% |
| LMMM | 11553 | | 67% | |
| LOVV | 119762 | | 83% | |
| LPPC | 57069 | | 89% | |
| LRBB | 91571 | 10.0 | 81% | 29% |
| LSAG | 62681 | 2.8 | 83% | 43% |
| LSAZ | 66321 | 6.5 | 81% | 34% |
| LZBB | 60464 | | 81% | |

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

Note: Due to a new retry process implemented in some ANSP (i.e. MUAC) aiming to increase the rate of successfully establishing CPDLC sessions, multiple and successive PAs may be generated for the same aircraft in a very short period. MUAC has contested the inclusion of these PAs and the issue is being discussed in the context of the metric definition updates.

## 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[1] file 'J1' in their flight plan <N-1>and what percentage indicate in the flight plan that the aircraft is exempt. For July 2021 79.3% of flights indicated the capability to perform CPDLC over ATN/VDL Mode 2. 17.0% indicate they are exempt. The remaining 3.7% filed neither capability, nor exemption. Considering the known exceptions, NM is estimating that about 1.3% of the filed FPLs are likely contravening the DLS IR.

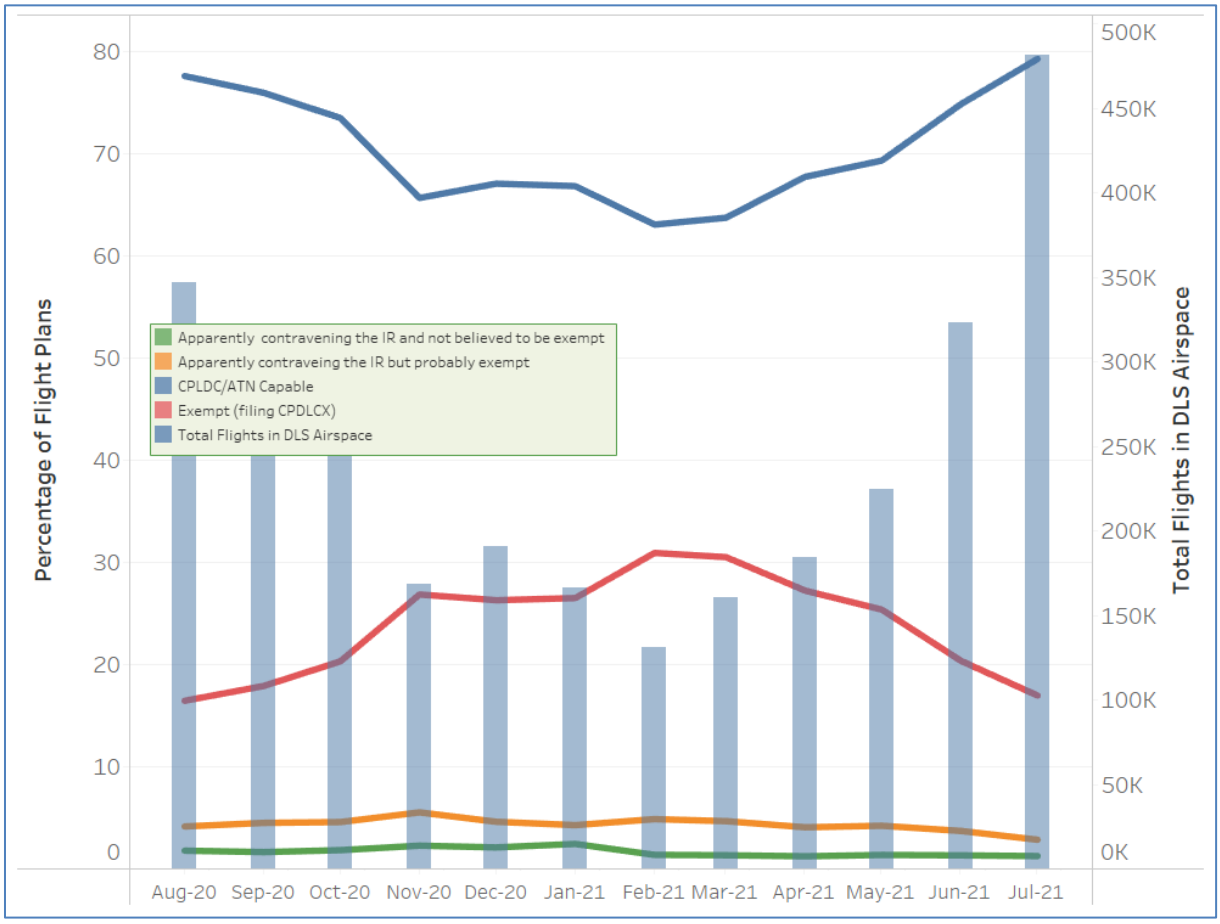



**Figure 1-2: Proportion of flights capable of using CPDLC over ATN/ VDL Mode 2**

[1] EHAAFIR, LOVVFIR, LECBUIR, LIBBUIR, EBURUIR, GCCCUIRN, GCCCUIRS, LFFFUIR, EDVVUIR, LPPCFIR, EGTTUIR, LECMUIR, LIMMUIR, EDUUUIR, LIRRUIR, EGPXUIR, EISNUIR, LZBBFIR, LRBBFIR, LHCCFIR, EKDKFIR, LJLAFIR, LCCCFIR, LKAAFIR, LBSRFIR, EPWWFIR, EFINFIR, LGGGUIR, LMMMUIR, EVRRUIR, ESAAUIR, EETTUIR, EYVLUIR.

# 2. Technical Performance

## Overall Provider Abort Rate

Figure 2-1 below shows the PA rate <O-23> aggregated for all ANSPs providing data to LISAT[2]. The target value is 1 PA per 100 hours CPDLC (shown as a dashed line on the graph below). The overall average rate for July 2021 was 7.2 PAs per 100 hours.

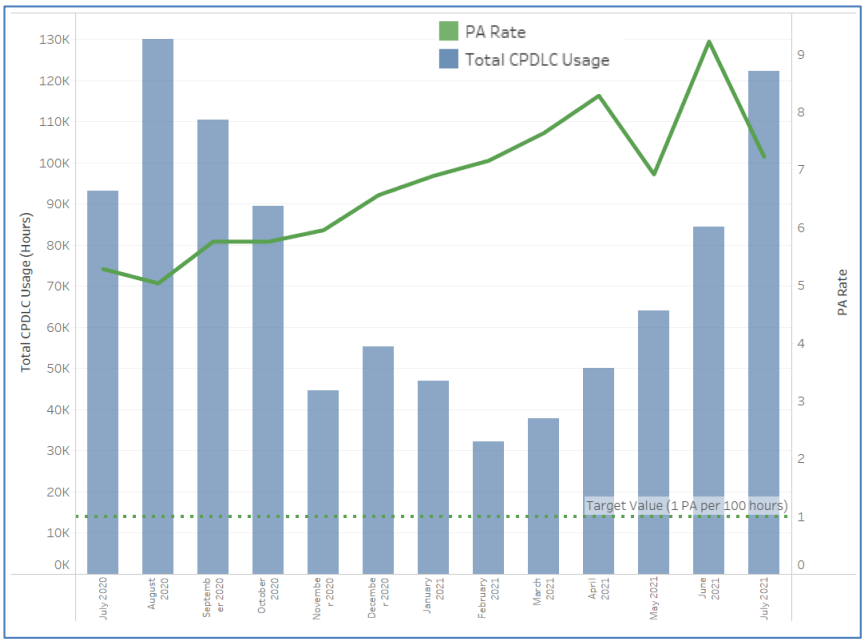



Figure 2-1: PA rate

Figure 2-2 below shows the 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[3].

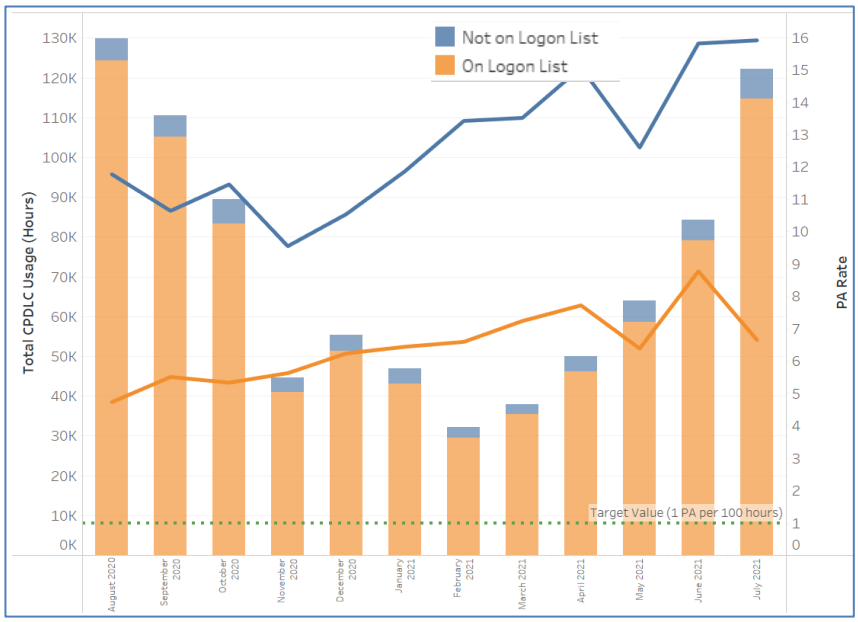



Figure 2-2: Logon Listed Aircraft PA rate

[2] Currently MUAC, Skyguide, DFS, NATS, ANS CZ, Slovenia Control, PANSA, ENAIRE, Latvia, Romatsa, DSNA and Croatia.

[3] EDUU,EGTT,EGPX,LKAA,GCCC,LECB,LECM,LJLA,EPWW,.

## PA rate per ACSP

Figure 2-3 below shows the PA rate per ACSP for aircraft on the Logon List.[4] The ACSP information is taken from the declarations made by the aircraft operators when adding their aircraft to the Logon List; 'BOTH' implies that the aircraft may use ARINC or SITA.

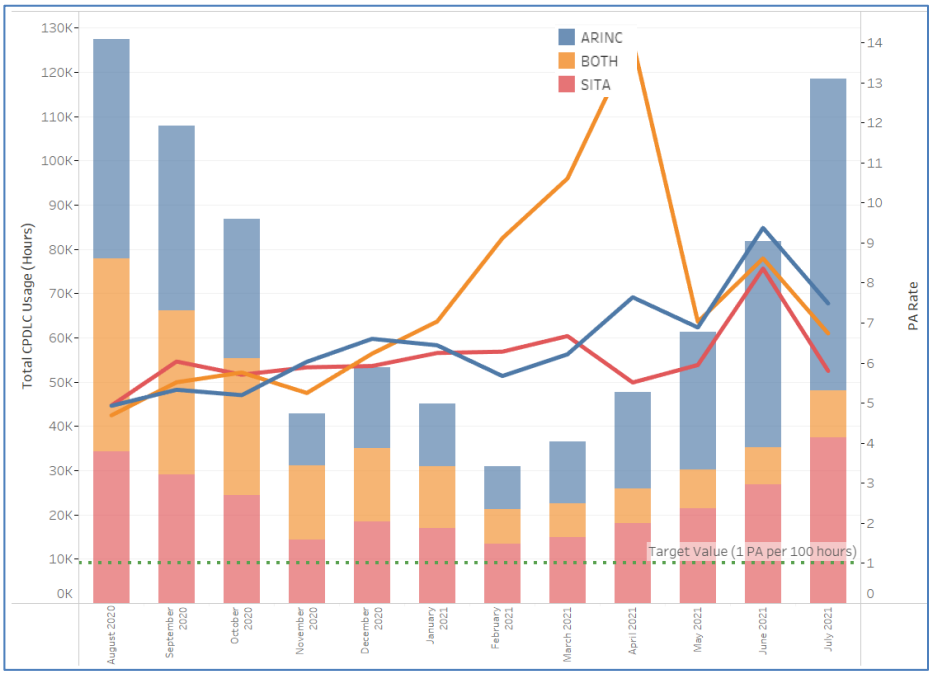



**Figure 2-3: ACSP PA rate**

## Weekly PA rate per Centre

| Atsu Code | 17 May 2021 | 24 May 2021 | 31 May 2021 | 7 June 2021 | 14 June 2021 | 21 June 2021 | 28 June 2021 | 5 July 2021 | 12 July 2021 | 19 July 2021 | 26 July 2021 | 2 August 2021 | 9 August 2021 | 16 August 2021 | 23 August 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EDUU | 8.95 | 4.67 | 5.60 | 4.62 | 6.94 | 6.04 | 3.40 | 3.32 | 3.24 | 3.23 | 2.59 | 3.31 | 2.36 | 2.92 | 2.27 |
| EDYY | 2.53 | 4.47 | 5.00 | 5.21 | 4.68 | 4.01 | 3.55 | 4.73 | 4.10 | 3.40 | 3.49 | 4.17 | 3.42 | 4.35 | 3.99 |
| EGPX | 9.00 | 9.33 | 7.97 | 8.86 | 6.66 | 6.73 | 4.61 | 6.40 | 5.12 | 7.02 | 7.17 | 6.66 | 6.97 | 7.22 | |
| EGTT | 6.45 | 7.92 | 5.91 | 5.83 | 6.05 | 6.86 | 4.44 | 5.80 | 6.05 | 5.56 | 5.46 | 6.46 | 6.20 | 6.00 | 6.58 |
| EKDK | 9.49 | 16.09 | 10.19 | 16.54 | 12.10 | 14.95 | | | | | | | 10.48 | | |
| EPWW | 6.52 | 3.42 | 4.39 | 5.58 | 6.63 | 5.03 | 3.66 | 4.74 | 4.04 | 2.72 | 2.71 | 3.36 | 2.45 | 2.46 | 4.90 |
| EVRR | 8.54 | 11.04 | 5.75 | 5.64 | 6.77 | 5.56 | 7.38 | 7.66 | 3.84 | 2.81 | 4.33 | 5.47 | 1.20 | 10.18 | 7.58 |
| GCCC | 66.21 | 56.96 | 68.06 | 55.82 | 59.21 | 56.53 | 85.43 | 60.17 | 64.63 | 52.29 | 78.26 | 44.81 | 75.10 | | |
| LDZO | 18.93 | 16.63 | 22.43 | 15.54 | 46.83 | 51.18 | 16.80 | 12.15 | 14.83 | 19.58 | 19.30 | 21.59 | 20.00 | 22.84 | 25.20 |
| LECB | 10.26 | 9.98 | 9.78 | 7.12 | 9.33 | 8.02 | 7.66 | 8.58 | 8.09 | 5.88 | 8.72 | 8.08 | 9.30 | | |
| LECM | 12.83 | 10.58 | 10.95 | 11.85 | 13.65 | 13.54 | 13.02 | 12.54 | 12.15 | 13.46 | 12.59 | 13.29 | 13.15 | | |
| LFBB | 1.25 | 0.72 | 1.98 | | | | | | | | | | | | |
| LFEE | 4.17 | 6.21 | 4.21 | | | | | | | | | | | | |
| LFFF | 4.00 | 3.32 | 9.70 | | | | | | | | | | | | |
| LFMM | 8.48 | 9.18 | 8.47 | | | | | | | | | | | | |
| LFRR | 3.98 | 3.75 | 5.21 | | | | | | | | | | | | |
| LJLA | 42.88 | 14.11 | 22.33 | 15.26 | 21.16 | 18.07 | 12.72 | 9.76 | 9.61 | 11.69 | 36.54 | 11.65 | 12.26 | 97.73 | 12.07 |
| LKAA | 12.65 | 7.07 | 6.48 | 5.77 | 13.06 | 5.81 | 5.90 | 4.46 | 4.10 | 5.97 | 3.09 | 5.65 | 4.92 | 5.28 | 6.03 |
| LRBB | 4.21 | 5.13 | 4.65 | 6.30 | 7.35 | 7.59 | 4.49 | 4.17 | 6.40 | 16.69 | 5.95 | 33.18 | 4.70 | 4.95 | 5.72 |
| LSAG | 1.99 | 3.91 | 3.78 | 2.35 | 1.80 | 1.63 | 1.80 | 4.43 | 3.01 | 2.92 | 1.95 | 1.88 | 3.16 | 2.85 | 2.94 |
| LSAZ | 2.67 | 5.43 | 3.46 | 27.64 | 24.70 | 19.94 | 4.94 | 4.03 | 4.52 | 5.85 | 10.24 | 11.39 | 5.52 | 4.91 | 9.34 |

**Figure 2-4: Weekly PA Rate per Centre**

[4] At the beginning of 2021, RYR changed in the logon list the ACSP they were declaring to be connected to ("BOTH" was used before). As there is no time information in the logon list for the change of ACSP by an airline operator, any change affects all the statistics retroactively. A filter is then applied while processing the data that sets the ACSP for RYR to "BOTH" before 21/02/2021 and to the current one afterward.

## Weekly PA Rate for Major Aircraft Operators

Figure 2-5 below shows the weekly PA rate for the three aircraft operators with the lowest average PA rate and the three aircraft operators with the highest average PA rate from a list of the top 30 aircraft operators in terms of usage of CPDLC/ATN over the past 15 weeks.

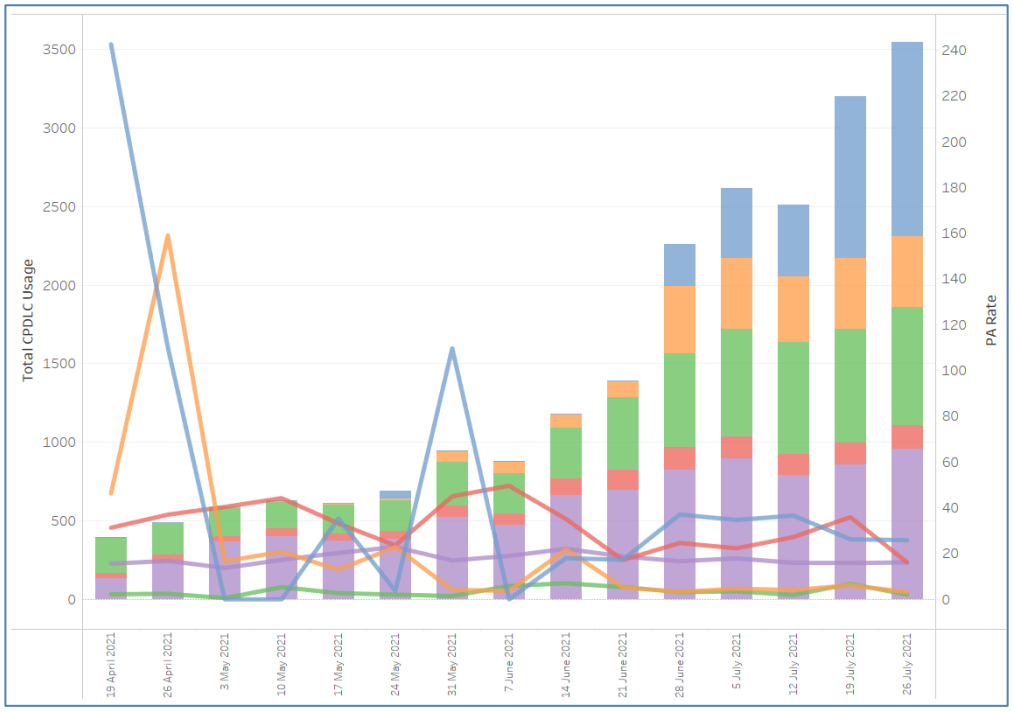



Figure 2-5: Top 3 and bottom 3 PA Rate for Major Aircraft Operators

## Weekly PA Rate for 5 biggest CPDLC users

Figure 2-6 below shows the weekly PA rate for the five aircraft operators that have used CPDLC most over the past 15 weeks.

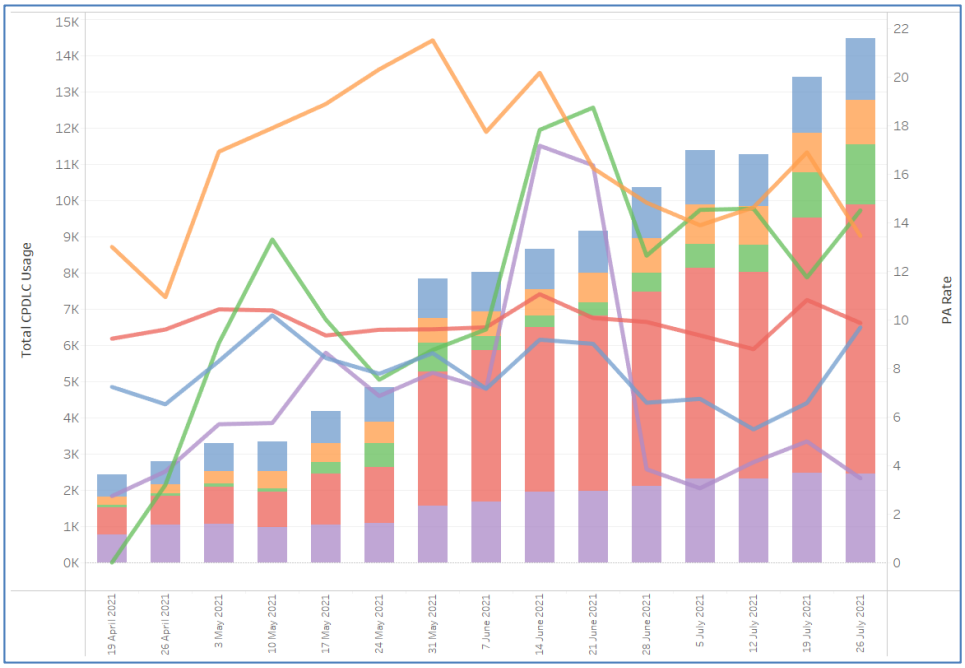



Figure 2-6: PA Rate of the 5 biggest users of CPDLC

## Weekly PA Rate for various aircraft types

The figures below show the weekly PA rate for specific aircraft types for the five aircraft operators using CPDLC the most over the past 15 weeks with the particular aircraft type.

### Airbus A320 Family

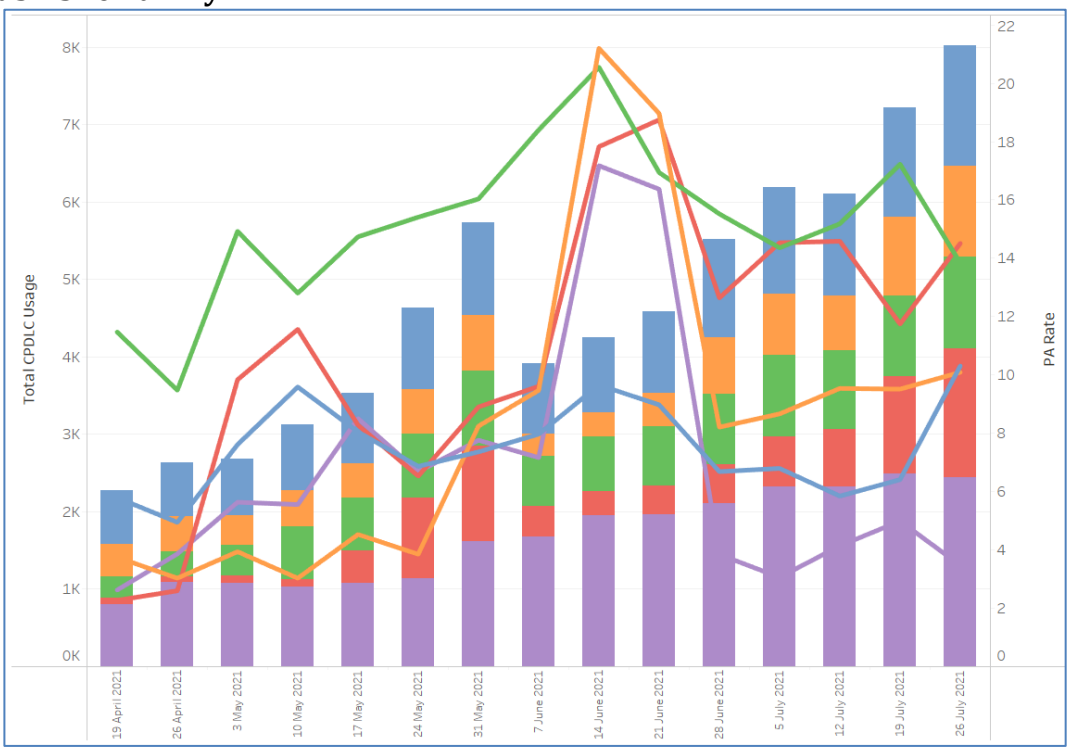



Figure 2-7: A320 Family (A318/319/320/321/20N/21N) Aircraft Operator PA Rates

### Boeing B737 Family

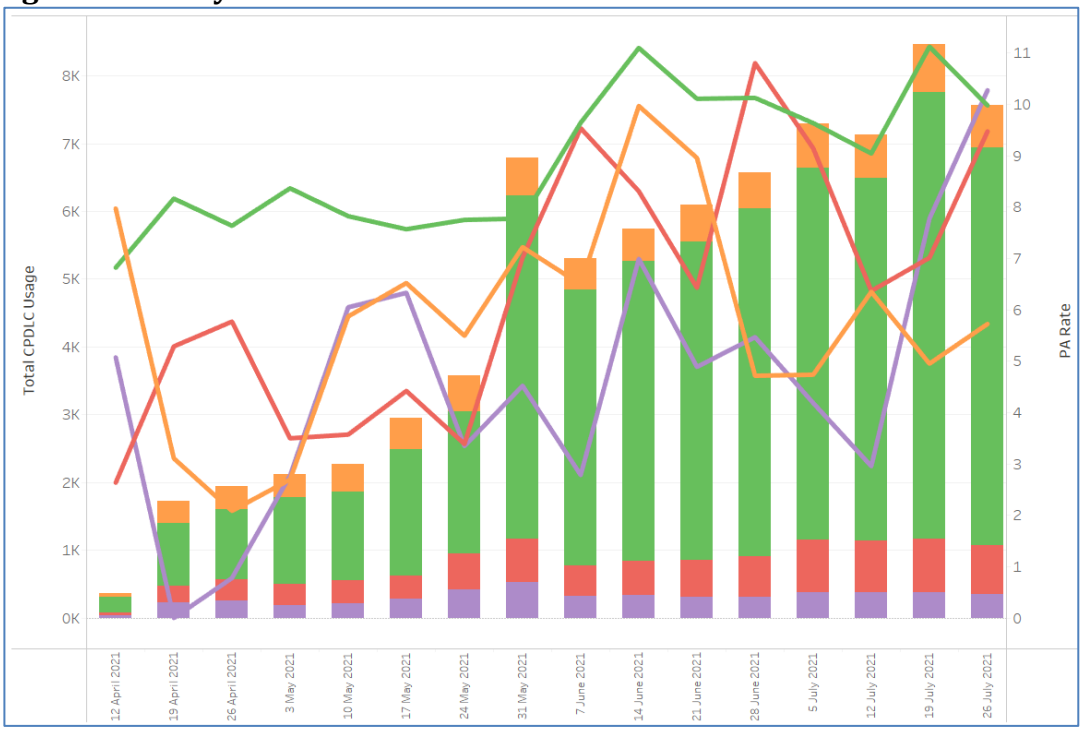



Figure 2-8: B737 Family Aircraft Operator PA Rates

## Technical Round Trip Delay

Figure 2-9 below shows the 95th and 99th percentiles of the technical round trip delay <O-2><O-3>. It represents the delay between when a message is uplinked and the ground system receives the corresponding application level acknowledgement (aggregated for all systems providing data to LISAT). As agreed during DPMG8, the TRTD is now computed taking into account downlinked ERROR messages. This has resulted in an increase of the 99th percentile value.

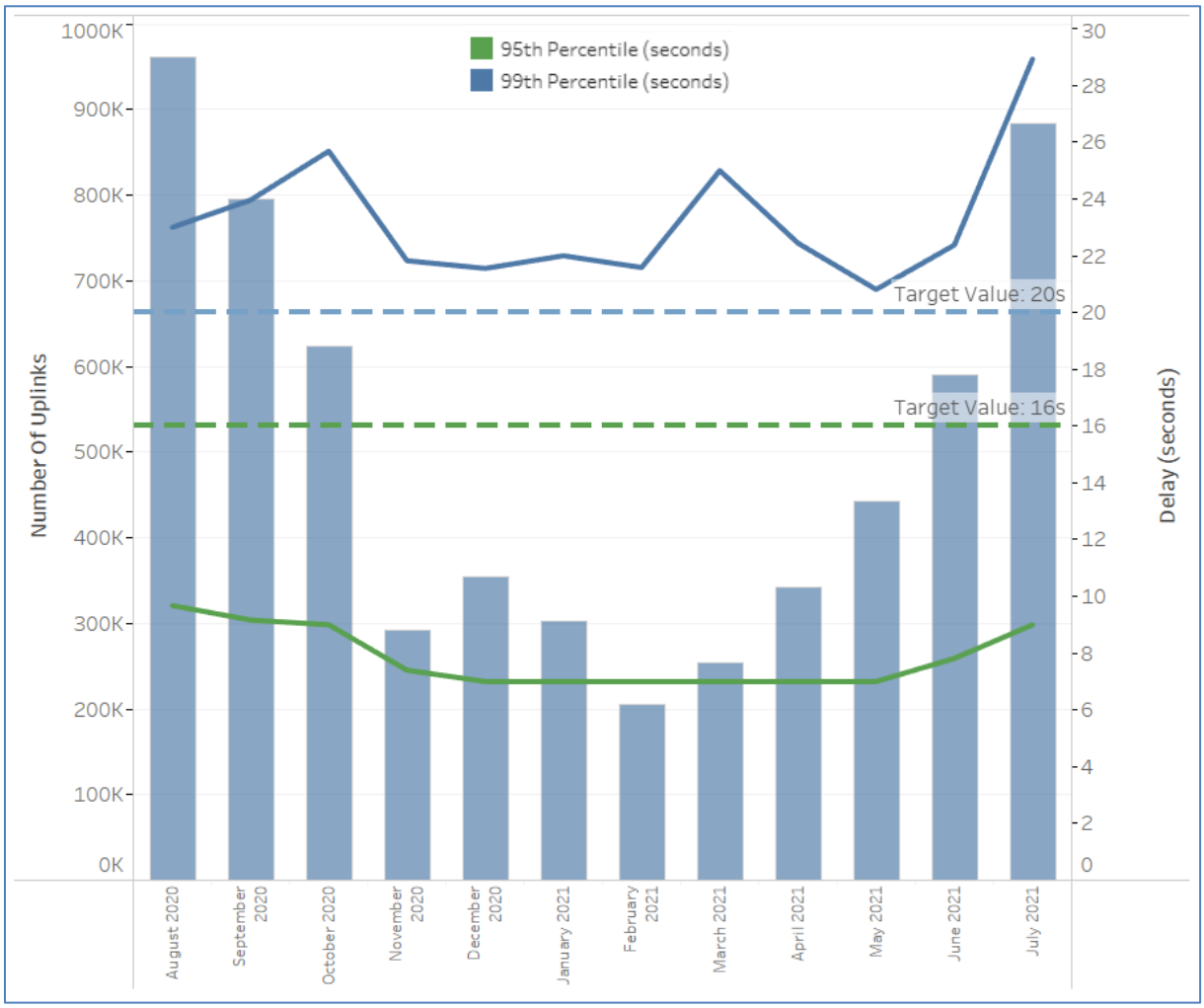



Figure 2-9: Technical Round Trip Delay

## Monthly 95th percentile of TRTD per Centre

| Atsu Code | August 2020 | September 2020 | October 2020 | November 2020 | December 2020 | January 2021 | February 2021 | March 2021 | April 2021 | May 2021 | June 2021 | July 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EDUU | 8.5 | 8.4 | 8.5 | 6.6 | 6.4 | 6.4 | 6.0 | 5.9 | 5.7 | 5.8 | 6.6 | 8.2 |
| EDYY | 9.7 | 9.6 | 8.9 | 6.5 | 6.6 | 6.1 | 6.1 | 6.1 | 6.6 | 6.0 | 6.9 | 8.3 |
| EGPX | 8.6 | 7.9 | 6.8 | 6.2 | 6.2 | 7.1 | 6.9 | 7.4 | 6.9 | 6.1 | 6.5 | 6.6 |
| EGTT | 9.3 | 8.8 | 6.7 | 6.0 | 5.9 | 5.6 | 5.5 | 5.7 | 6.0 | 5.6 | 5.8 | 6.7 |
| EKDK | | | | | 9.0 | 8.0 | 8.0 | 7.0 | 8.0 | 8.0 | 8.0 | |
| EPWW | 6.2 | 6.3 | 5.8 | 5.5 | 5.2 | 5.2 | 5.0 | 4.8 | 4.8 | 4.8 | 5.0 | 5.6 |
| EVRR | 7.0 | 9.0 | 8.0 | 9.0 | 8.0 | 8.0 | 10.0 | 11.0 | 9.0 | 9.0 | 11.0 | 9.0 |
| GCCC | 6.9 | 14.4 | 7.3 | 37.0 | 29.3 | 7.5 | 13.5 | 7.0 | 13.7 | 10.7 | 14.4 | 38.1 |
| LDZO | | | | | | | 7.0 | 7.0 | 8.0 | 9.0 | 10.0 | 12.0 |
| LECB | 8.3 | 7.6 | 7.2 | 6.8 | 6.8 | 7.0 | 7.5 | 8.8 | 7.6 | 7.8 | 8.3 | 9.3 |
| LECM | 7.2 | 6.7 | 6.8 | 7.0 | 6.7 | 6.8 | 6.7 | 7.4 | 7.0 | 6.4 | 6.6 | 7.1 |
| LFBB | 9.0 | 8.0 | 7.0 | 7.0 | 6.0 | 7.0 | 6.0 | 6.0 | 7.0 | 6.0 | 7.0 | |
| LFEE | 11.0 | 12.0 | 11.0 | 9.0 | 9.0 | 8.0 | 8.0 | 9.0 | 9.0 | 9.0 | 9.0 | |
| LFFF | 12.0 | 11.0 | 10.0 | 10.0 | 10.0 | 9.0 | 9.0 | 9.7 | 9.0 | 10.0 | 10.0 | |
| LFMM | 10.0 | 9.0 | 9.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 9.0 | |
| LFRR | 10.0 | 10.0 | 9.0 | 8.0 | 8.0 | 8.0 | 7.0 | 7.0 | 8.0 | 8.0 | 8.0 | |
| LJLA | 12.6 | 11.2 | 12.7 | 10.3 | 10.7 | 9.8 | 8.4 | 10.2 | 10.1 | 10.4 | 11.3 | 14.2 |
| LKAA | 10.0 | 10.0 | 10.0 | 9.0 | 8.0 | 8.0 | 8.0 | 8.0 | 7.0 | 7.0 | 8.0 | 9.0 |
| LRBB | | 7.2 | 7.0 | 6.6 | 6.3 | 5.9 | 6.1 | 6.2 | 6.2 | 6.2 | 6.9 | 7.7 |
| LSAG | 11.0 | 10.0 | 10.0 | 10.0 | 7.0 | 8.0 | 8.0 | 8.0 | 7.0 | 7.0 | 9.0 | 11.0 |
| LSAZ | 11.0 | 11.0 | 11.0 | 9.0 | 9.0 | 9.0 | 8.0 | 9.0 | 9.0 | 8.0 | 10.0 | 13.0 |

Figure 2-10: Monthly 95th percentile of TRTD per Centre

## Monthly 99th percentile of TRTD per Centre

| Atsu Code | August 2020 | September 2020 | October 2020 | November 2020 | December 2020 | January 2021 | February 2021 | March 2021 | April 2021 | May 2021 | June 2021 | July 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EDUU | 24.3 | 27.4 | 37.8 | 24.5 | 25.5 | 33.9 | 21.6 | 22.3 | 21.1 | 22.9 | 24.0 | 29.3 |
| EDYY | 30.7 | 37.3 | 37.1 | 22.0 | 23.2 | 21.5 | 23.7 | 47.4 | 45.2 | 21.3 | 22.2 | 23.6 |
| EGPX | 17.6 | 18.6 | 21.9 | 21.0 | 14.0 | 21.0 | 38.2 | 38.3 | 25.7 | 61.0 | 38.2 | 23.2 |
| EGTT | 23.9 | 23.8 | 20.9 | 21.1 | 20.9 | 20.3 | 21.0 | 26.8 | 38.7 | 21.6 | 21.0 | 21.4 |
| EKDK | | | | | 20.0 | 17.0 | 33.7 | 17.0 | 16.0 | 16.0 | 16.0 | |
| EPWW | 21.1 | 17.5 | 14.4 | 15.7 | 14.1 | 14.0 | 15.3 | 18.9 | 11.8 | 15.0 | 11.4 | 14.7 |
| EVRR | 17.0 | 24.3 | 17.0 | 24.2 | 16.0 | 21.0 | 38.0 | 39.2 | 28.9 | 37.0 | 37.0 | 37.0 |
| GCCC | 49.7 | 61.3 | 38.4 | 96.1 | 85.7 | 37.4 | 31.5 | 21.2 | 61.6 | 83.7 | 43.0 | 86.8 |
| LDZO | | | | | | | 15.0 | 17.0 | 19.0 | 22.0 | 26.0 | 32.0 |
| LECB | 25.0 | 23.9 | 37.0 | 29.8 | 37.3 | 34.2 | 38.3 | 61.3 | 31.0 | 37.1 | 27.2 | 34.5 |
| LECM | 37.8 | 37.4 | 37.6 | 38.1 | 38.0 | 39.1 | 40.1 | 61.2 | 43.8 | 38.9 | 37.2 | 36.8 |
| LFBB | 15.0 | 15.0 | 13.0 | 13.0 | 12.0 | 19.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | |
| LFEE | 21.0 | 23.0 | 20.0 | 16.0 | 17.0 | 15.0 | 15.0 | 16.2 | 18.0 | 16.0 | 17.0 | |
| LFFF | 22.0 | 21.0 | 20.0 | 16.0 | 18.0 | 16.0 | 17.0 | 17.0 | 16.0 | 17.0 | 16.1 | |
| LFMM | 19.0 | 17.0 | 17.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 16.0 | 15.0 | 17.0 | |
| LFRR | 18.0 | 18.0 | 16.0 | 15.0 | 15.0 | 15.0 | 14.0 | 14.0 | 15.0 | 14.0 | 14.0 | |
| LJLA | 37.4 | 36.4 | 46.0 | 32.4 | 39.4 | 37.0 | 20.1 | 49.5 | 36.2 | 37.7 | 38.3 | 46.1 |
| LKAA | 30.0 | 25.4 | 39.0 | 19.0 | 20.0 | 19.0 | 14.0 | 26.0 | 17.0 | 15.0 | 17.3 | 21.0 |
| LRBB | | 60.9 | 61.1 | 62.7 | 60.7 | 39.6 | 41.9 | 60.9 | 60.9 | 61.0 | 48.2 | 37.3 |
| LSAG | 32.0 | 32.5 | 29.0 | 30.0 | 21.0 | 31.0 | 26.0 | 20.0 | 19.0 | 15.0 | 24.0 | 31.0 |
| LSAZ | 31.0 | 31.0 | 36.0 | 24.0 | 31.6 | 24.0 | 26.0 | 32.0 | 17.0 | 20.0 | 25.0 | 39.0 |

Figure 2-11: Monthly 99th percentile of TRTD per Centre

## Technical Continuity

The graph below shows the 'Technical Continuity" (<0-25>). This is the probability that a LACK is received for an uplink message before the technical response timer expires i.e. within 40 seconds.

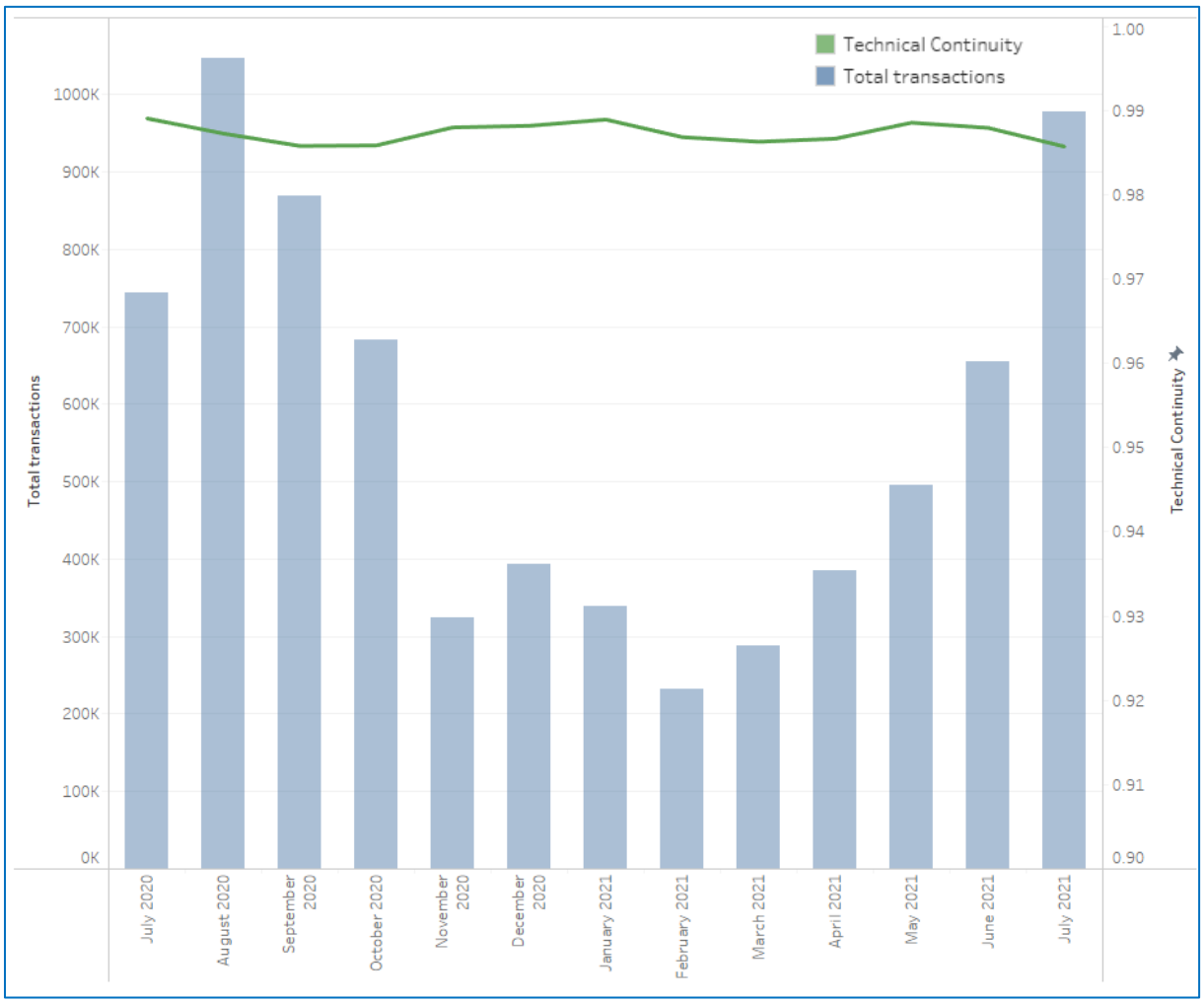



Figure 2-12: Technical Continuity

N.B.: An issue in LISAT computation led to abnormal Technical Continuity values during the March-June 2020 period as reported previously. Work is still ongoing to improve the situation. The Technical Continuity is currently displayed only for information purposes and may still change from a report to another.

# 3. VDL Mode 2 Performance

The following metrics[5] are computed based on the available data from the VGS logs provided each month to the DPMF by ARINC and SITA. These logs contain the AVLC traffic recorded at each VGS during the 24hrs of the first Friday[6] of each month.

Important note: As from April 2021, ARINC and SITA are providing logs for all their users and covering all the European Datalink airspace. ENAV is currently evaluating how to provide logs. Before April 2021 SITA was providing logs for all their users whereas ARINC is only providing data for their 28 largest ATN users as well as non-AOC users. Moreover, ARINC was providing logs for all their European VGSs whereas SITA is only providing logs of VGSs from which they can share the logs. Therefore the CSPs data was not represent the behaviour of their network as a whole. The trend information for each CSP was valuable and useful but the comparison between the two CSPs was problematic since different data sets were being compared.

## AVLC Round Trip Time for the first Friday of the month.

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 to Logon-List aircraft and considering all the VGS logs. The 95$^{th}$ and the 99$^{th}$ percentile of ED-120 together with the 95$^{th}$ and the 99.9$^{th}$ percentile of ED-228A are also provided for comparison purposes and tabulated values are reported in the legend. Please note the logarithmic scale of the RTT.

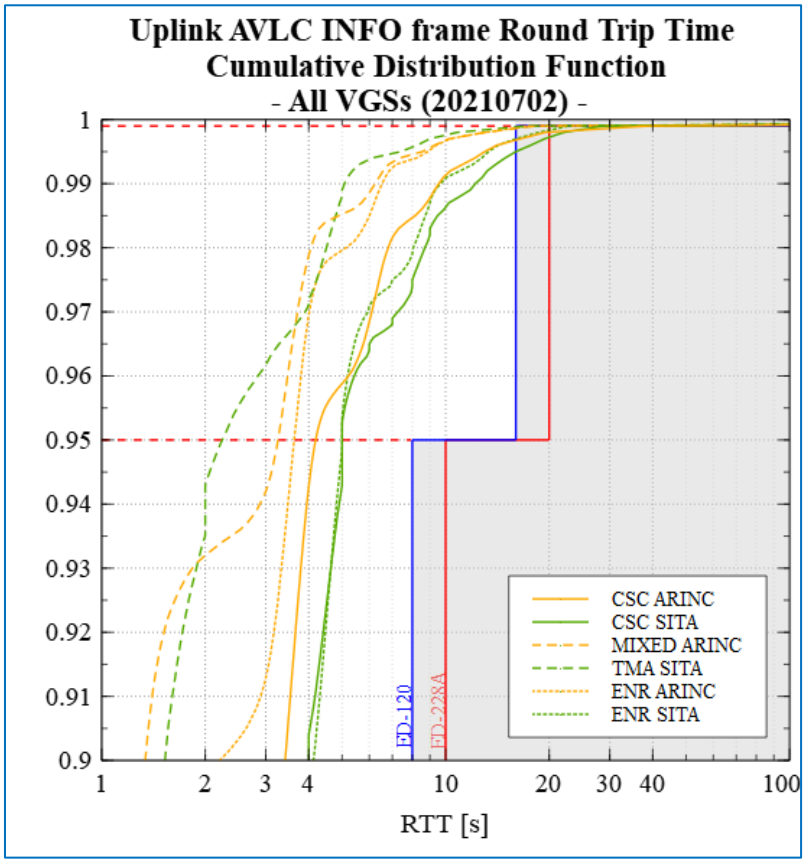



Figure 3-1: AVLC Round Trip Time

[5] The *Channel load*, the *AVLC RTT distribution* and the *number of retransmission distribution* are defined in the DPMF report catalogue.

[6] Friday is observed to have the highest flight traffic of the week.

### Number of retransmissions for the first Friday of the month.

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 to Logon-List aircraft 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.

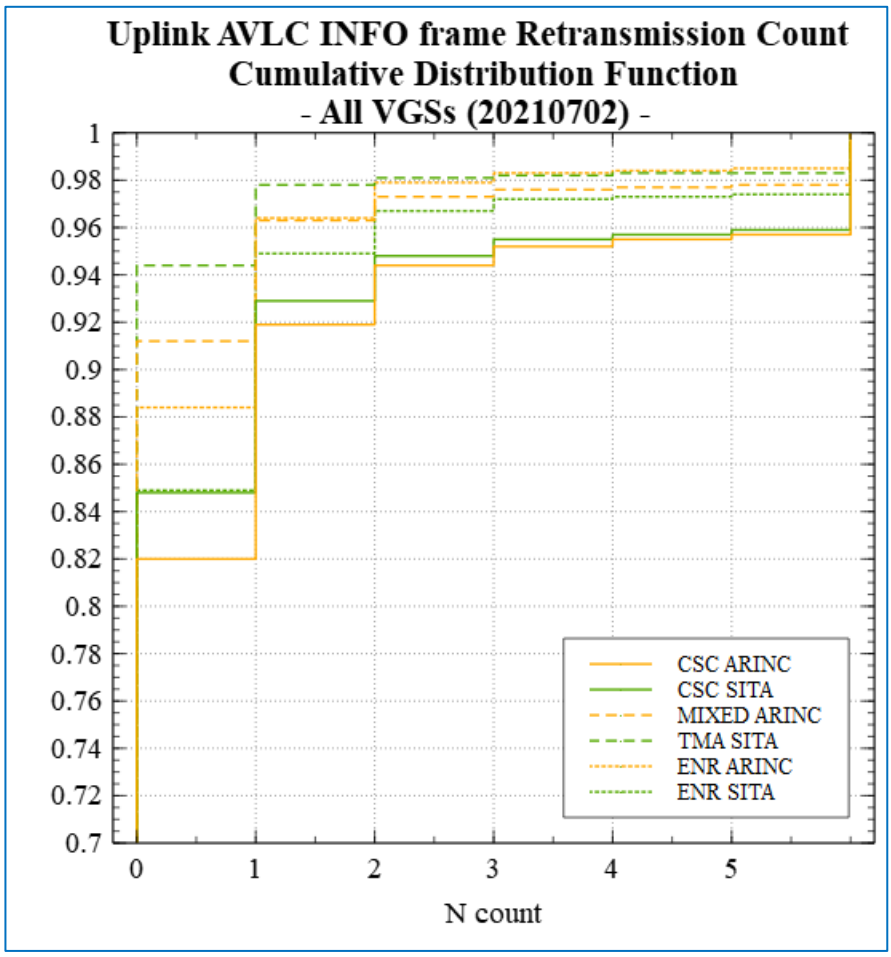



Figure 3-2: AVLC Uplink INFO frame retransmission count

## AVLC Round Trip Time per frequency trend

The following set of graphs show the 95th and the 99th percentile of the AVLC RTT (in seconds) of acknowledged AVLC INFO frames conveying ATN packet to Logon-List aircraft for the first Friday of each month 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).

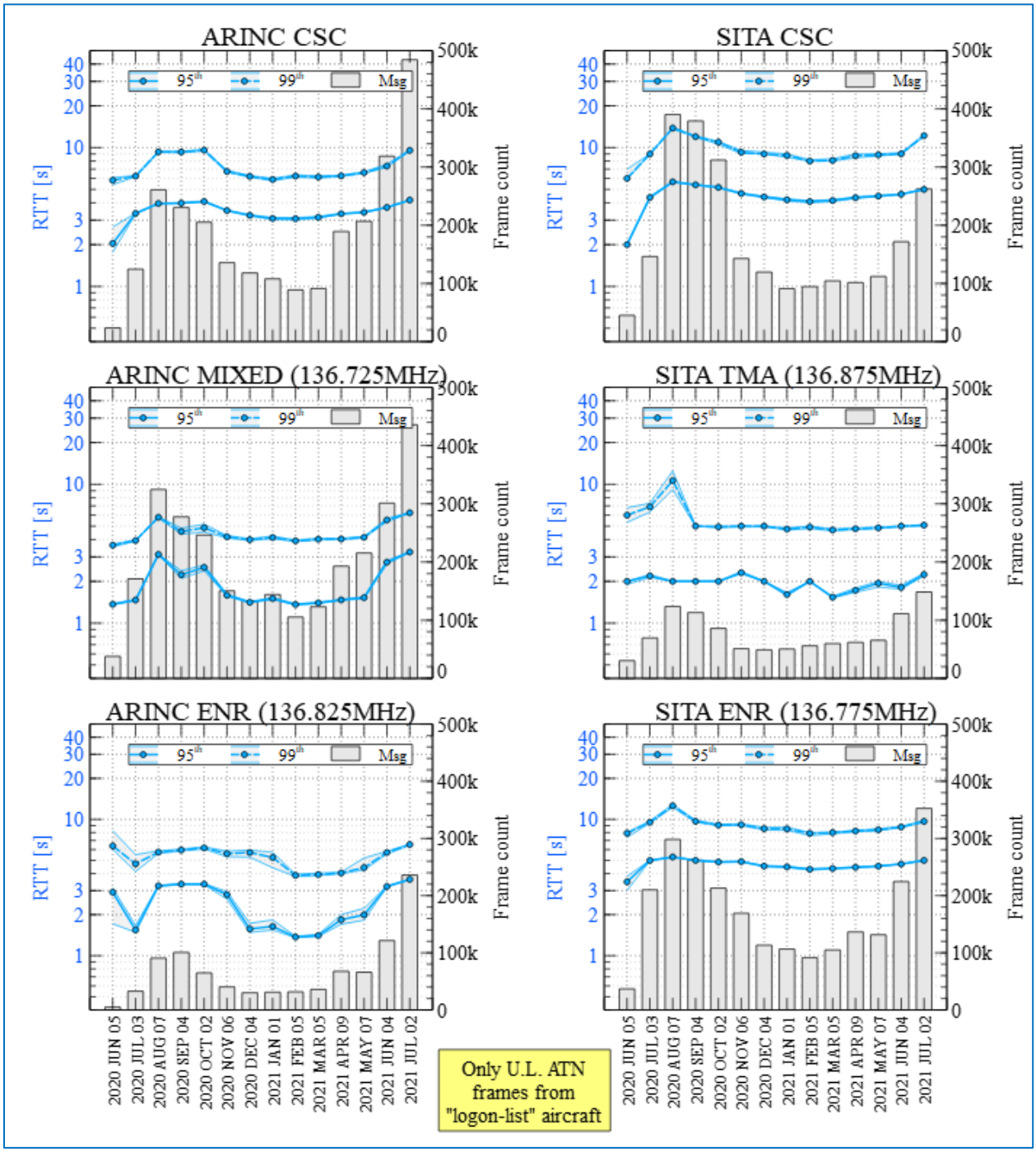



Figure 3-3: AVLC Uplink INFO Round Trip Time per Frequency

## Uplink delivery success rate

The following set of graphs show the uplink delivery rate of AVLC INFO frames conveying ATN packet to Logon-List aircraft for the first Friday of each month 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 shows 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).

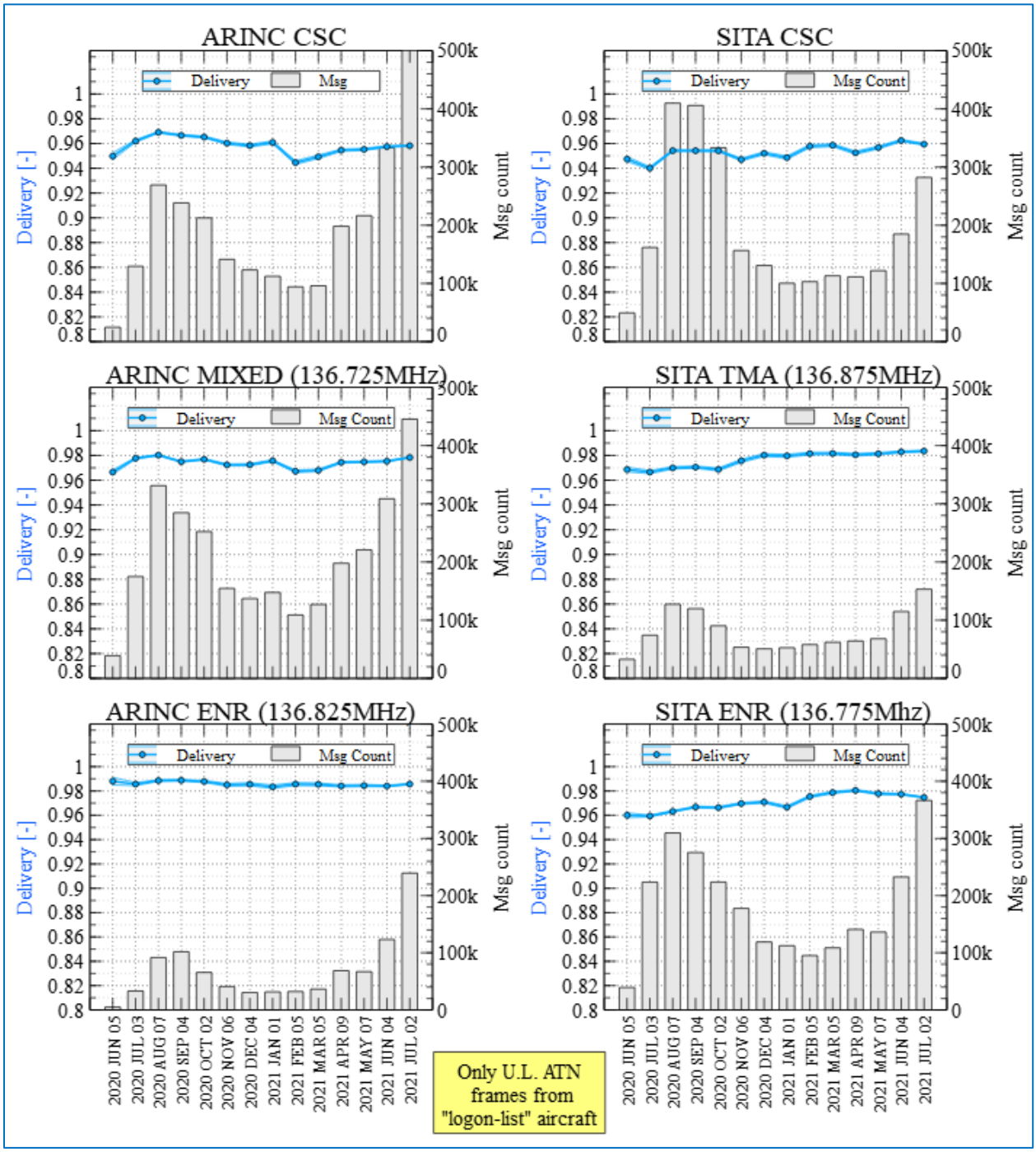



Figure 3-4: AVLC successful delivery rate per frequency

## Channel load per frequency trend

The following set of graphs show the channel load per AVLC payload type (ATN, AOA and AVLC protocol related frames[7]) for the first Friday of each month for each frequency with the CSC split over the two CSPs. The channel load is expressed in megabytes with the same range for the different frequencies.

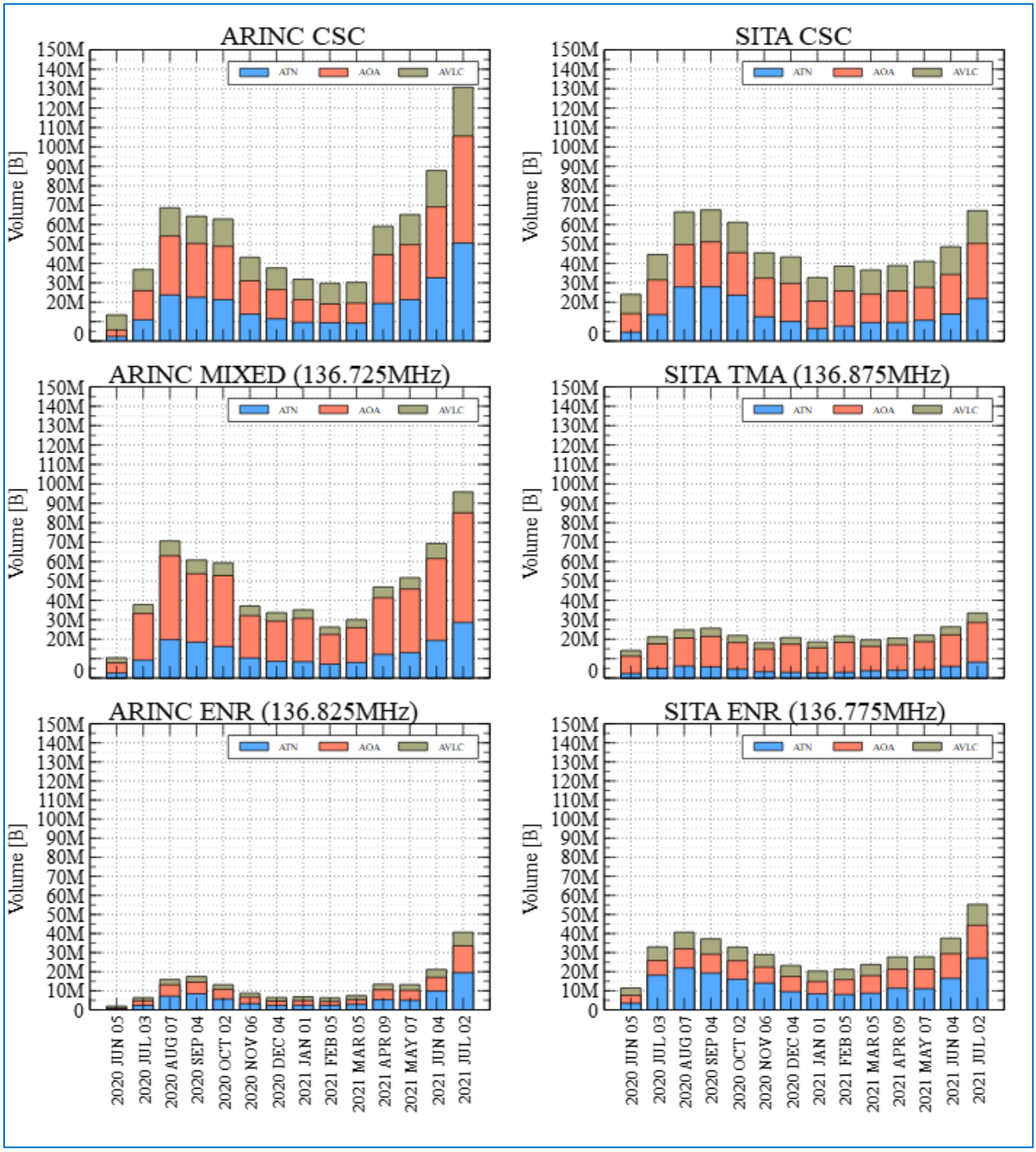



Figure 3-5: AVLC Channel load per frequency

[7] i.e. RR, SREJ, XID, …

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