Network Manager
nominated by
the European Commission

EUROCONTROL

Data link Network Operational Status Report

May 2019

This report is the '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.

A definition of the metrics used in this report is available in the DPMF Report Catalogue, the identifier for each metric is shown in angled brackets e.g. <N-1>.

The DPMF have started receiving LISAT data from DSNA but this data is being validated and so has not been used in the generation of the metrics presented in this report.

Operational Status

Figure 1 on the following page provides a status and performance summary for each FIR/UIR. The shading indicates whether CPDLC over the ATN is currently operational in that airspace (<N-4>). The light green shade represents areas where data link is provided but not in full compliance with the 2015/310 regulation. The five-line block of data provides the following information:

- **Line 1:** ICAO Ident and the date the service went operational. The planned dates are available from the data link services web site.
- **Line 2: Average PA:** The average PA rate in the FIR/UIR expressed as the number of PAs suffered per 100 hours CPDLC. <O-23>. A trend indicator shows whether the rate is increasing or decreasing since last month.
- **Line 3**: **CL**. Channel load for the following frequencies: 136.975 MHz /136.875 MHz /136.825 MHz /136.775 MHz /136.725M Hz. <KPI_PHY_01>
- **Line 4**: **Freq PA**: The average PA rate for the following frequencies: 136.975 MHz /136.875 MHz /136.825 MHz /136.775 MHz /136.725M Hz. <O-23>
- **Line 5: Flt.** The first figure is the total number of flights during the month of the report, the second figure is the percentage of those flights for which the flight plan declared the flight capable of performing CPDLC over the ATN (i.e. filed 'J1')<N-1>, and the third figure is the percentage of the flights that are observed to use CPDLC over the ATN <N-2>. A trend indicator shows whether the percentage of flights actually using CPDLC is increasing or decreasing since last month

CPDLC Operational Status - May 2019

Label explanantion

ICAO ID : in-service date

Average PA : Average number of PAs per 100 hours CPDLC in the FIR/UIR

CL : Channel load for 136.975 / 136.875 / 136.825 / 136.775 / 136.725

Freq PA : The average PA rate per channel : 136.975 / 136.875 / 136.825 / 136.775 / 136.725

Flt : Total flights / Percentage of flights capable of CPDLC over ATN / Percentage of flights using CPDLC over the ATN

Operational

Data link provided but not in compliance with EU 2015/310

Not yet operational

EUROCONTROL

ENOR:
Average PA:
CL: ////
Freq PA: ////
Flt: 49k/43.5/

EFIN: Dec-18
Average PA:
CL: ////
Freq PA: ////
Flt: 17k/40.9/

EGPX: Oct-13
Average PA: 5 ↘
CL: ////
Freq PA: ////
Flt: 93k/27.4/6 =

ESOS+ESMM: Apr-15
Average PA: ?
CL: ////
Freq PA: ////
Flt: 66k/44.3/

EETT: Jun-18
Average PA: ?
CL: ////
Freq PA: ////
Flt: 20k/42.9/

EVRR:
Average PA:
CL: ////
Freq PA: ////
Flt: 27k/44.2/

EKDK: Apr-15
Average PA: ?
CL: ////
Freq PA: ////
Flt: 51k/41.7/

EYVC:
Average PA:
CL: ////
Freq PA: ////
Flt: 23k/42.7/

EISN: Jun-14
Average PA: ?
CL: ////
Freq PA: ////
Flt: 59k/24.3/

EGTT: Oct-13
Average PA: 3 ↘
CL: ////
Freq PA: ////
Flt: 203k/30.8/13 ↘

EDYY: Jan-03
Average PA: 4 ↘
CL: ////
Freq PA: ////
Flt: 165k/32.4/18 ↘

EPWW: May-18
Average PA:
CL: ////
Freq PA: ////
Flt: 76k/33.1/

EDUU: Jun-14
Average PA: 4 ↘
CL: ////
Freq PA: ////
Flt: 281k/35.2/10 ↘

LKAA: Feb-17
Average PA: 4 ↘
CL: ////
Freq PA: ////
Flt: 74k/35.4/17 ↘

LZBB:
Average PA:
CL: ////
Freq PA: ////
Flt: 46k/33/

LFEE: May-16
Average PA: ?
CL: ////
Freq PA: ////
Flt: 95k/33.9/

LOVV: Oct-14
Average PA: ?
CL: ////
Freq PA: ////
Flt: 88k/36.3/

LHCC: Nov-15
Average PA: ?
CL: ////
Freq PA: ////
Flt: 72k/32.7/

LFFF: May-16
Average PA: ?
CL: ////
Freq PA: ////
Flt: 111k/38.7/

LSAG + LSAZ: Dec-12
Average PA: 4 ↗
CL: ////
Freq PA: ////
Flt: 77k/45.3/18 ↗

LJLA: Jan-19
Average PA:
CL: ////
Freq PA: ////
Flt: 38k/32.8/

LRBB:
Average PA:
CL: ////
Freq PA: ////
Flt: 60k/30.8/

LFRR: Apr-19
Average PA: ?
CL: ////
Freq PA: ////
Flt: 104k/29.5/

LFBB: Mar-19
Average PA: ?
CL: ////
Freq PA: ////
Flt: 91k/33.6/

LIMM: ??-18
Average PA: ?
CL: ////
Freq PA: ////
Flt: 83k/31.7/

LDZO: Mar-17
Average PA: ?
CL: ////
Freq PA: ////
Flt: 65k/32.7/

LBSR:
Average PA:
CL: ////
Freq PA: ////
Flt: 71k/37.7/

LPPC:
Average PA:
CL: ////
Freq PA: ////
Flt: 50k/22/

LECM: Oct-18
Average PA: ?
CL: ////
Freq PA: ////
Flt: 115k/24.1/

LFMM: May-16
Average PA: ?
CL: ////
Freq PA: ////
Flt: 108k/32.1/

LECB: Oct-18
Average PA: ?
CL: ////
Freq PA: ////
Flt: 93k/25.4/

LIBB: Nov-16
Average PA: ?
CL: ////
Freq PA: ////
Flt: 30k/25.9/

LIRR: ??-18
Average PA: ?
CL: ////
Freq PA: ////
Flt: 81k/26.9/

LGGG:
Average PA:
CL: ////
Freq PA: ////
Flt: 77k/27.5/

LCCC:
Average PA:
CL: ////
Freq PA: ////
Flt: 34k/34.4/

LMMM:
Average PA:
CL: ////
Freq PA: ////
Flt: 11k/21.2/

GCCC: Oct-18
Average PA: ?
CL: ////
Freq PA: ////
Flt: 27k/16.1/

Figure 1: Current operational status of CPDLC over the ATN

CPDLC / ATN Flights

Figure 2 below shows the monthly number of flights arriving at a European airport that indicate the capability to perform CPDLC over ATN VDL Mode 2 in their flight plan (i.e. include 'J1') as well as the total number of flights <N-1>. For April 2019 30.8% of flights indicated the capability to perform CPDLC over ATN/VDL Mode 2. The data for May is not yet available.

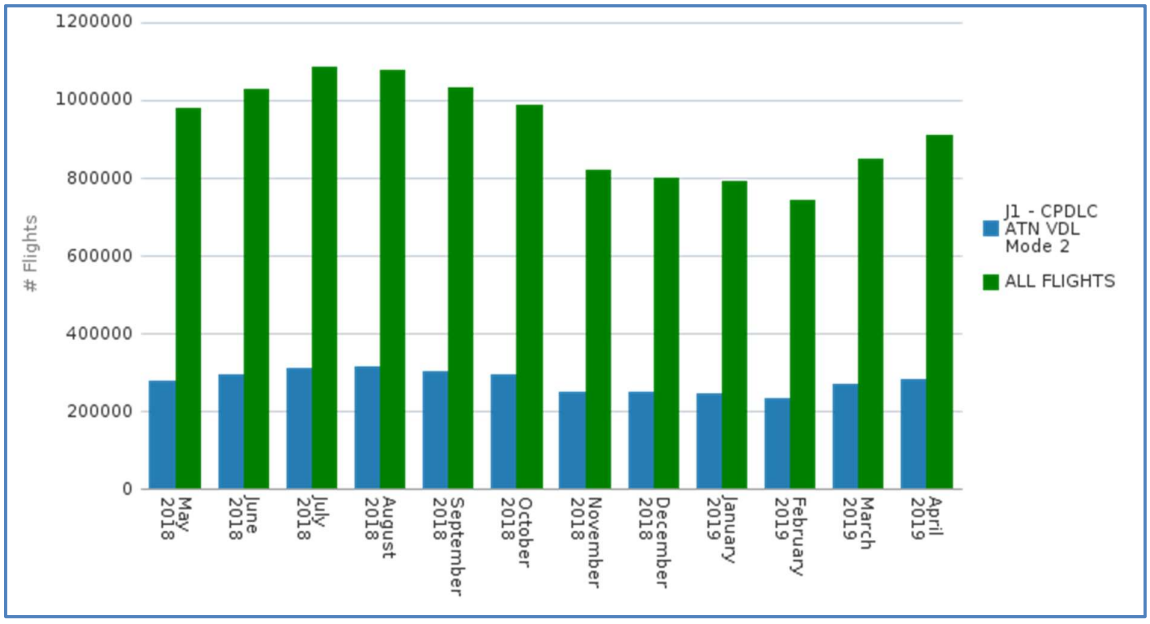

Figure 2: Proportion of flights capable of using CPDLC over ATN/ VDL Mode 2

Technical Performance

Overall Provider Abort Rate

Figure 3 below shows the PA rate <O-23> aggregated for all ANSPs providing data to LISAT[1]. The target value is 1 PA per 100 hours CPDLC (shown as a dashed line on the graph below). The overall average rate for May 2019 was 3.9 PAs per 100 hours.

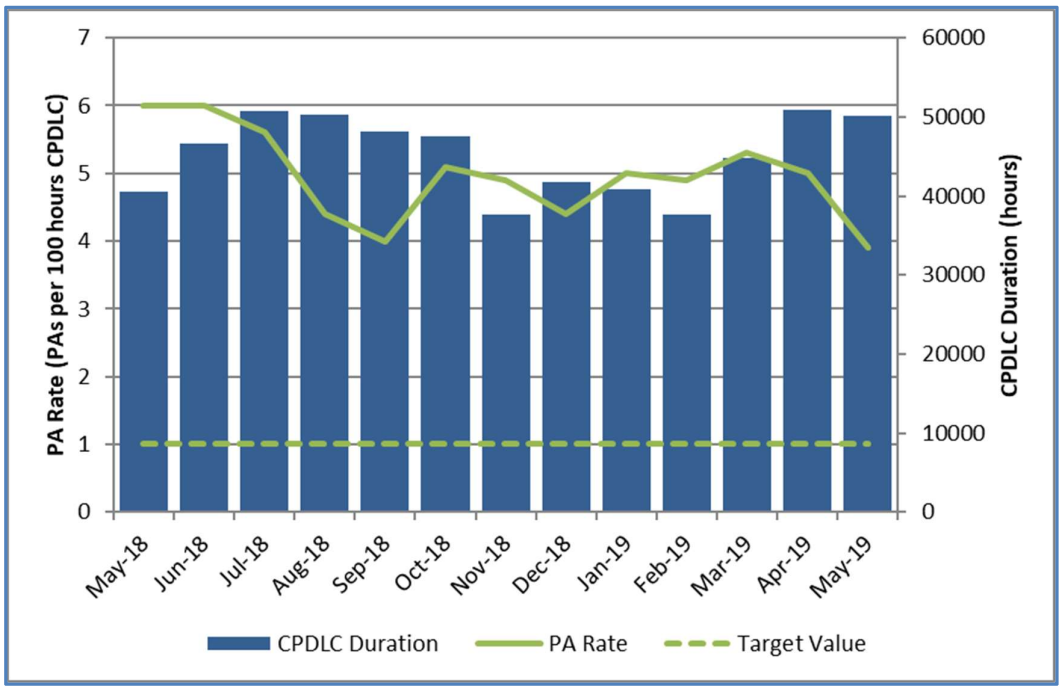

Figure 3: PA rate

This is the lowest monthly PA rate observed to date and would appear to be as a result of a significant reduction in the PA rate of SITA aircraft, as illustrated in the Figure 4 below which shows the PA rate by ACSP for aircraft on the white list. SITA implemented a change in their CVME in May and reported significant improvements in channel load, frequency management etc.

[1] Currently MUAC, Skyguide, DFS, NATS and ANS CZ. Data from DSNA is being validated.

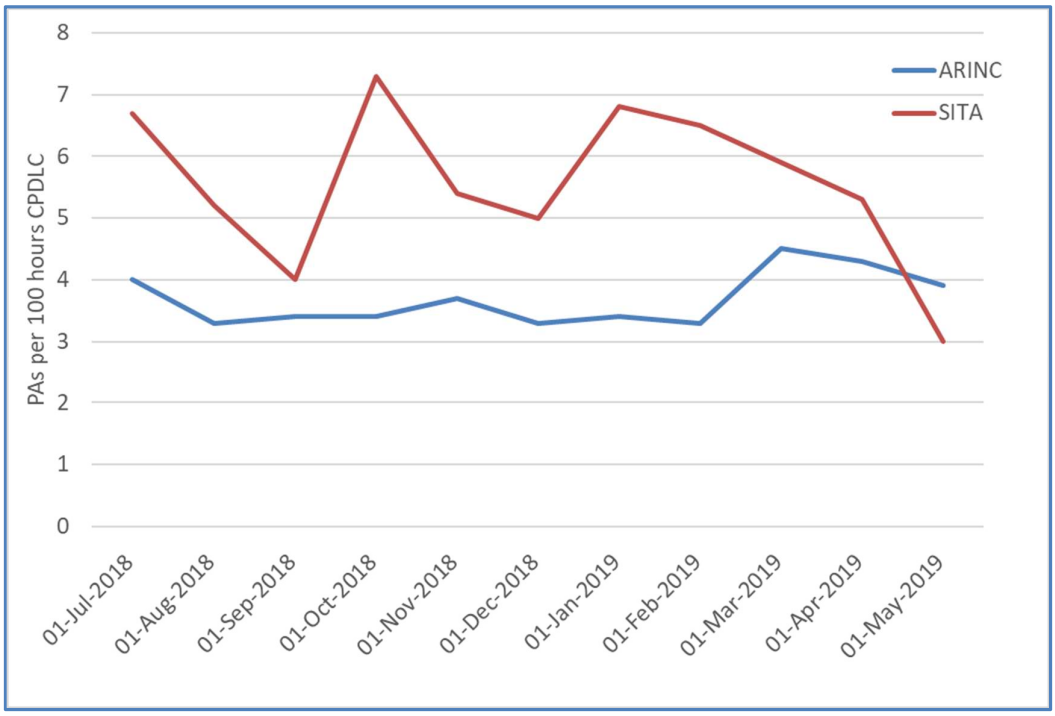

Figure 4: PA rate per CSP for white listed aircraft

Recent Weekly PA rate per Centre

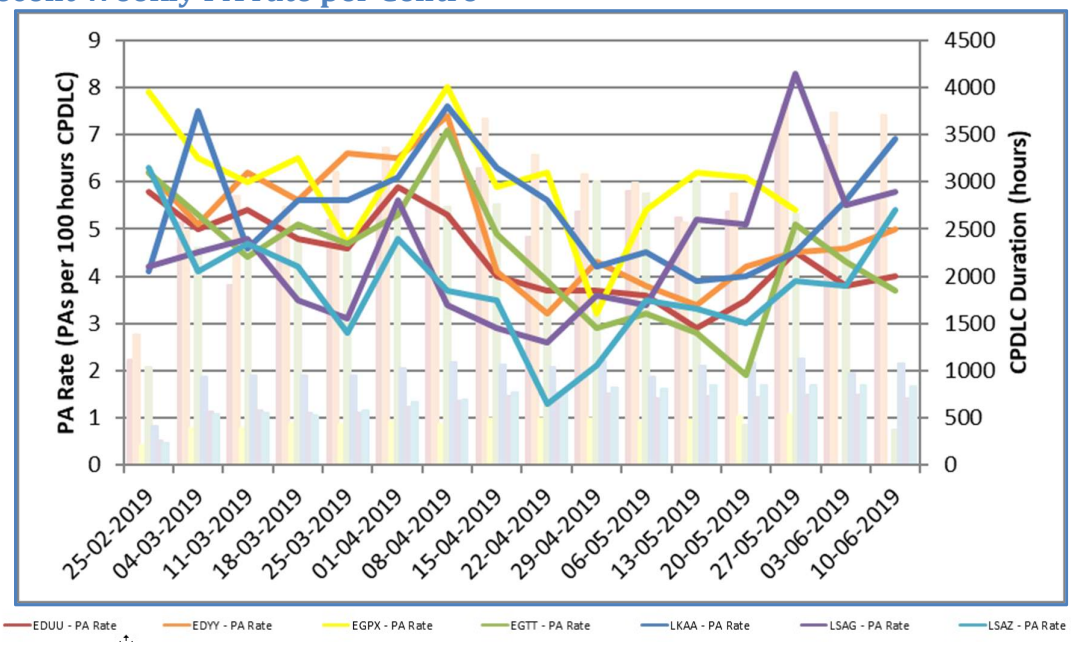

Figure 5: Weekly PA Rate per Centre

Weekly PA Rate for Major Aircraft Operators

Figure 6 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.

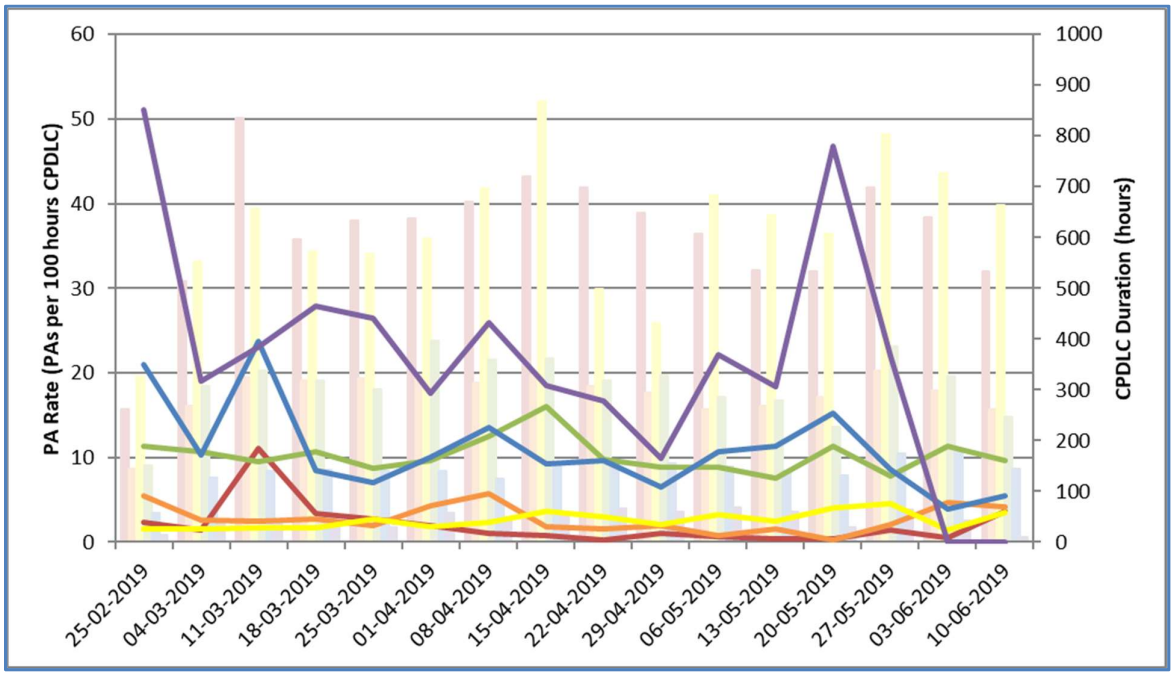

Figure 6: Top 3 and bottom 3 PA Rate for Major Aircraft Operators

Weekly PA Rate for 5 biggest users

Figure 7 below shows the weekly PA rate for the five aircraft operators that have used CPDLC most over the past 15 weeks.

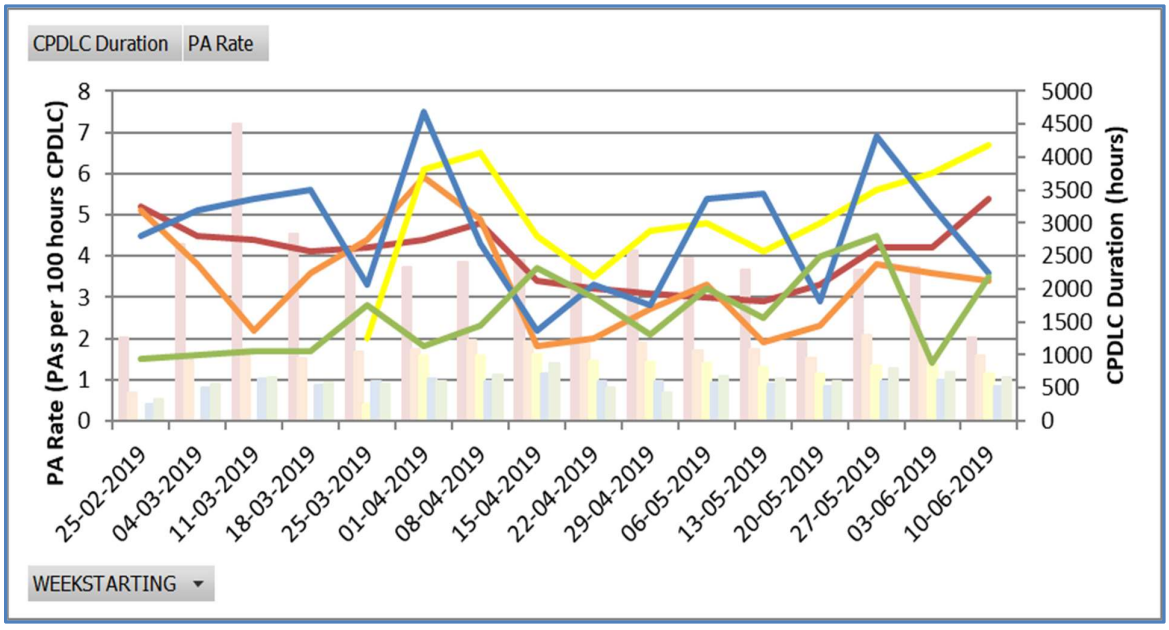

Figure 7: PA Rate of the 5 biggest users of CPDLC

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

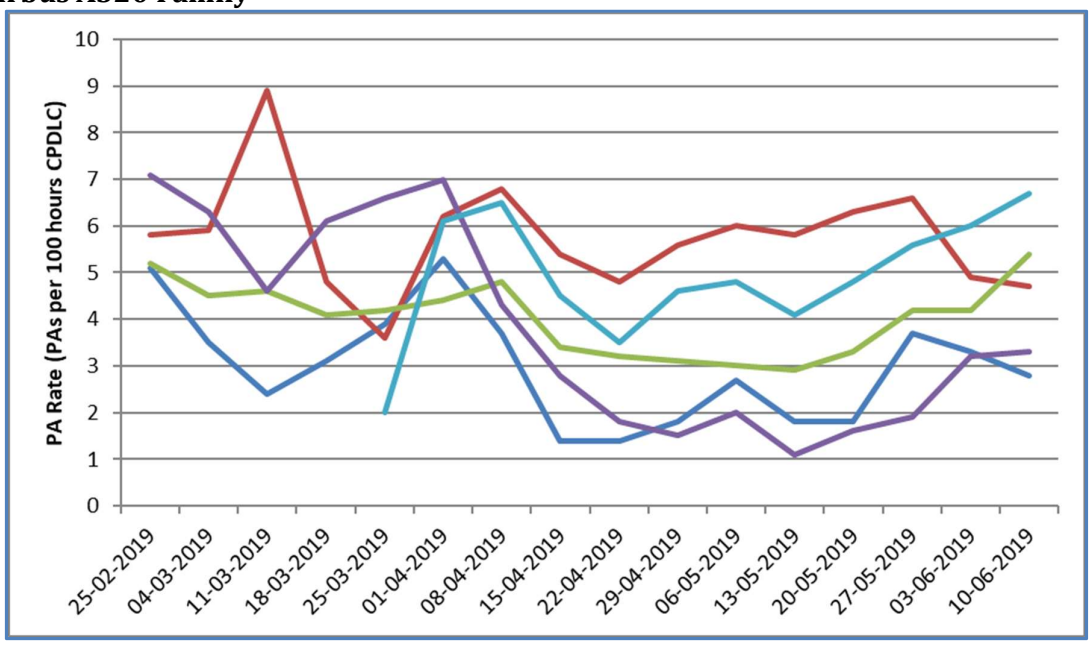

Figure 8: A320 Family (A318/319/320/321/20N/21N) Aircraft Operator PA Rates

Boeing B737 Family

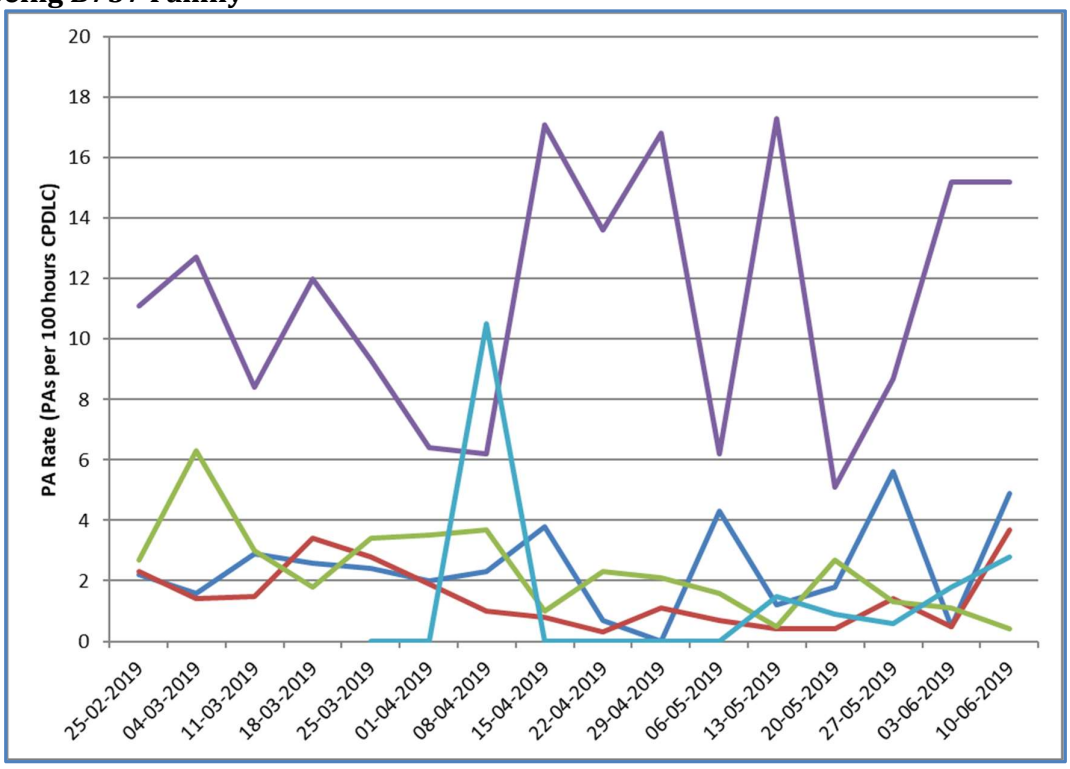

Figure 9: B737 Family Aircraft Operator PA Rates

The purple line is an operator that has reported that in several of its B737 fleet the radios had reverted back to an older version (that are known to not perform well) – they are in the process of updating these radios.

Technical Round Trip Delay

Figure 10 below shows the 95th and 99th percentile of the technical round trip delay <0-2><0-3>. 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).

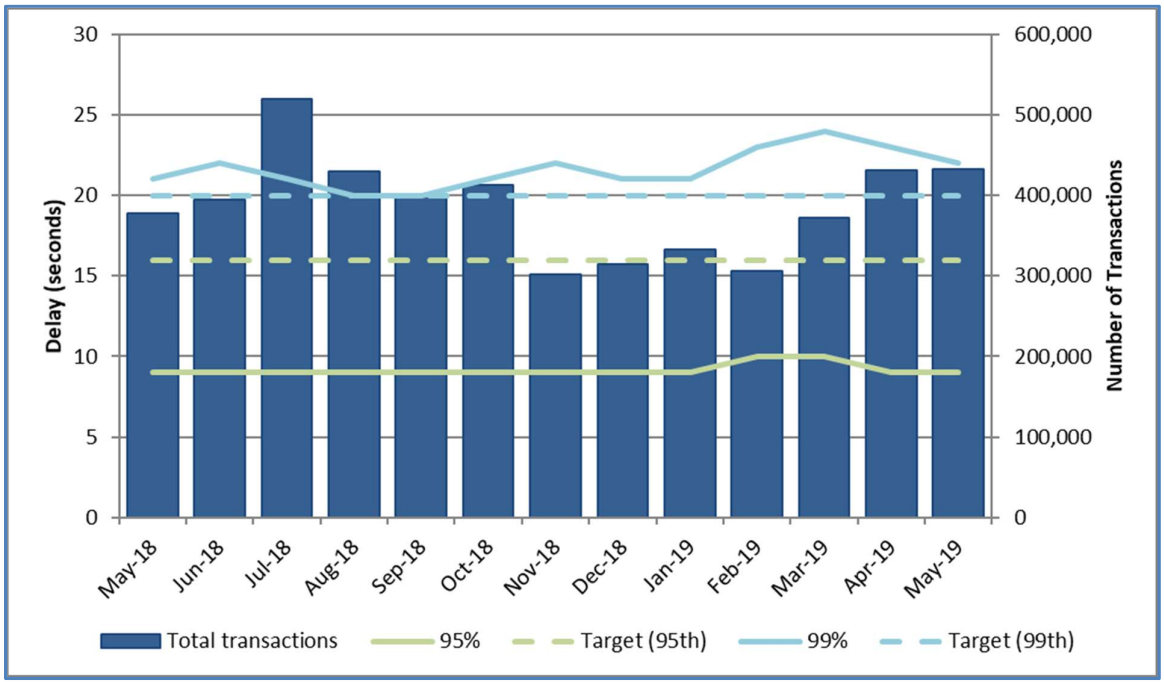

Figure 10: Technical Round Trip Delay

Technical Continuity

The graph below shows a new metric measuring 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.

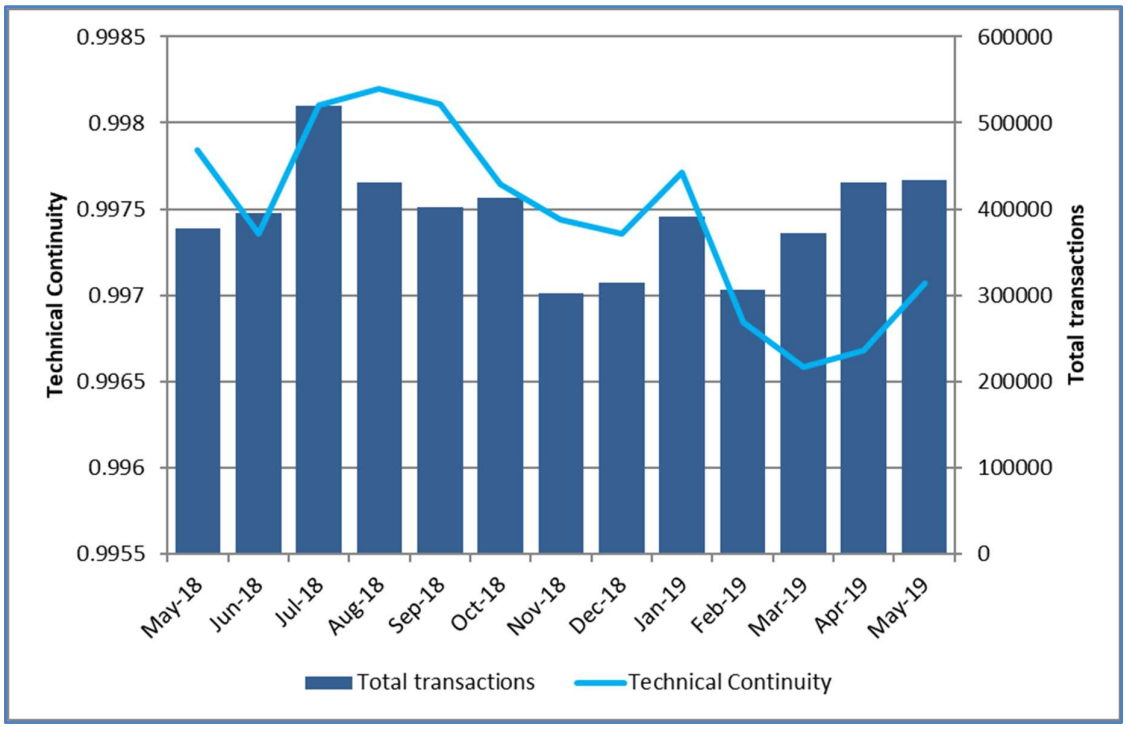

Figure 11: Technical Continuity

VDL Mode 2 Performance

The following metrics[2] 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[3] of each month since May 2018.

Important note: SITA is providing logs for all their users whereas ARINC is only providing data for their 3 largest ATN users (SAS, EZY, DLH group) and therefore the ARINC data does not represent the behaviour of their network as a whole. The trend information for each CSP is valuable and useful but the comparison between the two CSPs is problematic since different data sets are 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) considering all the VGS logs. The 95th and the 99th percentile of ED-120 together with the 95th and the 99.9th 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.

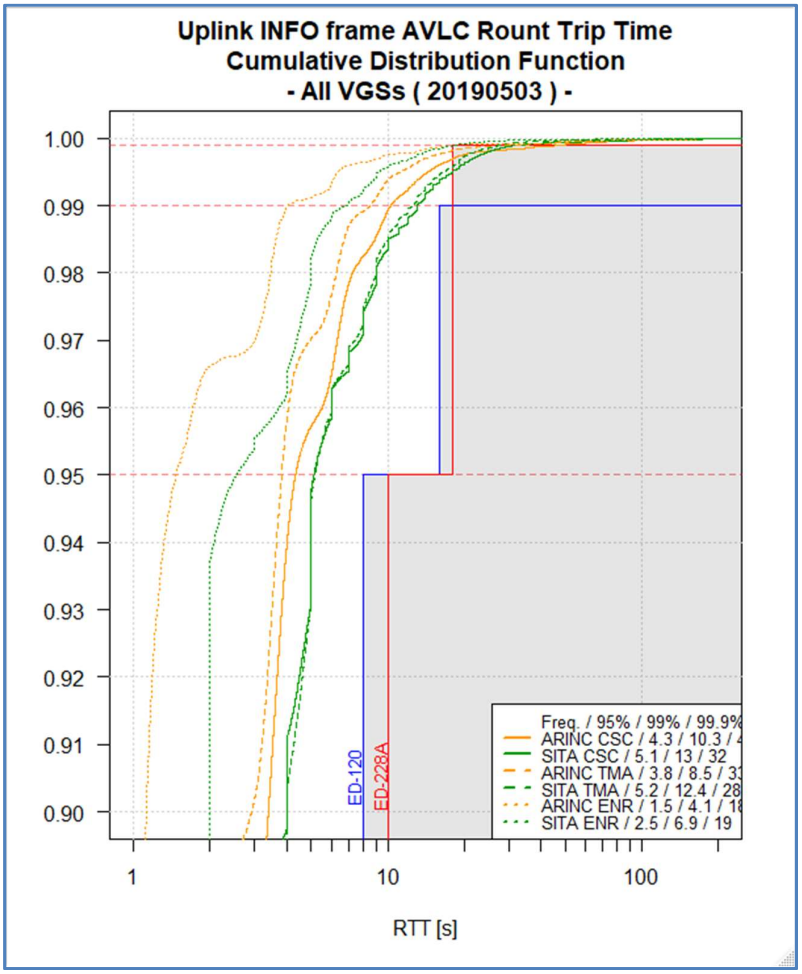

Figure 12: AVLC Round Trip Time

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

[3] 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 considering all the VGS logs. N=0 represents the first attempt, N=1 to N=5 represent the first to the fifth retransmissions and N>5 aggregates all the retransmissions greater than 5.

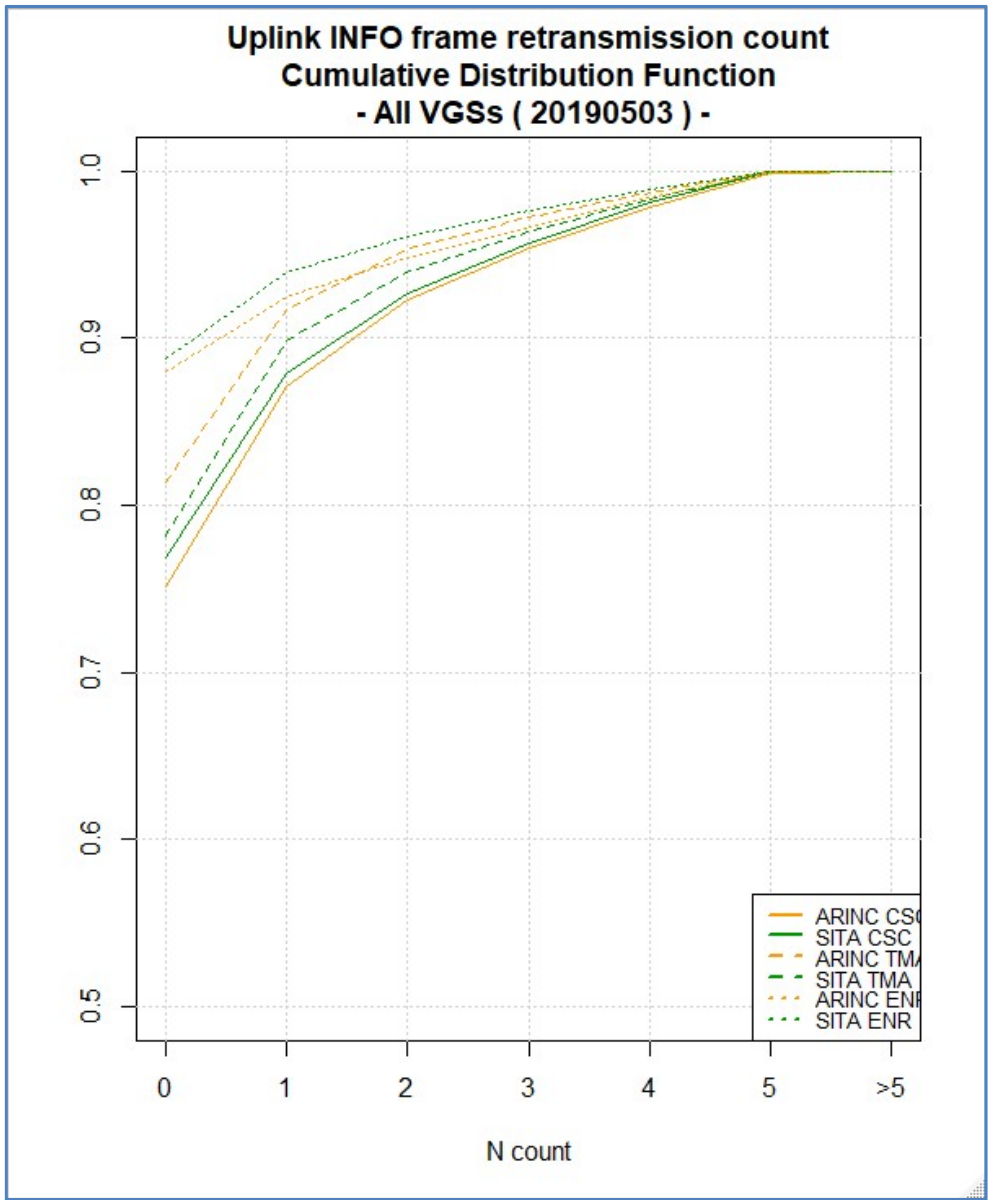

Figure 13: AVLC Uplink INFO frame retransmission count

AVLC Round Trip Time per frequency trend

The following set of graphs show the 50th, 95th, 99th and 99.9th percentile of the AVLC RTT (in seconds)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.

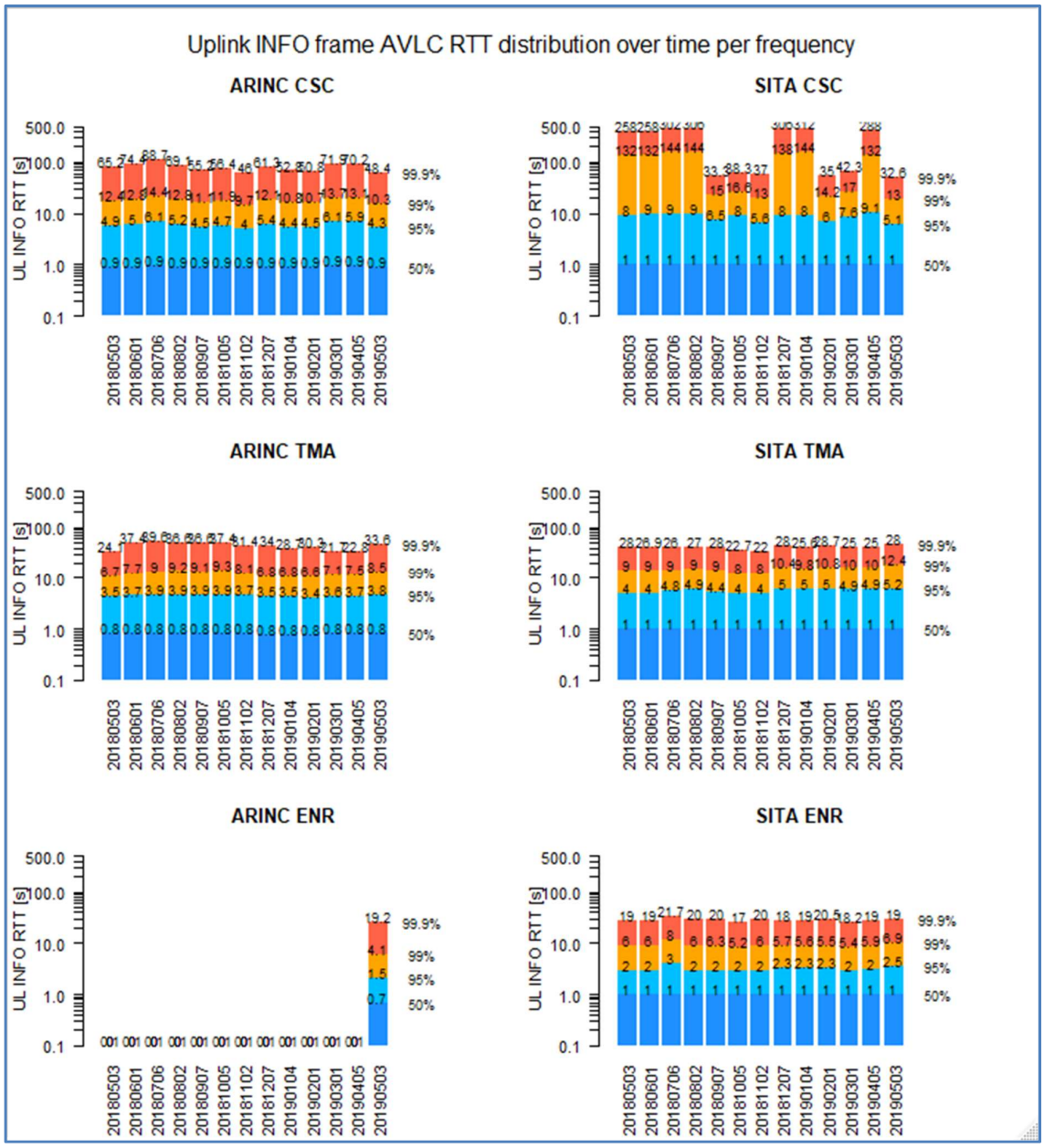

Figure 14: AVLC Uplink INFO Round Trip Time per Frequency

Retransmissions per frequency trend

The following set of graphs show the distribution of the number of retransmissions for the first Friday of each month for each frequency with the CSC is split over the two CSPs. The vertical axis shows the number of AVLC uplink INFO frames considered with the same range for the different frequencies. N=0 represents the first attempt, N=1 to N=5 represent the first and fifth retransmissions and N>5 aggregates all the retransmissions greater than 5.

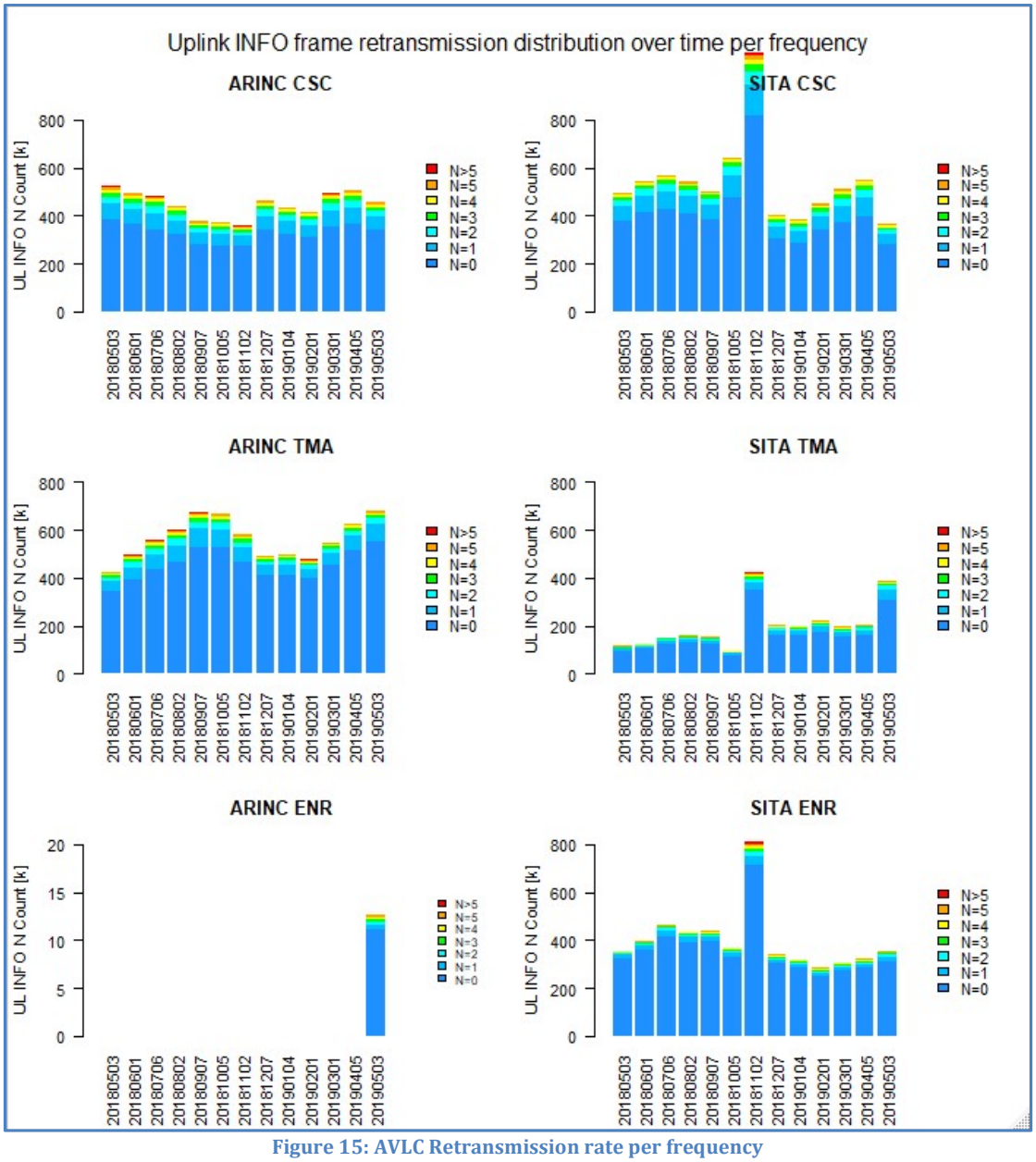

Figure 15: AVLC Retransmission rate per frequency

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[4]) 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.

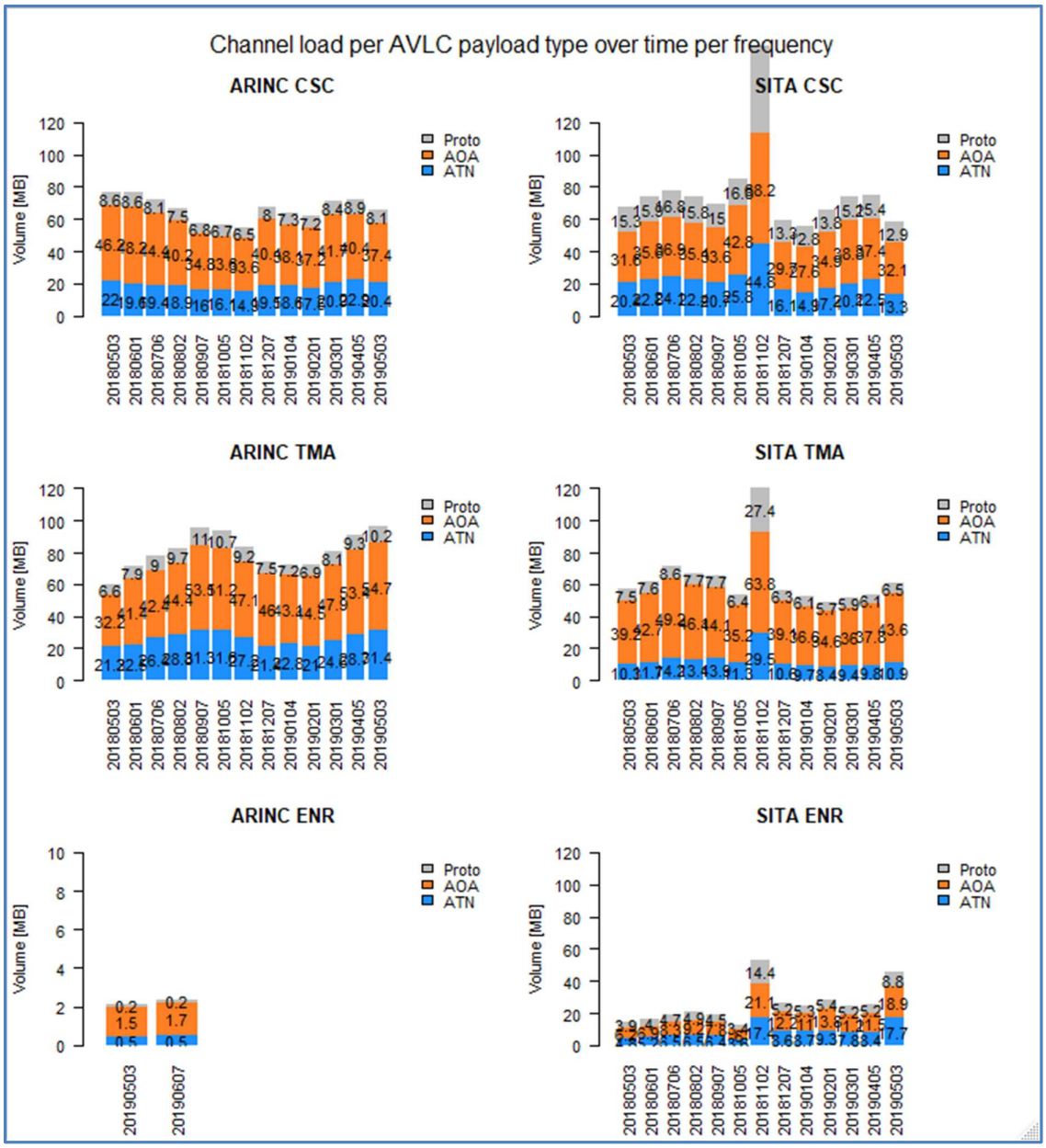

Figure 16: AVLC Channel load per frequency

[4] i.e. RR, SREJ, XID, …