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EUROCONTROL

Data link Network Operational Status Report

January 2024 – Developed 21/02/2024

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 January 2024.

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

1. Operational Status
2. Operational performance
3. Technical Performance
4. 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.
- Since January 2024, this report now includes Ground Initiated Transaction Continuity metrics.
- 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.
- LISAT data provided by ENAV only contains flights departing from ENAV's airspace.
- For the month of January there is no data for EETT, EISN (as shown in Appendix A).
- For the month of July 2023 VDL2 graphs, there is partial data for SITA.
- As from May 2023, this report includes data from LZBB (Slovakia).
- This report assesses 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

1. Operational Status

Figure 1-1(a) 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. The 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). 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

The followings maps show:

2. the operational status of Datalink in Europe. Greyed Centres refers to those where the Logon List is applied,
3. centres where mandatory the logon is stated in their AIP. Planned centres are referred in orange.

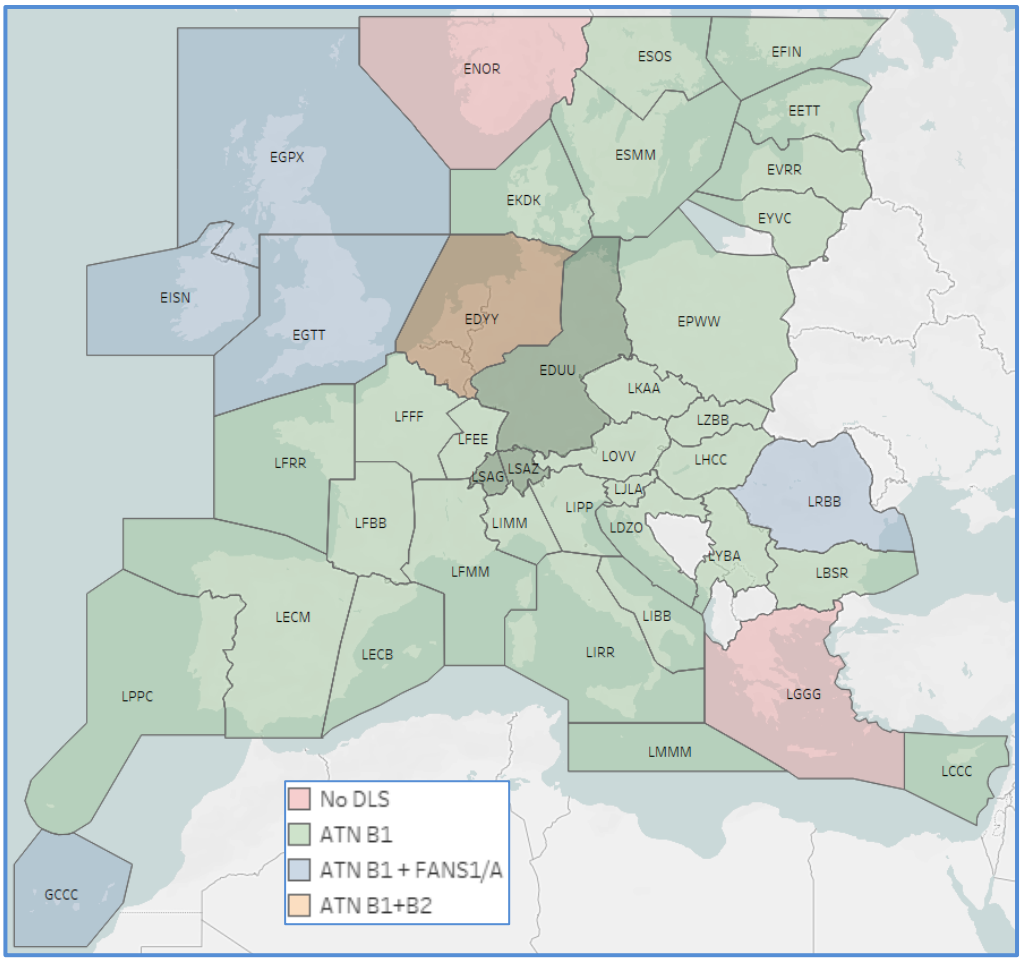

Figure 1-1: Current operational status of data link over the ATN

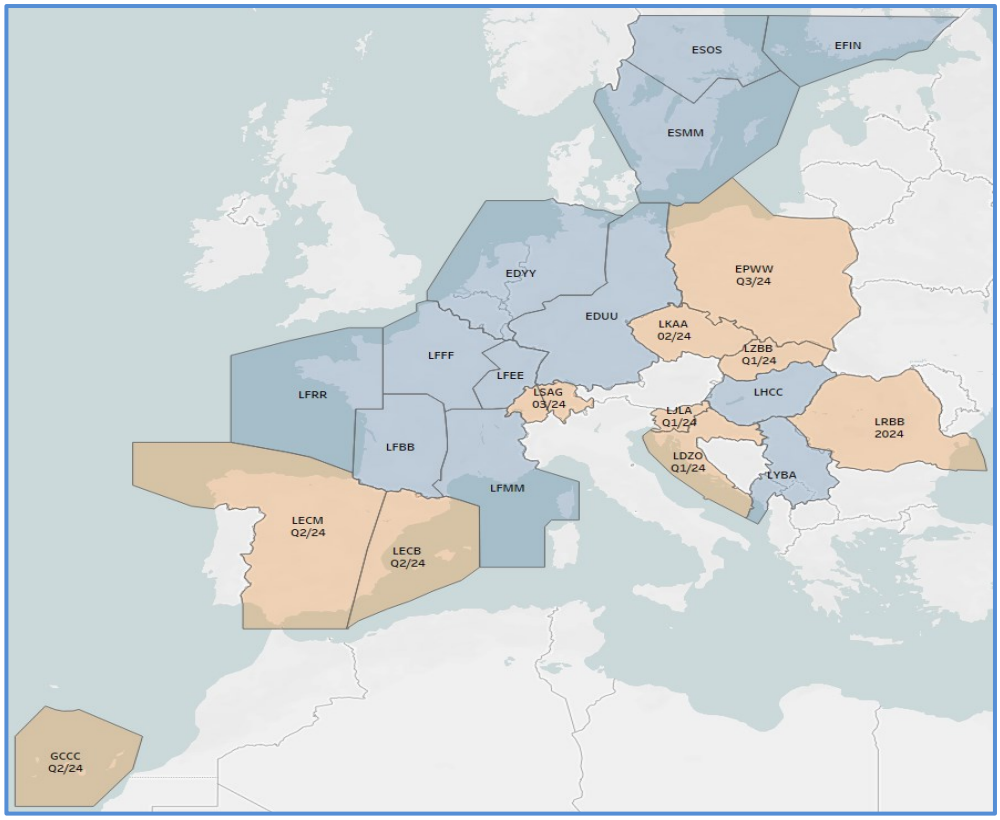

Figure 1-2(a): Centres where mandatory the logon is stated in their AIP

CPDLC / ATN Flights

Figure 1-3 presents data only for flights operating above FL285 in the DLS airspace. It shows what percentage of flights in that airspace file 'J1' in their flight plan <N-1> and what percentage indicate in the flight plan that the aircraft is exempt. For this month, 83.4% of flights indicated the capability to perform CPDLC over ATN/VDL Mode, and 13.3% (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).

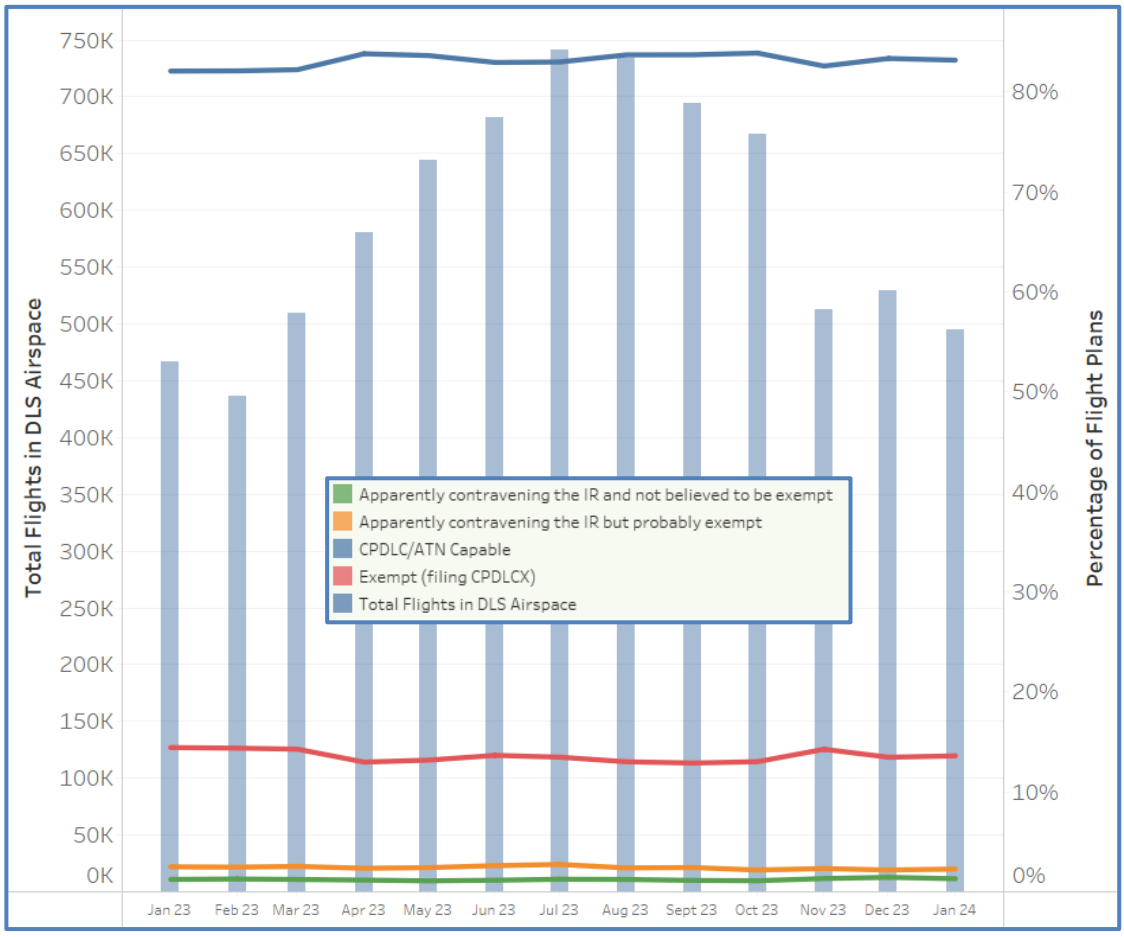

Figure 1-3: Proportion of flights capable of using CPDLC over ATN/ VDL Mode 2

2. Operational Performance

Overall Ground Initiated Transaction Continuity (GITC)

The graph below shows the Ground Initiated Transaction Continuity [GITC(120) and GITC(60)]. This is the probability that an operational response is received for an uplink message within 120 seconds (Expiration Time) or 60 seconds (Nominal Time).

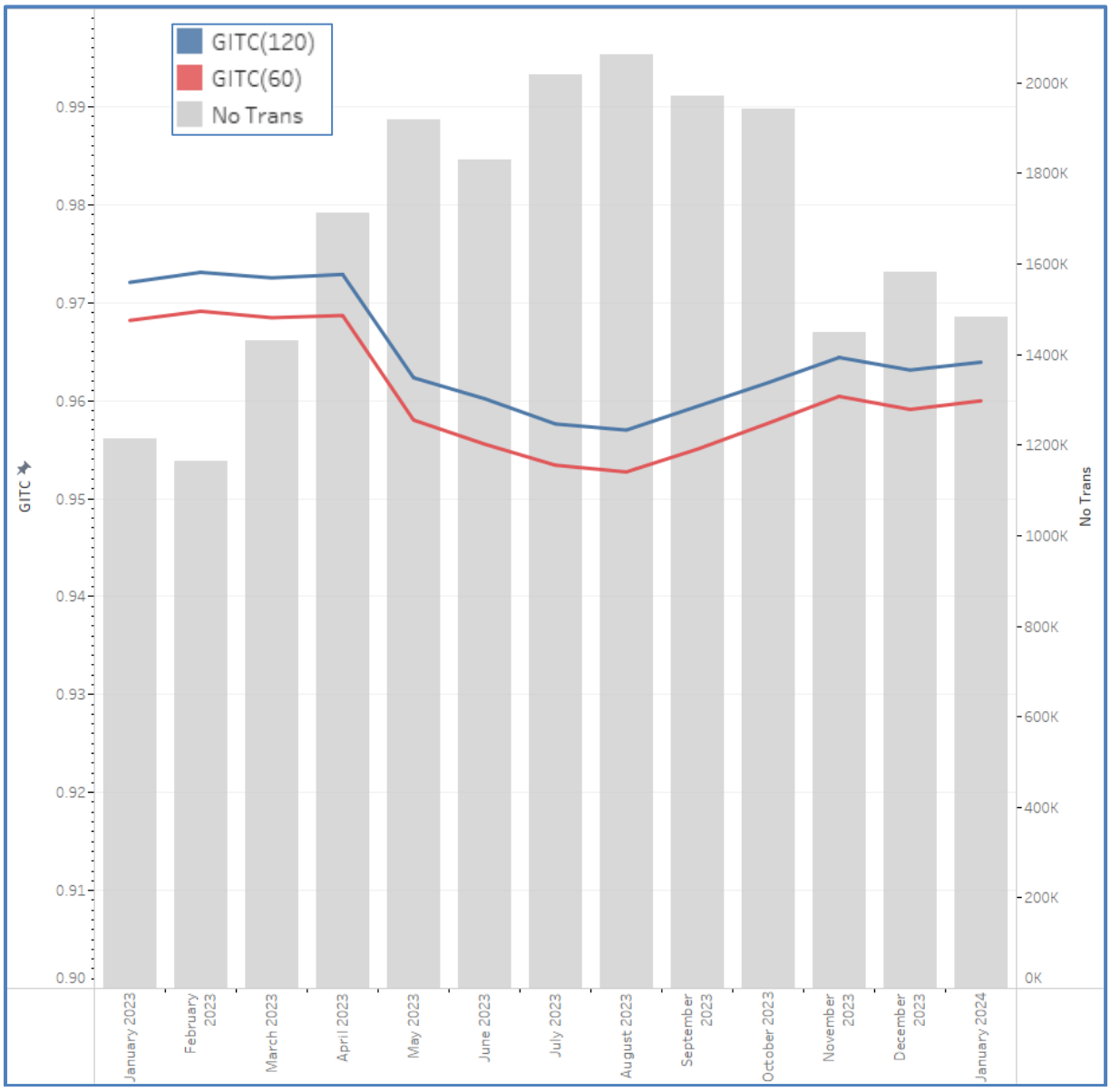

Figure 2: the Ground Initiated Transaction Continuity GITC (120) and GITC (60)

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

Ground Initiated Transaction Continuity (GITC) per Centre

Ident Txt		January 2023	February 2023	March 2023	April 2023	May 2023	June 2023	July 2023	August 2023	September 2023	October 2023	November 2023	December 2023	January 2024
EDUU	GITC(120)	98.7%	98.5%	98.3%	98.1%	97.9%	98.0%	97.3%	97.5%	97.9%	98.2%	98.6%	98.7%	98.7%
	GITC(60)	98.4%	98.3%	98.0%	97.8%	97.5%	97.6%	96.8%	97.2%	97.5%	97.8%	98.3%	98.4%	98.4%
EDYY	GITC(120)	97.9%	97.7%	97.9%	97.6%	97.2%	97.1%	97.0%	97.0%	97.1%	97.4%	97.8%	97.6%	97.7%
	GITC(60)	97.6%	97.4%	97.5%	97.2%	96.7%	96.6%	96.5%	96.5%	96.6%	97.0%	97.3%	97.2%	97.2%
EETT	GITC(120)	96.1%	96.0%	96.1%	95.9%	95.7%	95.5%	96.0%	100.0%					
	GITC(60)	96.0%	95.8%	95.9%	95.9%	95.5%	95.2%	95.9%	100.0%					
EFIN	GITC(120)										96.4%			96.3%
	GITC(60)										96.4%			95.9%
EGPX	GITC(120)	97.4%	97.4%	97.2%	96.7%	96.8%	96.8%	97.0%	96.6%	96.9%	97.1%	97.2%	97.3%	97.4%
	GITC(60)	97.0%	96.9%	96.8%	96.3%	96.5%	96.4%	96.5%	96.1%	96.5%	96.6%	96.8%	97.0%	97.0%
EGTT	GITC(120)	98.4%	98.4%	98.4%	98.3%	98.0%	97.7%	97.8%	97.7%	97.7%	97.9%	98.1%	98.0%	98.2%
	GITC(60)	98.1%	98.1%	98.1%	97.9%	97.6%	97.2%	97.4%	97.3%	97.3%	97.5%	97.7%	97.6%	97.9%
EISN	GITC(120)	86.1%	85.6%	86.6%	86.7%									
	GITC(60)	85.6%	84.7%	86.0%	86.1%									
EKDK	GITC(120)	97.4%	97.4%	97.2%	97.4%	97.3%	97.0%	96.8%	96.6%	97.3%	97.5%		97.5%	97.4%
	GITC(60)	97.0%	97.1%	96.8%	97.0%	97.0%	96.6%	96.4%	96.2%	96.9%	97.2%		97.1%	97.0%
EPWW	GITC(120)	97.3%	97.4%	97.5%	97.7%	97.5%	97.5%	97.2%	97.0%	97.6%	97.7%	97.8%	97.5%	97.5%
	GITC(60)	97.0%	97.1%	97.3%	97.4%	97.2%	97.2%	96.8%	96.7%	97.3%	97.4%	97.4%	97.2%	97.2%
ESMM	GITC(120)	97.9%	97.9%	97.9%	98.0%	98.2%	98.0%	98.0%	97.8%	98.3%	98.1%	98.0%	97.9%	97.8%
	GITC(60)	97.7%	97.7%	97.6%	97.7%	98.0%	97.7%	97.7%	97.5%	98.1%	97.9%	97.8%	97.7%	97.6%
ESOS	GITC(120)	97.7%	97.7%	97.4%	97.3%	97.8%	97.8%	97.4%	97.5%	98.6%	98.5%	98.3%	98.0%	98.0%
	GITC(60)	97.4%	97.4%	97.1%	97.0%	97.5%	97.5%	97.2%	97.2%	98.2%	98.2%	98.1%	97.6%	97.6%
EVRR	GITC(120)	96.8%	96.7%	96.7%	96.8%	97.3%	97.0%	96.7%	96.4%	96.6%	97.2%	96.7%	96.2%	96.5%
	GITC(60)	96.6%	96.6%	96.6%	96.7%	97.2%	96.8%	96.5%	96.3%	96.5%	97.1%	96.5%	95.9%	96.3%
EYVC	GITC(120)	97.5%	97.5%	98.1%	98.1%	98.1%	98.0%	98.1%	98.3%	97.7%	98.1%	98.0%	96.8%	96.8%
	GITC(60)	97.3%	97.1%	97.9%	98.0%	97.9%	97.8%	97.9%	98.1%	97.6%	97.9%	97.8%	96.7%	96.7%
GCCC	GITC(120)	87.0%	88.8%	86.4%	87.7%	89.4%	87.6%	89.6%	88.3%	88.3%	87.3%	90.0%	89.5%	89.4%
	GITC(60)	84.4%	86.0%	84.4%	85.3%	86.8%	85.5%	87.2%	86.3%	86.2%	85.4%	87.6%	87.1%	87.2%
LDZO	GITC(120)	97.2%	96.9%	97.2%	97.1%	96.7%	96.5%	95.8%	95.3%	95.7%	96.3%	96.4%	97.3%	97.6%
	GITC(60)	97.0%	96.7%	96.9%	96.9%	96.4%	96.1%	95.4%	94.8%	95.4%	96.0%	96.2%	97.1%	97.4%
LECB	GITC(120)	98.1%	97.7%	98.1%	98.2%	98.1%	98.1%	98.0%	98.2%	98.0%	98.3%	98.1%	98.2%	97.7%
	GITC(60)	97.6%	97.2%	97.7%	97.8%	97.7%	97.7%	97.6%	97.7%	97.6%	97.9%	97.8%	97.8%	97.2%
LECM	GITC(120)	97.0%	96.8%	96.9%	97.0%	97.1%	97.2%	97.2%	97.2%	97.1%	97.2%	97.3%	97.3%	97.4%
	GITC(60)	96.5%	96.2%	96.3%	96.5%	96.5%	96.6%	96.7%	96.6%	96.5%	96.6%	96.7%	96.8%	96.9%
LFBB	GITC(120)	62.2%	62.6%	62.3%	60.9%	60.0%	58.4%	59.5%	59.2%	59.8%	60.7%	62.1%	61.5%	72.1%
	GITC(60)	62.2%	62.5%	62.2%	60.8%	59.9%	58.3%	59.4%	59.1%	59.7%	60.6%	62.0%	61.4%	71.9%
LFEE	GITC(120)	67.0%	64.8%	67.5%	62.0%	59.4%	58.2%	58.9%	58.8%	58.4%	61.0%	68.8%	66.2%	97.1%
	GITC(60)	66.8%	64.6%	67.3%	61.9%	59.2%	58.0%	58.6%	58.6%	58.2%	60.8%	68.6%	66.0%	96.8%
LFFF	GITC(120)	80.5%	80.8%	80.9%	80.5%	79.3%	79.2%	79.1%	79.1%	78.5%	81.2%	83.9%	83.6%	94.9%
	GITC(60)	80.5%	80.8%	80.9%	80.5%	79.3%	79.2%	79.0%	79.1%	78.5%	81.2%	83.8%	83.6%	94.7%
LFMM	GITC(120)	54.7%	55.1%	54.7%	49.6%	49.9%	48.0%	46.6%	47.5%	48.7%	51.0%	54.4%	55.5%	96.1%
	GITC(60)	54.6%	55.0%	54.6%	49.5%	49.8%	47.9%	46.5%	47.4%	48.5%	50.9%	54.2%	55.4%	95.9%
LFRR	GITC(120)	61.0%	60.0%	61.4%	61.5%	61.4%	60.6%	60.4%	60.6%	60.2%	62.0%	65.4%	66.3%	74.7%
	GITC(60)	60.9%	60.0%	61.3%	61.5%	61.3%	60.5%	60.3%	60.5%	60.1%	61.9%	65.3%	66.2%	74.5%
LHCC	GITC(120)	96.5%	96.6%	96.7%	96.7%	96.8%	96.6%	96.4%	96.4%	96.6%	96.8%	96.2%	96.7%	96.6%
	GITC(60)	96.3%	96.5%	96.5%	96.5%	96.6%	96.4%	96.2%	96.1%	96.4%	96.6%	96.0%	96.5%	96.4%
LIBB	GITC(120)	93.7%	95.4%	94.6%	94.2%	93.4%	90.8%			88.9%	93.1%	96.3%	93.9%	
	GITC(60)	93.1%	94.8%	93.7%	93.1%	91.8%	89.3%			87.5%	92.1%	96.3%	93.2%	
LIMM	GITC(120)	76.5%	84.9%	91.6%	91.8%	89.4%	90.6%			87.2%	90.1%	94.6%	93.9%	
	GITC(60)	75.6%	83.8%	89.8%	90.0%	87.7%	88.8%			85.1%	89.0%	93.8%	93.2%	
LIPP	GITC(120)	56.0%	75.9%	86.2%	89.4%	91.5%	88.5%			88.7%	87.3%	89.7%	91.3%	
	GITC(60)	54.8%	74.7%	84.7%	88.0%	90.1%	87.0%			87.1%	86.0%	88.6%	90.5%	
LIRR	GITC(120)	93.7%	94.1%	94.2%	92.1%	93.4%	92.3%		89.4%	91.0%	93.2%	95.9%	96.0%	
	GITC(60)	93.2%	93.0%	93.1%	90.9%	92.0%	90.6%		87.4%	89.2%	91.7%	94.8%	95.2%	
LJLA	GITC(120)	98.4%	98.3%	98.3%	98.0%	97.9%	97.8%	97.2%	96.7%	97.0%	97.1%	97.3%	97.8%	97.9%
	GITC(60)	97.9%	97.8%	97.7%	97.6%	97.3%	97.3%	96.7%	96.1%	96.3%	96.4%	96.9%	97.3%	97.3%
LKAA	GITC(120)	97.9%	97.7%	98.0%	98.0%	98.1%	98.1%	97.8%	97.9%	98.1%	97.9%	98.0%	98.1%	98.0%
	GITC(60)	97.6%	97.3%	97.7%	97.8%	97.8%	97.9%	97.5%	97.6%	97.8%	97.6%	97.7%	97.8%	97.7%
LOVV	GITC(120)	97.0%	97.1%	97.0%	96.8%	96.7%		95.9%	96.4%	96.6%	96.8%	97.1%	97.1%	97.3%
	GITC(60)	96.6%	96.7%	96.6%	96.4%	96.4%		95.5%	96.0%	96.2%	96.4%	96.7%	96.8%	96.9%
LPPC	GITC(120)	91.3%	94.5%	92.7%	94.4%	94.7%	94.4%	94.7%	93.8%	94.7%	94.5%	94.0%	90.8%	91.3%
	GITC(60)	90.3%	93.6%	91.7%	93.6%	93.9%	93.6%	93.9%	93.0%	94.0%	93.7%	93.1%	89.6%	90.1%
LRBB	GITC(120)	97.1%	97.3%	97.3%	97.2%	97.3%	97.2%	97.2%	97.4%	97.3%	97.4%	96.9%	96.8%	97.4%
	GITC(60)	96.9%	97.1%	97.1%	97.0%	97.1%	97.0%	96.9%	97.2%	97.1%	97.2%	96.7%	96.6%	97.2%
LSAG	GITC(120)	98.4%	98.2%	98.3%	97.7%	97.6%	97.3%	97.0%	97.3%	97.5%	98.3%	98.1%	98.7%	98.6%
	GITC(60)	98.0%	97.8%	97.9%	97.2%	97.2%	96.7%	96.5%	96.8%	96.9%	97.8%	97.7%	98.2%	98.2%
LSAZ	GITC(120)	98.5%	98.5%	98.3%	97.9%	97.4%	97.3%	96.7%	96.9%	97.1%	98.1%	98.7%	98.6%	98.6%
	GITC(60)	98.2%	98.1%	97.9%	97.4%	96.9%	96.7%	96.1%	96.4%	96.6%	97.7%	98.3%	98.2%	98.2%
LZBB	GITC(120)					35.8%	34.8%	34.6%	34.9%	35.0%	35.9%	35.2%	35.5%	36.3%
	GITC(60)					35.7%	34.7%	34.5%	34.8%	34.8%	35.7%	35.1%	35.4%	36.1%

Figure 2-2: the GITC for each Centre for the current reporting month GITC(120)

The following map displays the GITC for each Centre for the current reporting month. The first value refers to the GITC(120) and the second to GITC(60). Color refers to GITC(120).

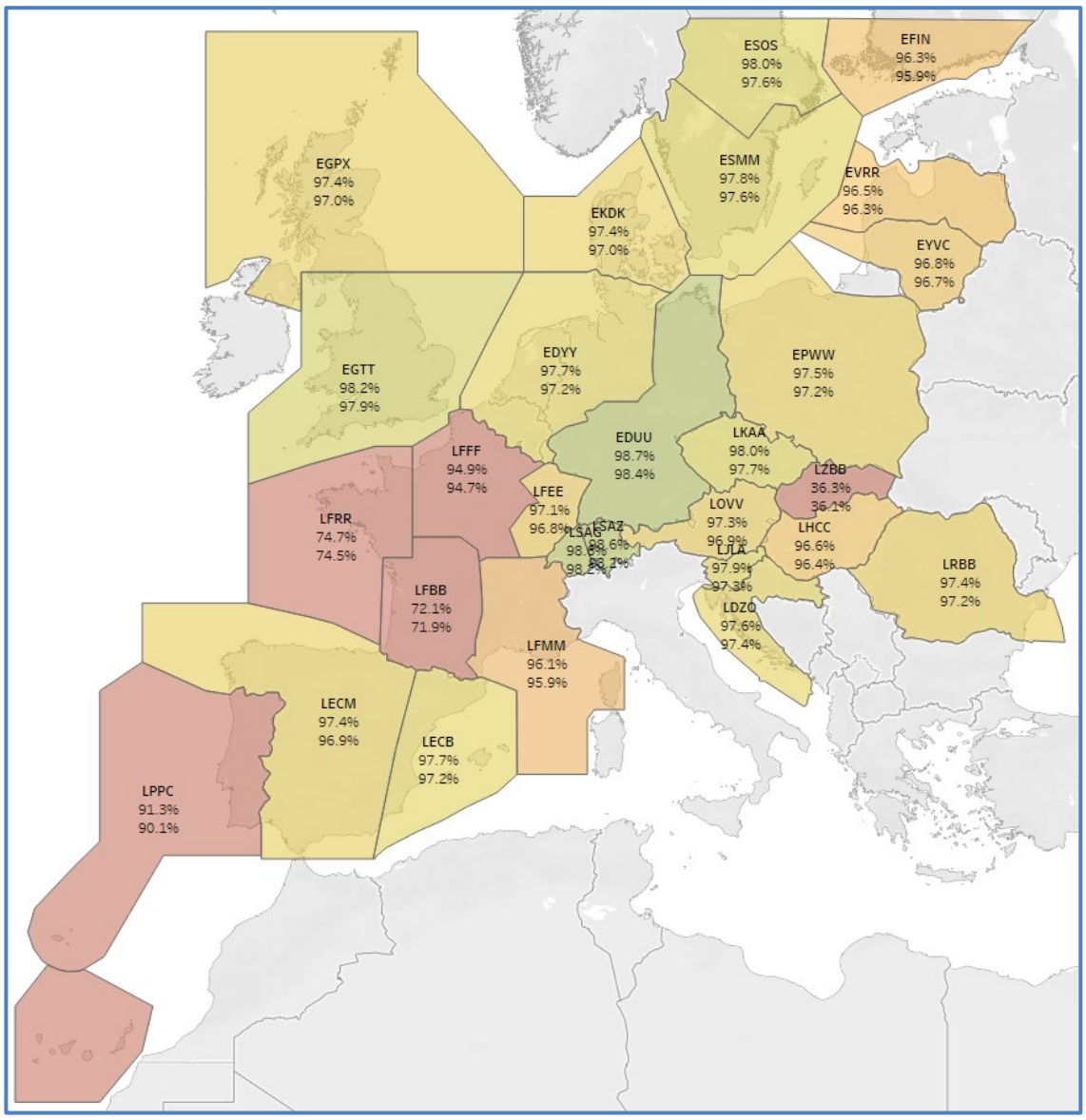

Figure 2-3: the GITC for each Centre for the current reporting month GITC(60)

3. Technical Performance

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. The RTCP TC at 40 seconds is also displayed for information purposes.

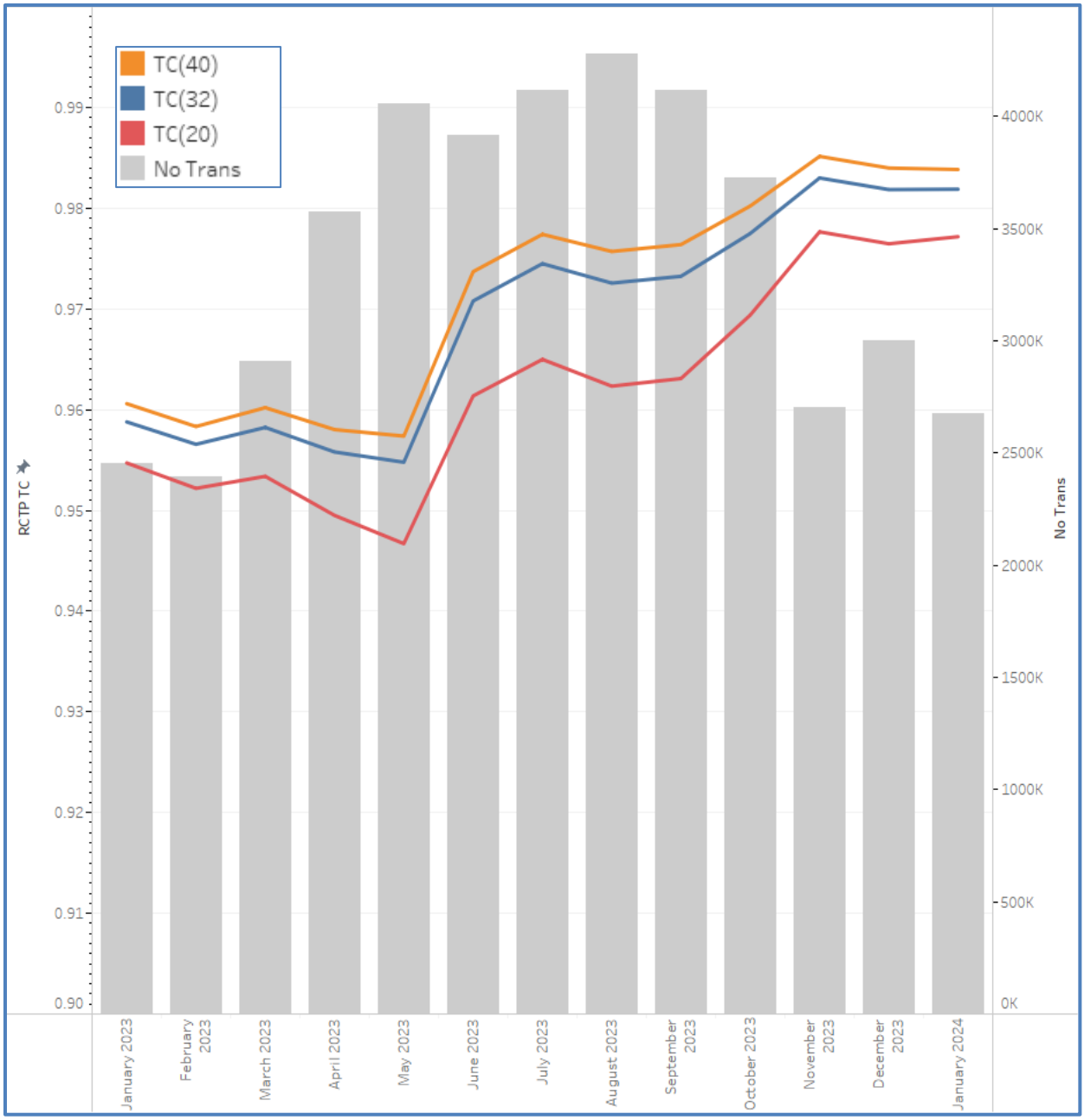

Figure 3-1: the Required Communications Technical Performance Technical Continuity [RCTP_TC(32) and RCTP_TC(20)

RCTP Technical Continuity per Centre

		January 2023	February 2023	March 2023	April 2023	May 2023	June 2023	July 2023	August 2023	September 2023	October 2023	November 2023	December 2023	January 2024
EDUU	TC(32)	99.1%	99.0%	98.7%	98.3%	98.1%	98.1%	97.4%	97.8%	98.1%	98.4%	99.0%	99.1%	99.1%
	TC(20)	98.7%	98.5%	98.1%	97.5%	97.0%	96.9%	96.3%	96.5%	96.9%	97.5%	98.4%	98.5%	98.6%
EDYY	TC(32)	99.1%	98.9%	99.0%	98.7%	98.1%	98.0%	97.9%	97.9%	98.0%	98.4%	98.9%	98.8%	99.0%
	TC(20)	98.6%	98.4%	98.4%	97.8%	96.9%	96.9%	96.7%	96.7%	96.9%	97.4%	98.2%	98.1%	98.3%
EETT	TC(32)	99.3%	99.4%	99.3%	99.1%	99.1%	99.0%	99.2%	100.0%					
	TC(20)	99.0%	99.1%	99.0%	98.7%	98.8%	98.9%	98.9%	100.0%					
EFIN	TC(32)										100.0%			98.0%
	TC(20)										100.0%			97.6%
EGPX	TC(32)	99.1%	99.1%	99.1%	98.9%	98.7%	98.5%	98.7%	98.5%	98.7%	98.6%	98.9%	99.0%	99.2%
	TC(20)	98.7%	98.7%	98.6%	98.4%	98.0%	97.6%	97.9%	97.7%	97.9%	97.9%	98.4%	98.6%	98.7%
EGTT	TC(32)	99.1%	99.1%	99.1%	98.9%	98.6%	98.3%	98.4%	98.3%	98.4%	98.5%	98.8%	98.8%	99.0%
	TC(20)	98.5%	98.4%	98.4%	98.1%	97.6%	97.2%	97.3%	97.1%	97.2%	97.5%	97.9%	98.0%	98.2%
EISN	TC(32)	87.6%	87.5%	88.3%	88.3%									
	TC(20)	87.1%	86.9%	87.7%	87.8%									
EKDK	TC(32)	98.9%	98.8%	98.7%	98.7%	98.5%	98.2%	98.2%	98.1%	98.6%	98.8%		98.8%	98.9%
	TC(20)	98.7%	98.5%	98.4%	98.3%	98.1%	97.7%	97.7%	97.6%	98.2%	98.4%		98.5%	98.7%
EPWW	TC(32)	98.7%	99.0%	98.9%	99.0%	98.8%	98.9%	98.5%	98.3%	98.8%	99.0%	99.0%	98.8%	98.7%
	TC(20)	98.3%	98.7%	98.6%	98.6%	98.3%	98.5%	98.1%	97.8%	98.4%	98.7%	98.7%	98.5%	98.3%
ESMM	TC(32)	99.4%	99.3%	99.3%	99.3%	99.3%	99.1%	99.1%	99.1%	99.3%	99.3%	99.4%	99.2%	99.3%
	TC(20)	99.3%	99.2%	99.2%	99.2%	99.1%	99.0%	99.0%	99.0%	99.2%	99.2%	99.3%	99.1%	99.2%
ESOS	TC(32)	99.0%	98.9%	99.0%	98.9%	98.9%	98.9%	98.7%	98.8%	99.4%	99.2%	99.1%	98.9%	98.9%
	TC(20)	99.0%	98.8%	98.9%	98.8%	98.9%	98.8%	98.6%	98.7%	99.3%	99.1%	99.0%	98.8%	98.8%
EVRR	TC(32)	98.6%	98.9%	98.5%	98.4%	98.4%	98.5%	98.0%	98.1%	98.6%	98.5%	98.9%	97.2%	97.6%
	TC(20)	98.5%	98.6%	98.4%	98.2%	98.2%	98.3%	97.8%	98.0%	98.4%	98.4%	98.6%	97.0%	97.4%
EYVC	TC(32)	99.4%	99.2%	99.3%	99.2%	99.4%	99.4%	99.5%	99.4%	99.1%	99.3%	99.4%	98.4%	98.4%
	TC(20)	99.3%	99.2%	99.3%	99.2%	99.3%	99.3%	99.5%	99.3%	99.1%	99.3%	99.3%	98.4%	98.3%
GCCC	TC(32)	90.6%	91.3%	90.3%	90.9%	91.4%	91.0%	91.6%	91.5%	91.0%	90.1%	92.7%	92.2%	92.3%
	TC(20)	90.0%	90.7%	89.5%	89.9%	90.5%	90.4%	91.2%	90.9%	90.3%	89.7%	92.0%	91.5%	91.7%
LDZO	TC(32)	98.1%	97.8%	98.0%	97.4%	97.0%	96.7%	95.5%	94.9%	95.2%	96.0%	97.2%	97.8%	97.8%
	TC(20)	97.6%	97.3%	97.4%	96.5%	95.9%	95.3%	93.8%	92.8%	93.1%	94.5%	96.4%	97.2%	97.2%
LECB	TC(32)	99.0%	98.7%	99.0%	99.0%	98.8%	98.9%	98.7%	98.8%	98.7%	99.0%	99.0%	99.0%	98.4%
	TC(20)	98.5%	98.1%	98.6%	98.4%	98.2%	98.3%	98.1%	98.1%	98.1%	98.5%	98.4%	98.4%	97.9%
LECM	TC(32)	98.1%	97.9%	98.0%	98.1%	98.1%	98.3%	98.2%	98.1%	98.1%	98.1%	98.3%	98.5%	98.7%
	TC(20)	97.6%	97.3%	97.5%	97.6%	97.6%	97.7%	97.6%	97.5%	97.5%	97.5%	97.7%	97.8%	98.2%
LFBB	TC(32)	87.1%	86.3%	87.2%	87.5%	87.5%	95.1%	97.2%	97.1%	97.1%	97.8%	98.3%	98.5%	93.2%
	TC(20)	87.0%	86.1%	87.0%	87.3%	87.1%	94.6%	96.7%	96.5%	96.6%	97.4%	98.1%	98.3%	93.1%
LFEE	TC(32)	89.2%	88.6%	89.4%	89.1%	88.9%	97.1%	97.0%	96.9%	97.1%	97.7%	98.6%	98.5%	98.7%
	TC(20)	88.9%	88.3%	89.0%	88.6%	88.1%	96.0%	95.9%	95.7%	96.0%	96.8%	98.0%	98.0%	98.2%
LFFF	TC(32)	88.8%	88.6%	88.8%	88.6%	88.6%	92.7%	93.6%	93.4%	93.6%	95.6%	97.1%	96.8%	94.5%
	TC(20)	88.3%	88.1%	88.2%	87.8%	87.4%	91.1%	91.9%	91.7%	92.2%	94.9%	96.7%	96.4%	94.1%
LFMM	TC(32)	86.4%	85.5%	86.5%	86.9%	86.9%	96.7%	96.4%	96.2%	96.6%	97.3%	97.9%	98.3%	98.3%
	TC(20)	86.2%	85.3%	86.3%	86.6%	86.5%	96.0%	95.5%	95.3%	95.7%	96.7%	97.6%	98.0%	98.1%
LFRR	TC(32)	88.5%	88.1%	88.2%	88.3%	88.1%	94.7%	96.4%	96.2%	96.4%	97.0%	97.7%	97.7%	91.6%
	TC(20)	88.2%	87.8%	87.8%	87.9%	87.5%	94.0%	95.6%	95.4%	95.6%	96.4%	97.3%	97.2%	91.3%
LHCC	TC(32)	99.1%	99.2%	99.2%	99.1%	99.0%	98.9%	98.8%	98.7%	98.8%	99.0%	98.9%	99.0%	99.1%
	TC(20)	98.7%	98.9%	98.8%	98.6%	98.4%	98.2%	98.1%	97.9%	98.0%	98.4%	98.6%	98.6%	98.7%
LIBB	TC(32)	96.1%	96.7%	97.0%	96.1%	95.6%	94.4%			92.9%	95.0%	98.6%	98.5%	
	TC(20)	95.8%	96.3%	96.6%	95.4%	94.8%	93.0%			91.5%	93.9%	98.6%	98.4%	
LIMM	TC(32)	89.8%	92.3%	93.8%	93.0%	92.7%	91.8%			91.1%	93.7%	95.8%	95.9%	
	TC(20)	89.3%	91.7%	93.1%	91.9%	91.4%	90.3%			89.6%	92.6%	95.2%	95.3%	
LIPP	TC(32)	80.4%	89.3%	92.1%	93.0%	93.4%	91.4%			90.8%	91.5%	93.4%	93.9%	
	TC(20)	80.0%	88.7%	91.2%	91.8%	92.0%	89.7%			88.6%	90.0%	92.6%	93.0%	
LIRR	TC(32)	95.9%	96.2%	95.8%	94.3%	94.7%	93.7%		91.4%	92.6%	94.5%	96.4%	96.5%	
	TC(20)	95.5%	95.7%	95.2%	93.4%	93.5%	92.3%		89.7%	91.0%	93.3%	95.8%	95.9%	
LJLA	TC(32)	98.6%	98.2%	98.0%	97.1%	96.1%	95.6%	93.9%	93.3%	93.6%	94.8%	97.3%	97.6%	97.4%
	TC(20)	98.0%	97.4%	97.1%	95.6%	94.3%	93.4%	91.2%	90.5%	90.9%	92.5%	96.1%	96.6%	96.5%
LKAA	TC(32)	98.9%	98.8%	99.0%	99.0%	99.0%	99.0%	98.8%	98.8%	98.9%	98.9%	99.0%	99.0%	99.1%
	TC(20)	98.8%	98.7%	98.8%	98.8%	98.7%	98.7%	98.5%	98.5%	98.6%	98.6%	98.8%	98.9%	98.9%
LOVV	TC(32)	97.8%	97.7%	97.7%	97.3%	97.0%		96.4%	96.6%	96.8%	97.1%	97.8%	97.8%	97.9%
	TC(20)	97.5%	97.3%	97.2%	96.6%	96.1%		95.2%	95.4%	95.5%	96.2%	97.3%	97.3%	97.5%
LPPC	TC(32)	93.7%	95.3%	94.1%	95.5%	95.4%	95.5%	95.8%	95.1%	95.9%	95.6%	95.3%	92.5%	93.1%
	TC(20)	93.1%	94.8%	93.4%	95.0%	94.9%	94.9%	95.3%	94.5%	95.4%	95.0%	94.7%	91.7%	92.3%
LRBB	TC(32)	98.5%	98.6%	98.7%	98.5%	98.8%	98.8%	98.9%	98.8%	98.9%	99.0%	98.7%	98.7%	98.9%
	TC(20)	98.1%	98.1%	98.2%	98.0%	98.3%	98.3%	98.3%	98.2%	98.4%	98.6%	98.3%	98.2%	98.6%
LSAG	TC(32)	98.8%	98.7%	98.6%	98.1%	97.7%	97.4%	97.2%	97.2%	97.3%	98.3%	98.8%	99.0%	99.2%
	TC(20)	98.3%	98.1%	98.0%	97.1%	96.3%	95.8%	95.4%	95.4%	95.5%	97.1%	98.1%	98.4%	98.6%
LSAZ	TC(32)	99.0%	98.8%	98.7%	98.1%	97.3%	97.0%	96.6%	96.8%	96.8%	97.9%	99.0%	98.9%	98.9%
	TC(20)	98.5%	98.1%	98.0%	97.1%	95.7%	95.1%	94.6%	94.9%	95.1%	96.6%	98.2%	98.2%	98.3%
LZBB	TC(32)					98.8%	98.6%	98.6%	98.4%	98.5%	98.7%	98.9%	98.9%	99.0%
	TC(20)					98.1%	97.8%	97.7%	97.4%	97.4%	97.9%	98.5%	98.4%	98.5%

Figure 3-2: the RCTP TC for each Centre RCTP(32)

The following map displays the RCTP TC for each Centre for the current reporting month. The first value refers to the RCTP(32) and the second to RCTP(20). Color refers to RCTP TC(32)

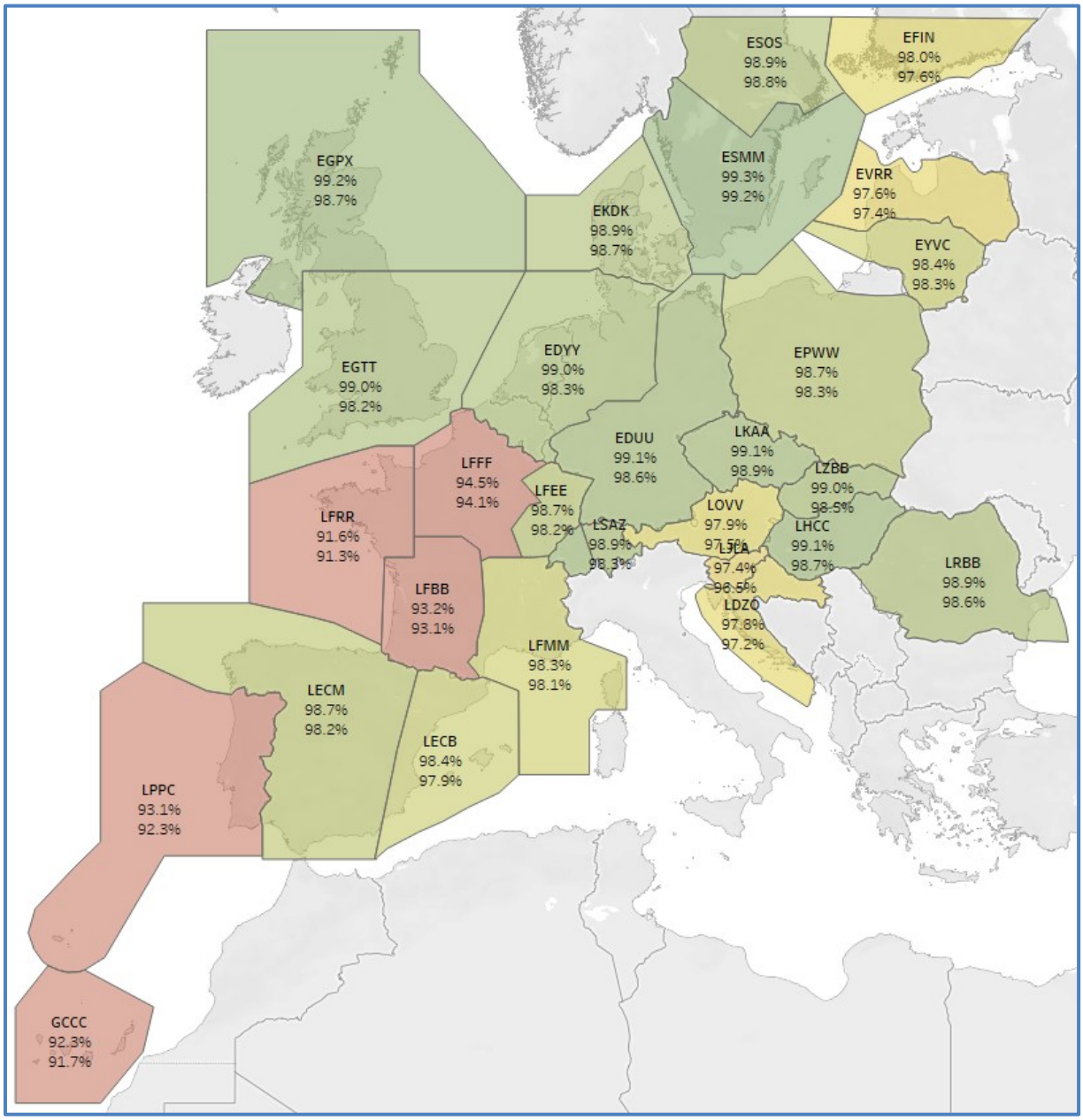

Figure 3-2: the RCTP TC for each Centre RCTP(20)

Overall Monthly Provider Abort Rate

Figure 3-4 below shows the monthly PA rate 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 4.0 PAs per 100 hours.

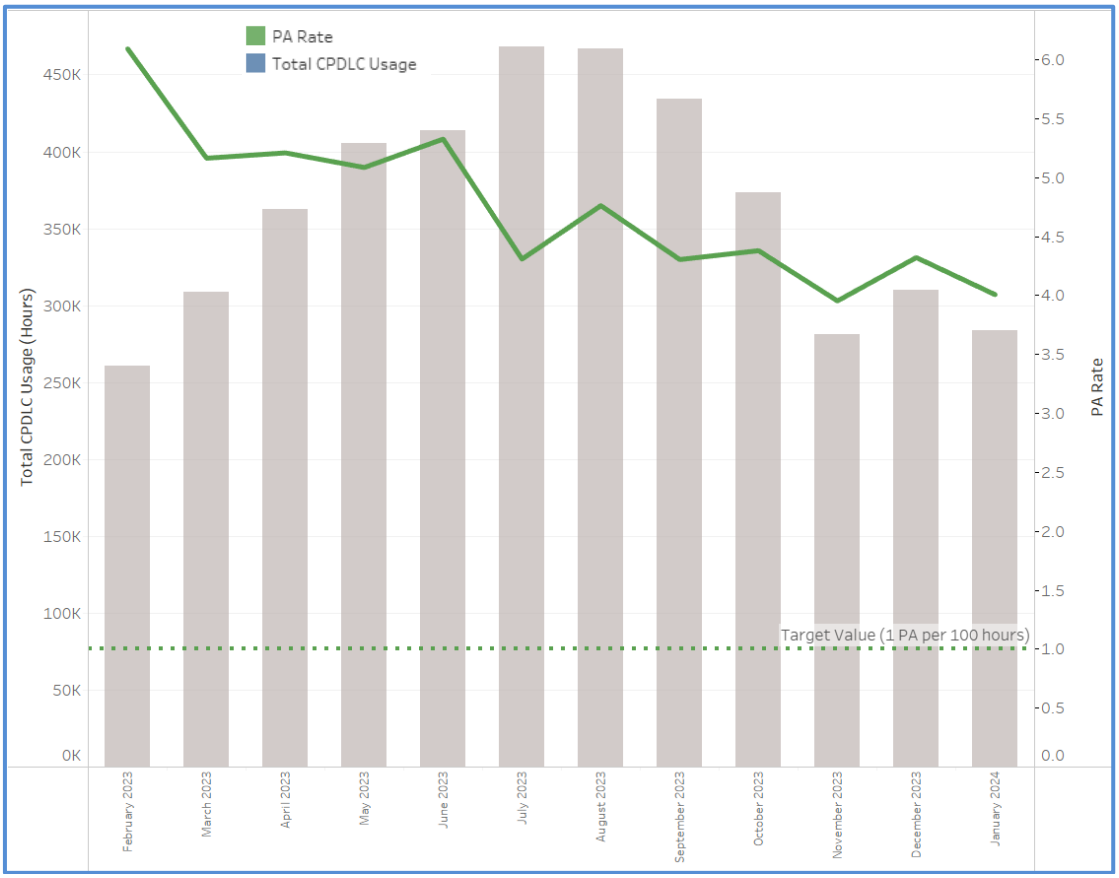

Figure 3-4: PA rate

Figure 3-5 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.

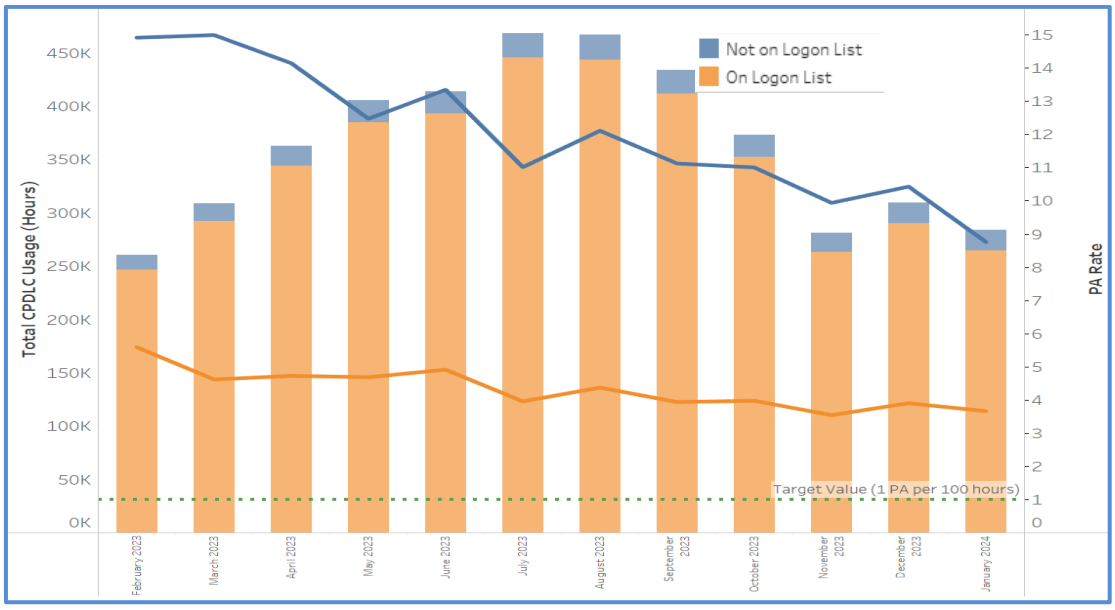

Figure 3-5: Logon Listed Aircraft PA rate

Monthly PA rate per Centre

The PA rate for each of the centers providing data to NM is shown in the table in Figure 3-6 below for the last 12 month period for the months LISAT data are available.

Atsu Code	February 2023	March 2023	April 2023	May 2023	June 2023	July 2023	August 2023	September 2023	October 2023	November 2023	December 2023	January 2024
EDUU	1,5	2,0	2,5	2,4	2,4	4,7	3,3	2,5	2,5	1,5	1,2	1,3
EDYY	2,1	2,1	3,0	3,7	3,4	4,2	4,2	3,8	3,3	2,4	2,2	2,1
EETT	3,6	2,7	4,0	3,4	3,0	3,3						
EFIN									0,0			16,7
EGPX	5,1	5,7	7,0	6,9	6,5	6,5	5,2	5,7	5,8	4,5	3,8	4,1
EGTT	3,7	3,9	4,8	5,6	5,6	4,4	4,8	4,0	3,9	2,9	3,1	2,6
EISN	51,8	57,2	73,5									
EKDK	8,6	9,7	8,4	7,4	7,4	6,4	6,5	6,5	6,0		7,7	7,9
EPWW	3,2	4,0	4,1	3,7	3,5	5,9	6,8	4,1	3,4	3,1	3,0	3,3
ESMM	2,8	3,1	2,6	2,0	1,9	2,2	2,3	2,1	2,5	1,9	2,0	2,8
ESOS	4,2	4,5	4,2	3,8	2,9	2,9	2,8	2,2	3,3	3,2	8,0	8,5
EVRR	3,0	3,2	4,5	3,4	3,5	3,7	4,7	4,7	3,1	2,7	4,5	5,3
EYVC	1,5	1,6	3,0	1,2	1,5	2,3	2,2	2,0	2,4	2,1	3,2	3,3
GCCC	49,0	46,7	43,6	53,1	43,1	41,9	46,5	50,0	47,7	47,0	49,2	50,3
LDZO	5,3	5,7	7,4	7,2	9,9	15,4	16,2	15,1	10,3	8,8	6,0	6,6
LECB	2,8	2,7	3,0	3,6	3,5	3,9	3,9	4,2	3,4	2,5	2,3	2,8
LECM	6,6	5,9	5,6	5,2	4,9	4,7	5,3	4,9	5,4	4,8	4,3	3,6
LFBB	1,3	1,5	2,0	1,8	1,6	1,3	1,6	1,4	2,2	1,4	1,0	0,8
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	4,4	4,0	6,5	5,0	2,9	2,2	2,9	2,5	2,5	1,2	1,3	0,6
LFMM	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
LFRR	1,8	2,0	2,6	2,5	1,8	1,3	1,9	1,4	2,8	2,3	2,3	1,4
LHCC	4,0	4,2	4,7	3,4	3,7	3,8	4,2	4,1	4,0	5,7	4,1	3,2
LIBB	49,2	31,6	32,0	35,3	42,8			18,6	7,3	8,8	2,1	
LIMM	105,9	18,1	63,1	59,7	61,0			23,8	15,5	21,7	9,3	
LIPP	270,1	76,6	72,2	67,0	75,7			35,0	15,7	9,0	7,5	
LIRR	29,5	29,1	40,5	47,0	46,9		23,0	19,1	12,0	5,3	6,8	
LJLA	5,1	5,4	8,8	10,1	11,1	15,4	17,7	14,8	12,6	6,8	5,7	5,3
LKAA	4,6	5,4	5,0	4,5	4,7	4,7	5,1	4,6	4,3	4,2	4,1	4,0
LOVV	4,5	6,7	6,2	5,8		10,5	6,9	5,7	5,4	5,3	4,6	4,1
LPPC	24,7	14,8	1,6	13,9	13,6	12,7	18,4	14,5	15,9	17,0	26,5	23,5
LRBB	3,8	3,6	3,8	3,1	3,4	3,4	3,9	3,1	2,8	2,7	2,7	2,4
LSAG	3,2	3,2	3,1	3,7	4,2	4,7	5,6	4,6	2,5	2,1	1,9	2,5
LSAZ	2,2	2,6	3,2	4,3	5,3	6,0	6,3	5,2	3,6	2,8	2,6	2,2
LZBB				2,5	2,5	2,7	3,4	3,4	2,7	3,3	2,7	2,5

Figure 3-6: Monthly PA Rate per Centre

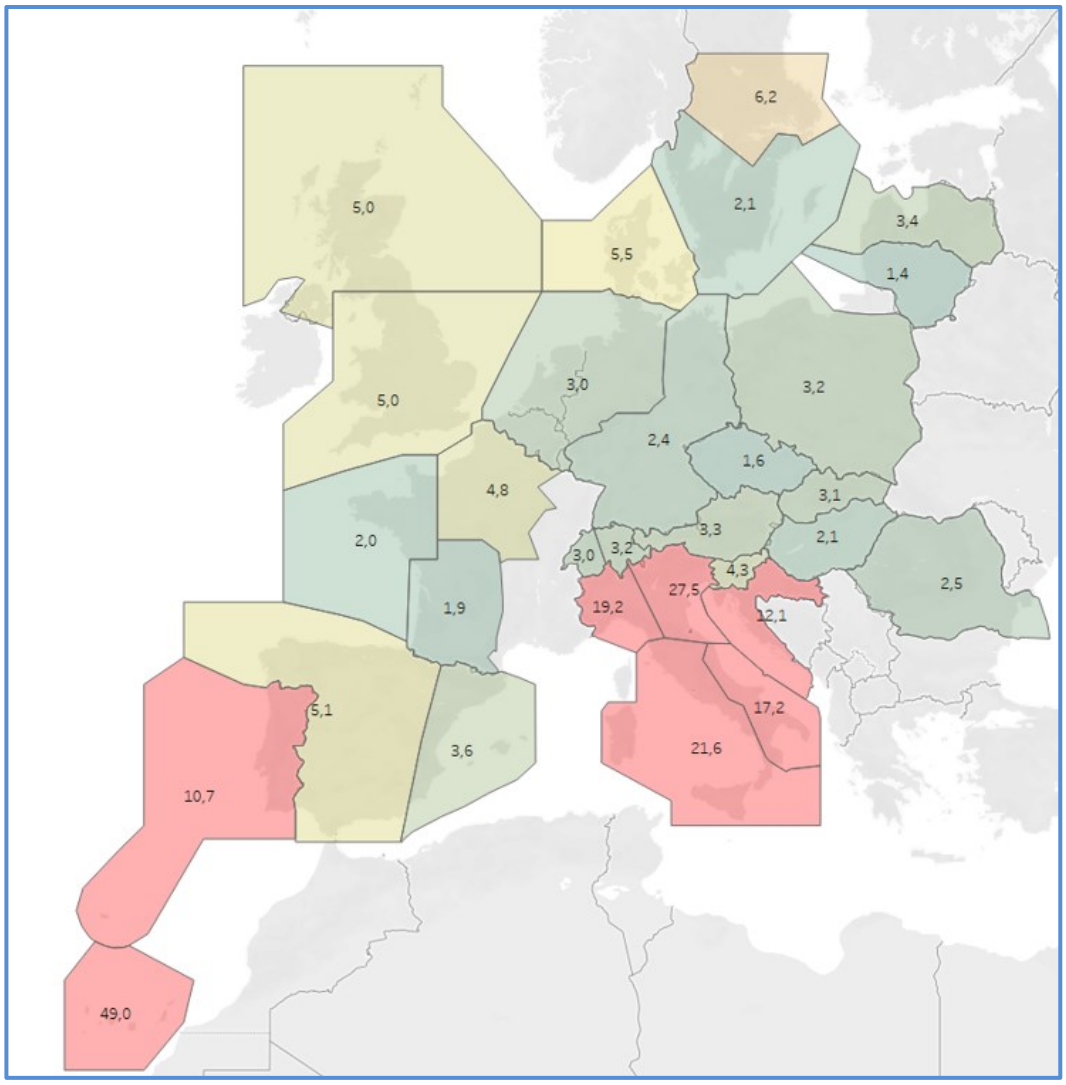

Figure 3-7: PA Rate Map

PA Rate for Major Aircraft Operators

Figure 3- 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 (from FL)	Total CPDLC Usage	Total Flights	PA Rate Top30 AOs
RYR	72501,10	58.300	2,8
EZY	31603,60	21.776	2,2
EXS	23296,85	11.483	4,5
EJU	16228,79	17.175	2,0
DLH	14714,12	16.950	2,7
WZZ	14494,39	11.680	2,6
BAW	14342,23	11.358	6,4
EWG	13095,60	13.282	3,8
THY	12216,77	8.064	5,5
TOM	11068,00	6.230	4,1
TAP	9831,23	8.158	8,0
VLG	9344,77	11.419	4,9
KLM	9328,04	11.552	4,1
PGT	8862,74	5.416	1,7
SAS	8689,72	7.711	3,8
AFR	8684,58	11.103	4,0
WMT	6641,93	6.302	4,6
TRA	6548,14	4.117	2,7
NSZ	5705,37	3.332	1,9
AUA	5478,61	7.469	3,2
EIN	4977,02	4.486	3,2
SWR	4959,10	6.181	6,3
NOZ	4725,91	3.445	2,1
IBE	4325,40	4.647	2,5
BEL	4243,41	4.443	2,7
CFG	4142,24	3.180	5,0
TVF	3430,82	3.640	2,1
VOE	3197,67	4.098	1,6
EZS	2913,45	4.016	3,1
LOT	2824,13	3.435	6,9

Figure 3-8: 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.

Vdr Make	Vdr Model	Cmu Make	Cmu Model	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sept 23	Oct 23	Nov 23	Dec 23	Jan 24
Garmin	GDR66	Garmin	GIA64E	3.40	2.53	8.25	7.85	12.38	16.24	16.38	14.53	12.96	11.01	2.78	3.90	5.10
			GIA63W	7.55	8.70	9.61	12.93	18.67	17.68	14.66	15.92	15.72	11.87	8.27	6.09	4.88
Honeywell	EPIC VDR	Honeywell	EPIC CMF	4.88	5.18	4.79	6.82	6.83	7.13	6.82	6.86	7.06	5.86	4.10	4.60	5.07
	KTR2280A	Honeywell	EPIC CMF	4.74	7.79	1.80	5.80	11.01							1.41	0.57
	RTA44D	Airbus	FANS-B+	5.25	4.10	3.27	3.99	3.69	4.32	3.16	3.61	2.82	3.32	2.87	2.82	2.62
			FANS-A+B							1.99	2.28	2.32	3.75	1.18	2.73	1.24
		Honeywell	Mk2+	3.09	3.30	2.34	2.59	2.95	2.50	1.57	1.91	2.14	2.12	1.77	3.36	3.76
		Rockwell Collins	CMU900	4.04	3.59	4.72	4.02	4.71	4.22	5.49	5.02	6.35	4.80	3.74	5.83	4.59
	RTA50D	Airbus	FANS-C	7.18	5.69	5.04	3.94	3.28	4.19	3.97	3.65	3.09	3.13	2.59	2.94	2.65
			FANS-B+	5.54	4.59	3.67	3.62	3.51	3.69	2.72	3.18	2.49	2.23	2.05	2.18	1.91
			FANS-A+B	3.36		9.35	18.40	19.41	23.61	15.44	12.61	9.47	5.69	5.30	4.43	2.87
		Honeywell	Mk2+	6.02	5.99	4.91	5.45	4.76	4.33	3.00	3.37	2.92	3.07	2.69	2.54	2.31
			777 AIMS2	30.52	65.61	44.32	43.38	27.41	19.33	12.32				40.25		
		Rockwell Collins	CMU900						2.96							
Rockwell Collins	920	Airbus	FANS-B+	7.82	7.25	5.25	4.92	6.18	7.94	6.27	6.35	5.95	6.25	4.95	5.88	7.09
		Honeywell	Mk2+	9.30	7.97	1.16	1.58	3.00	3.78	4.61	3.99	3.98	3.15	0.59	1.22	1.87
		Rockwell Collins	CMU900	7.34	7.47	5.02	5.83	5.28	5.66	4.92	9.19	6.92	5.98	8.96	8.04	5.85
	2100	Airbus	FANS-C	5.55	4.93	4.91	5.16	4.81	3.50	2.45	3.46	2.67	2.82	1.64	1.15	1.52
			FANS-B+	5.47	4.35	2.88	3.50	3.69	4.23	3.28	3.78	3.25	3.20	2.78	2.62	2.24
			FANS-A+B	4.30	4.61	4.13	4.11	3.63	4.33	4.29	4.94	3.38	3.54	4.17	3.29	3.50
		Honeywell	Mk2+	2.26	2.07	1.77	2.63	3.33	3.15	2.19	2.32	1.84	2.47	1.19	2.39	1.83
			787 CMF	9.50	9.47	10.22	9.62	6.59	6.14	3.95	4.77	4.08	4.19	3.83	3.67	3.34
		Rockwell Collins	CMU900	7.20	5.69	4.82	4.22	4.41	4.36	3.61	4.16	4.16	4.27	4.90	7.79	7.59
	2200	Airbus	FANS-C	14.33	10.01	7.77	4.94	5.06	5.88	4.58	6.43	4.50	5.63	7.06	11.86	9.00
			FANS-B+	5.43	4.84	3.24	2.70	3.47	4.12	2.98	3.43	3.27	2.90	2.59	3.41	3.52
			FANS-A+B	5.09	4.94	3.84	4.10	4.69	3.94	4.29	3.97	3.95	3.75	3.47	3.63	2.93
	4000	Rockwell Collins	RIU-4010	9.25	10.73	10.73	10.73	9.90	12.02	12.01	12.28	14.47	13.86	13.49	11.72	10.79
			RIU-4000	6.13	5.12	7.30	5.31	8.07	8.19	12.86	7.30	6.79	9.75	7.72	5.05	8.73
			CMU900	7.61	2.90	5.69	4.38	6.11	4.62	7.17	8.00	6.62	8.21	6.26	5.97	1.40
			CMU4000	4.32	3.47	4.28	5.14	5.73	6.65	9.00	7.13	5.47	5.65	3.64	4.89	2.58
Spectralux	Dlink+	Spectralux	Dlink+	22.11	18.54	15.56	11.58	18.35	15.48	13.97	17.40	17.07	19.37	15.20	18.41	16.30
Thales	EVR750	Airbus	FANS-B+	6.65	6.47	5.23	5.86	7.07	8.60	9.26	8.75	8.27	8.40	6.11	7.84	7.83
			FANS-A+B		3.50						2.41	3.09	1.28			

Figure 3-9: 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.

4. 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.

The logs contain AVLC traffic recorded at each VGS during the 24hrs of each Fridays[1] (one dataset 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. Please note the logarithmic scale of the delays.

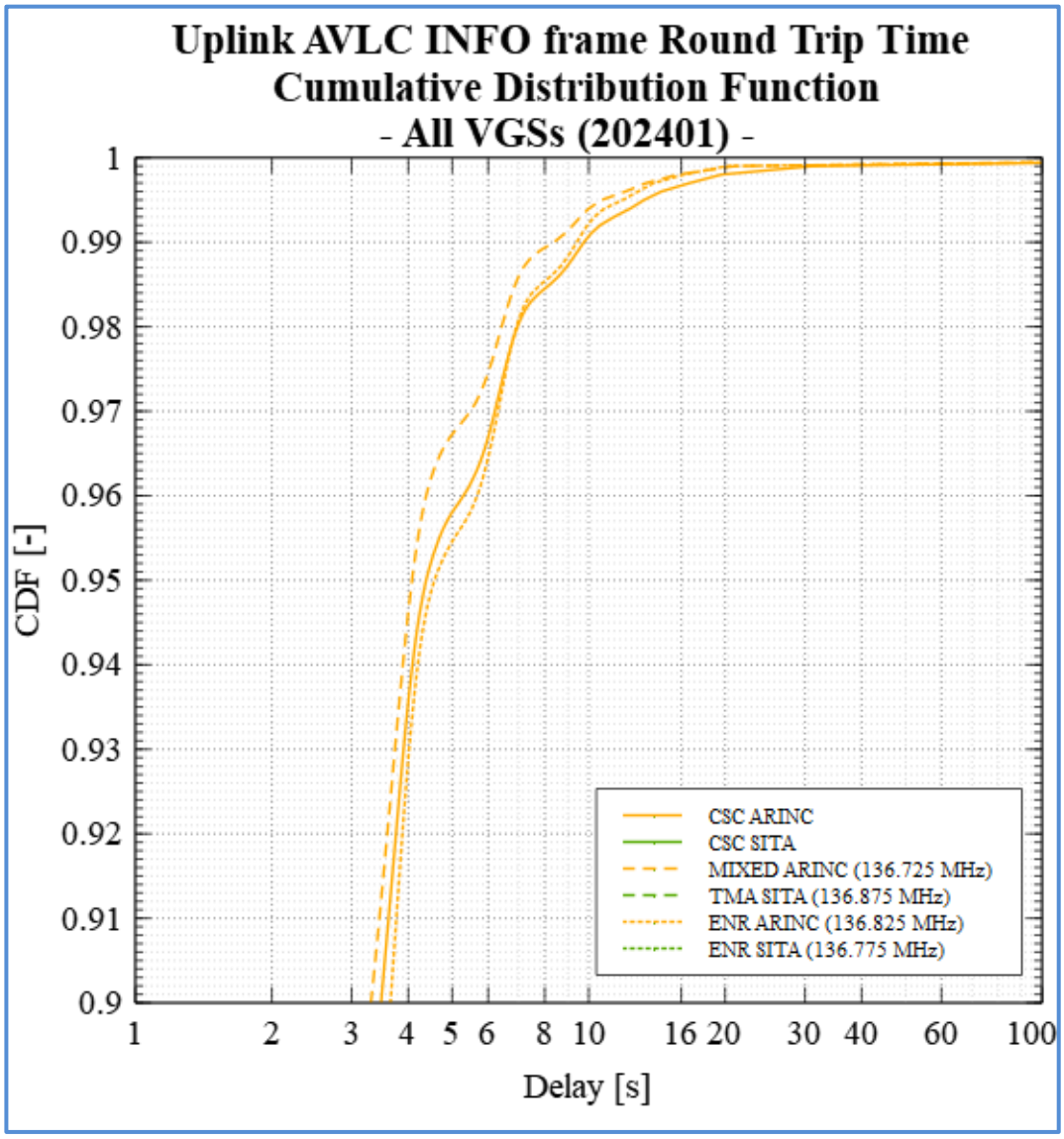

Figure 4-1: AVLC Round Trip Time

[1] The frequency of log provision has been increased from one day per month to one day per week.

AVLC Reliability

The graph below shows the cumulative distributions per frequency (and per CSP) for the AVLC Reliability[2] of AVLC INFO frames conveying ATN packet considering all the VGS logs. The 95th and the 99.9th 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.

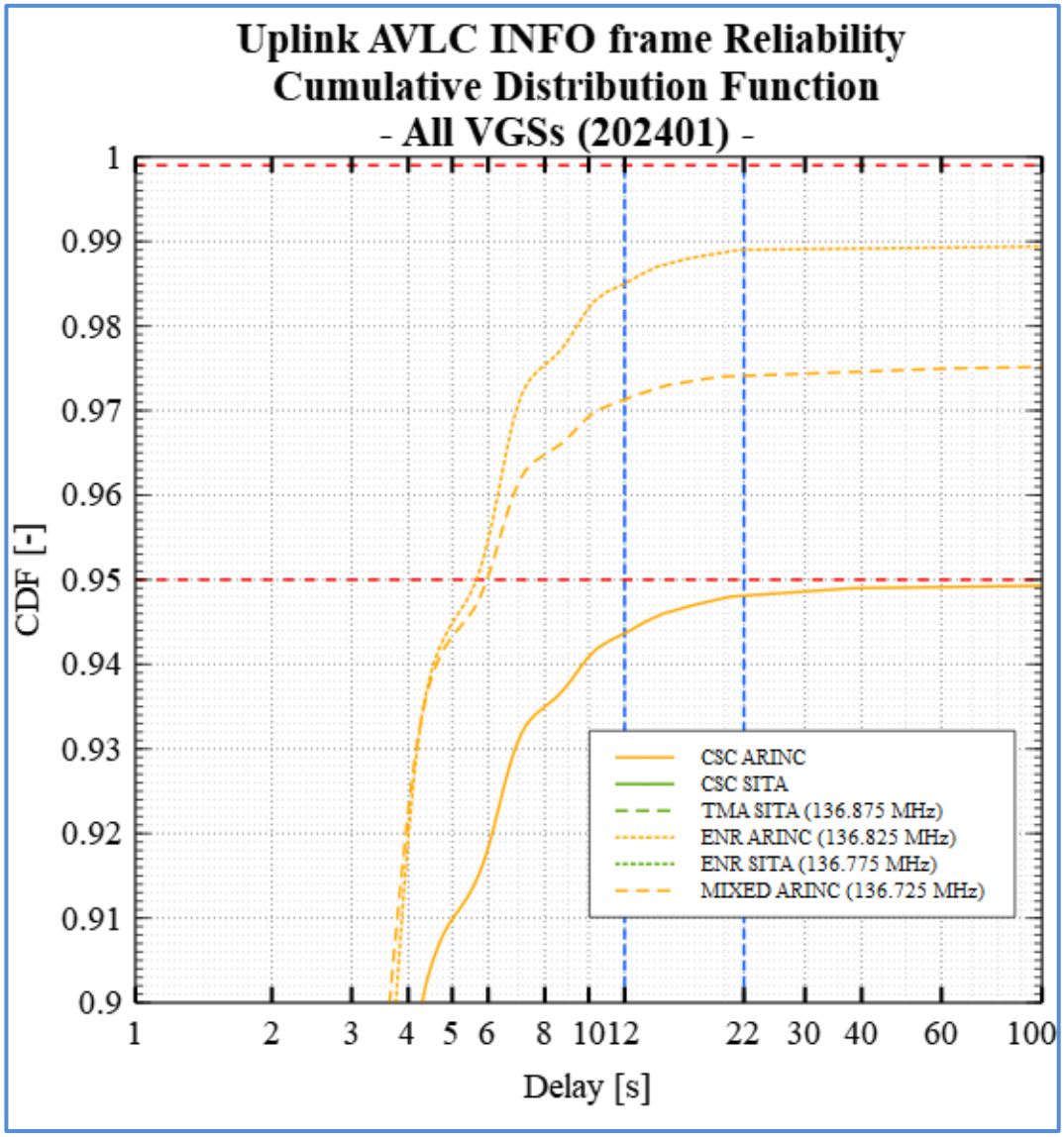

Figure 4-1: AVLC Reliability

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

[2] 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.

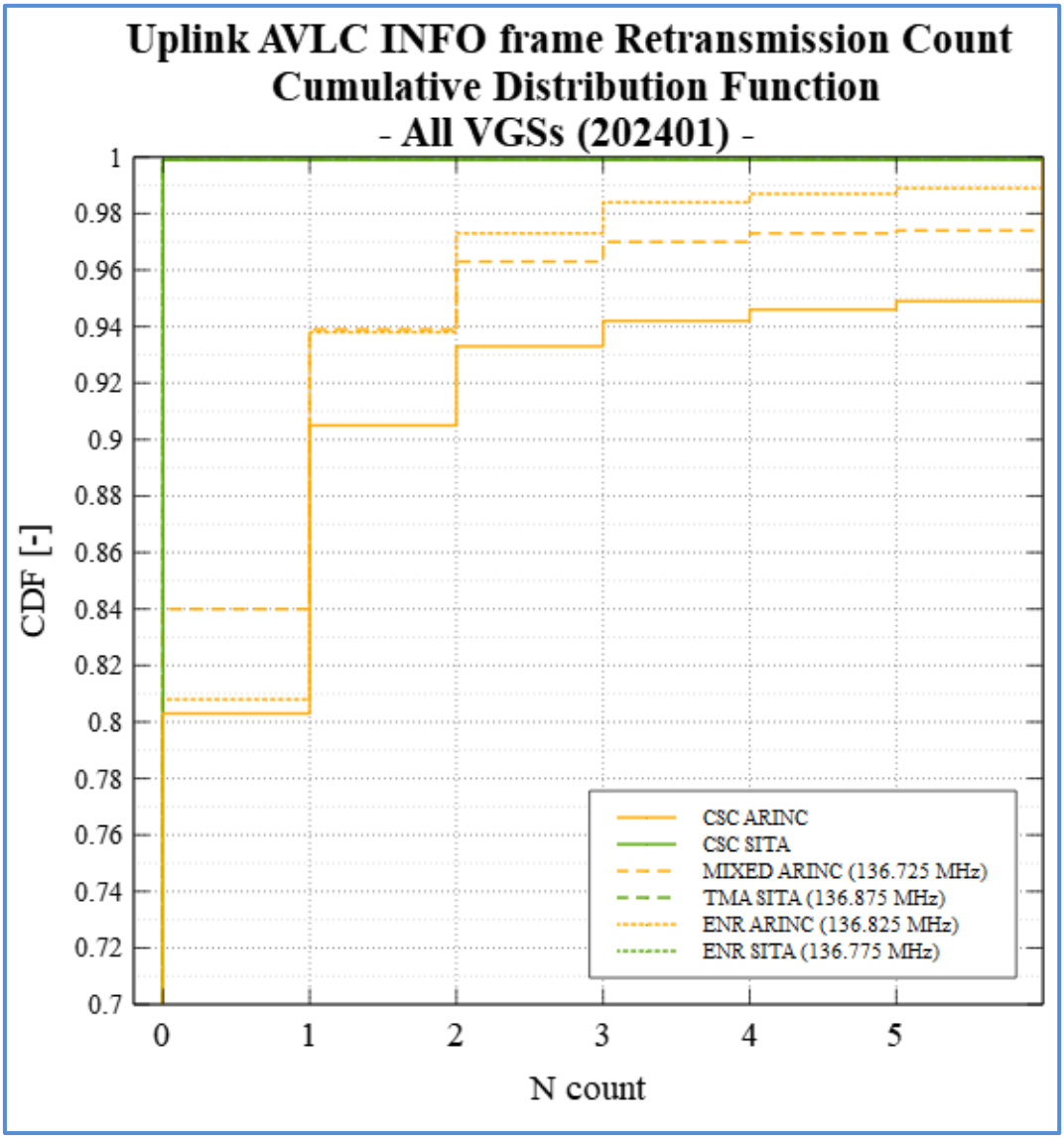

Figure 4-2: AVLC Uplink INFO frame retransmission count

AVLC Round Trip Time per frequency trend

The following set of graphs show the 95th ,99th and the 99.9th 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).

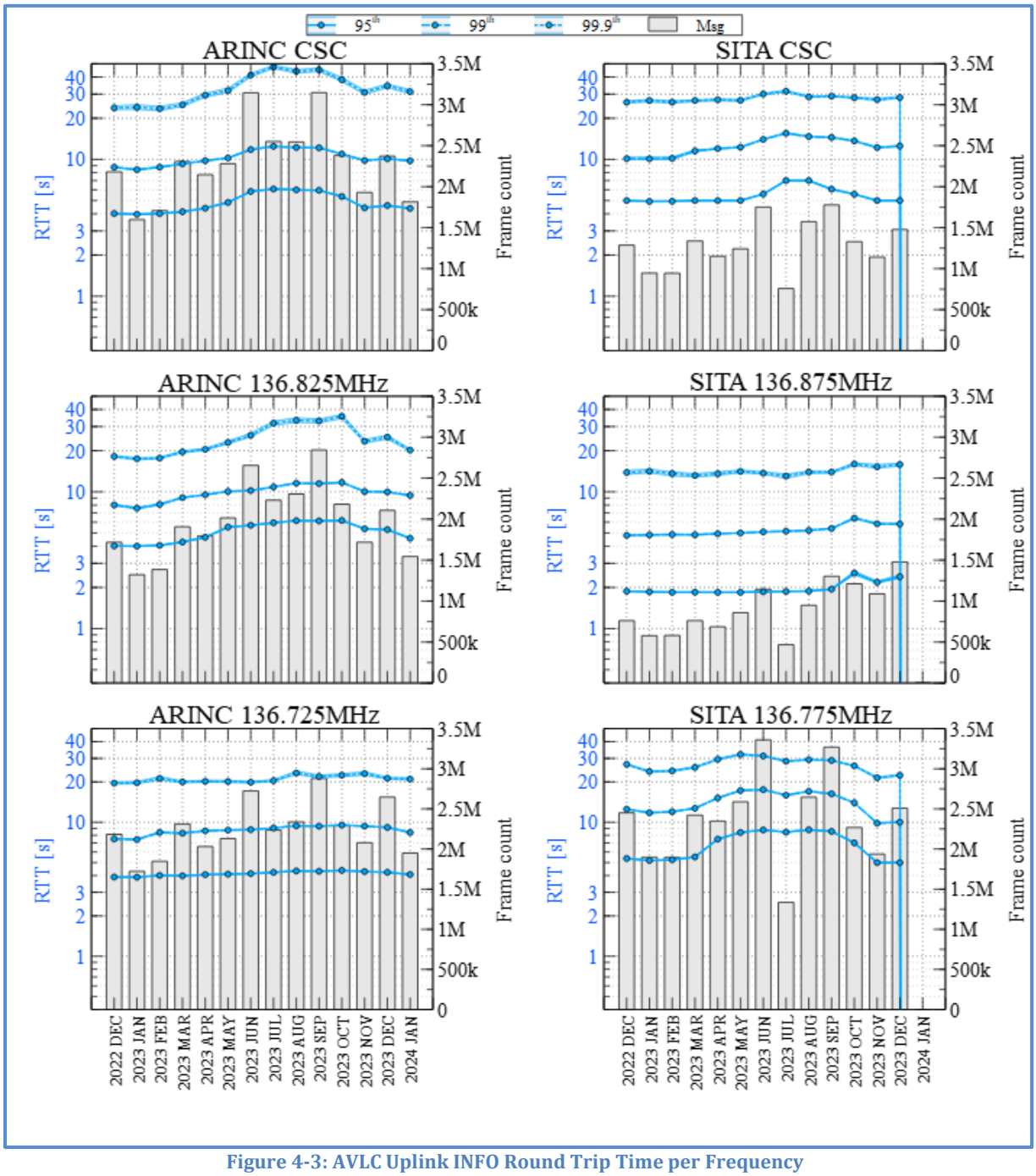

Figure 4-3: AVLC Uplink INFO Round Trip Time per Frequency

Uplink delivery success rate

The following set of graphs show the uplink delivery rate of AVLC INFO frames conveying ATN packet 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).

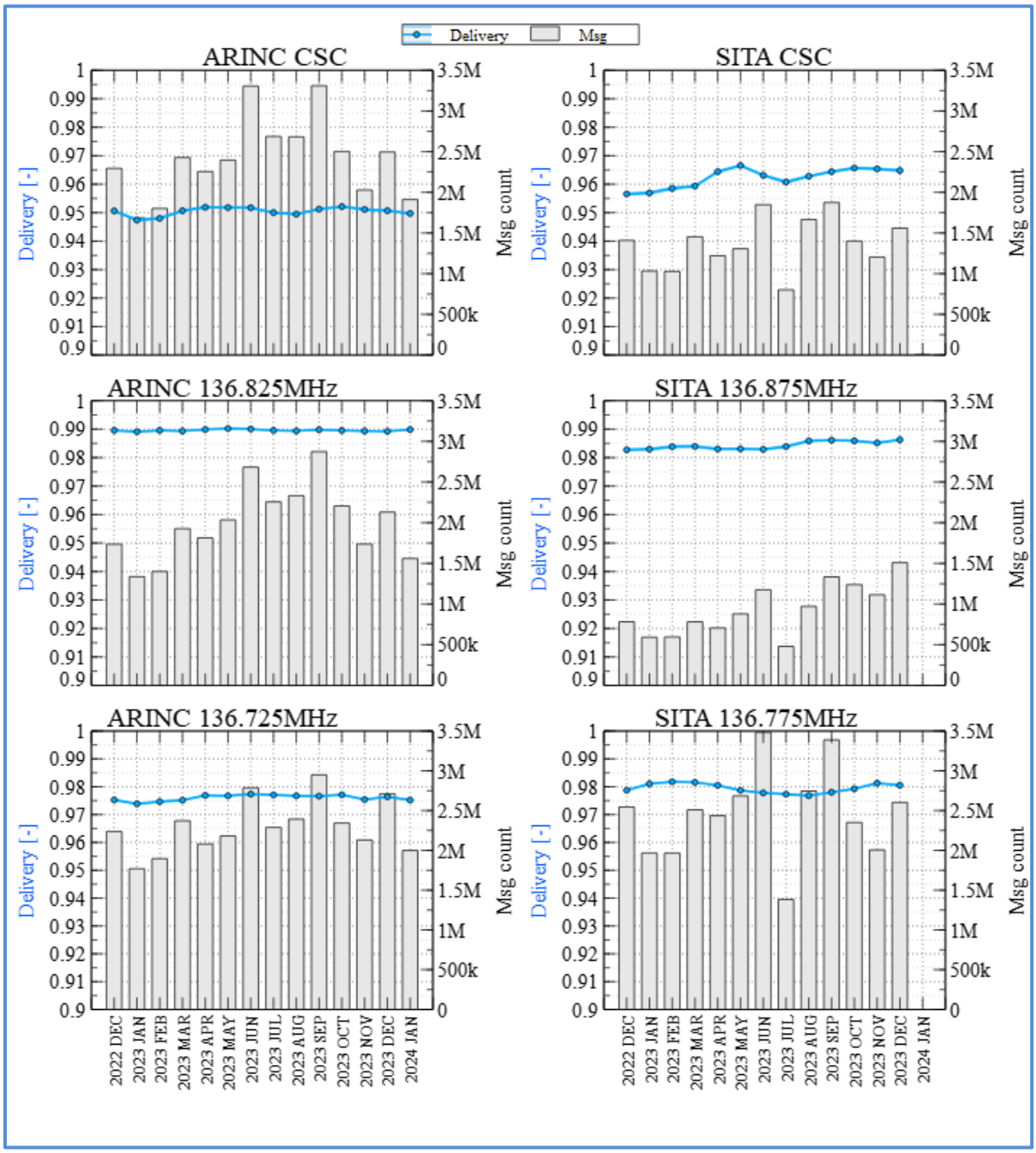

Figure 4-4: AVLC successful delivery rate per frequency

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).

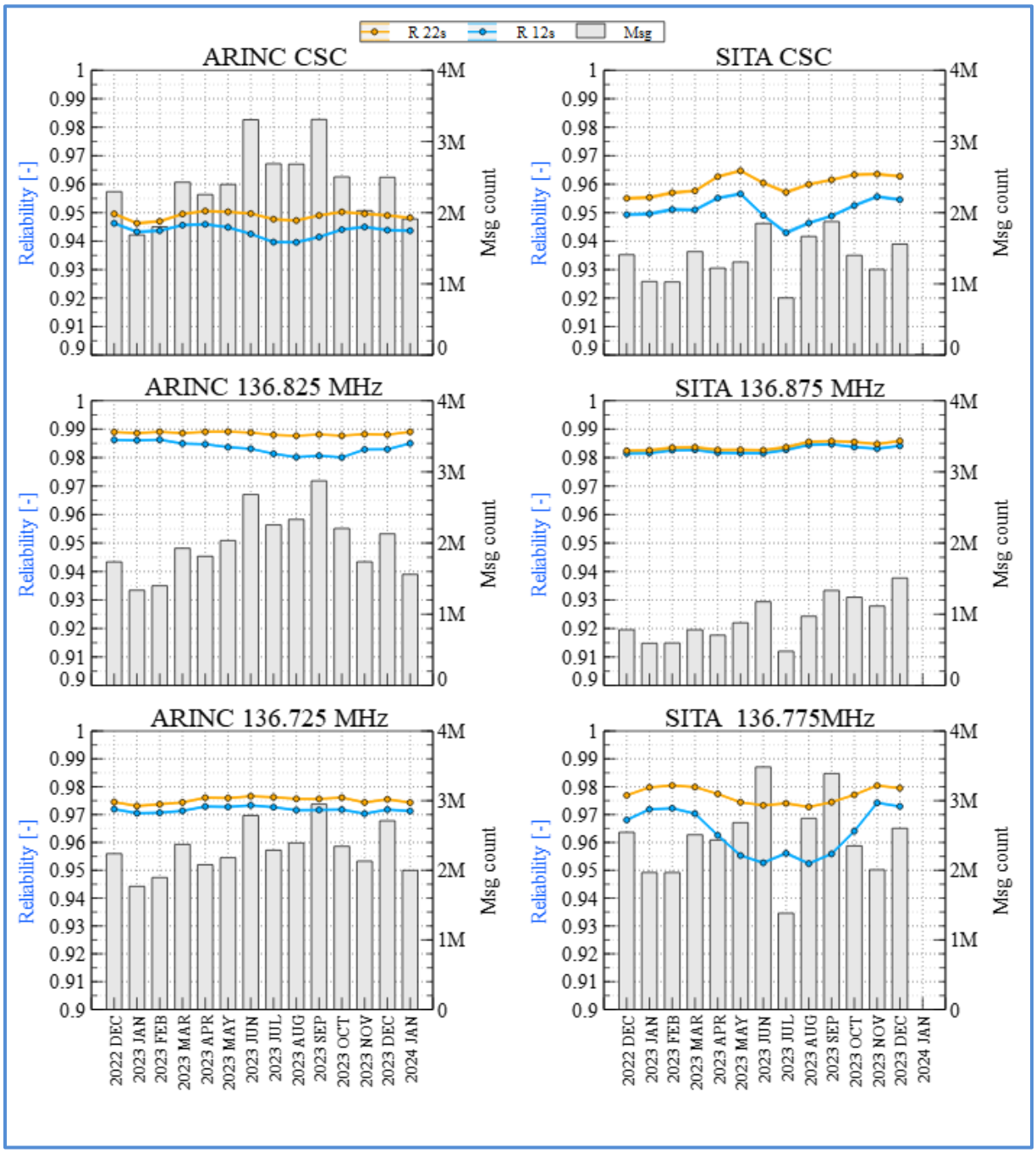

Figure 4-5: AVLC Reliability per frequency

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[3]) 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.

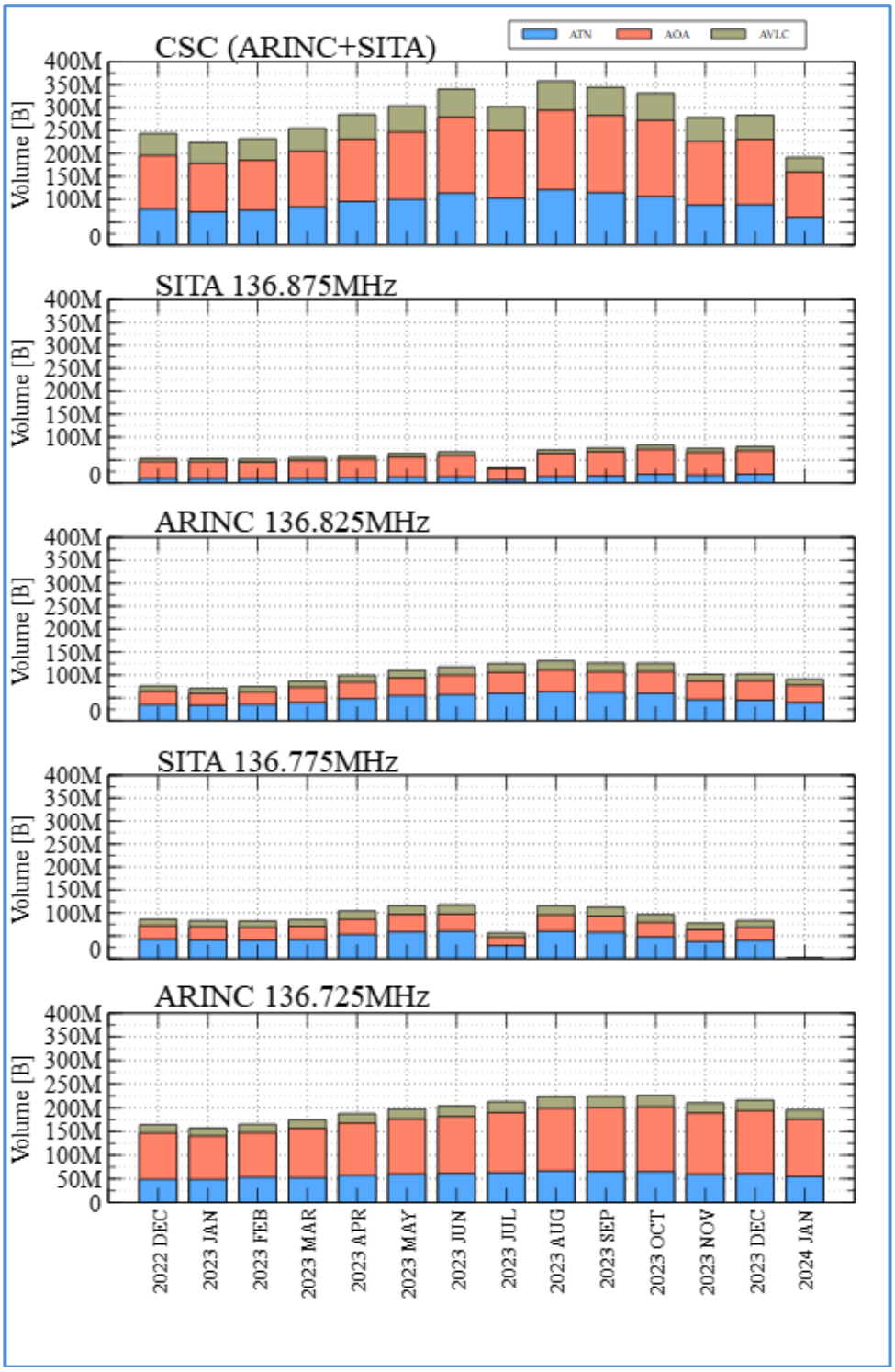

Figure 4-6: Daily average AVLC Channel load per frequency

[3] i.e. RR, SREJ, XID, …

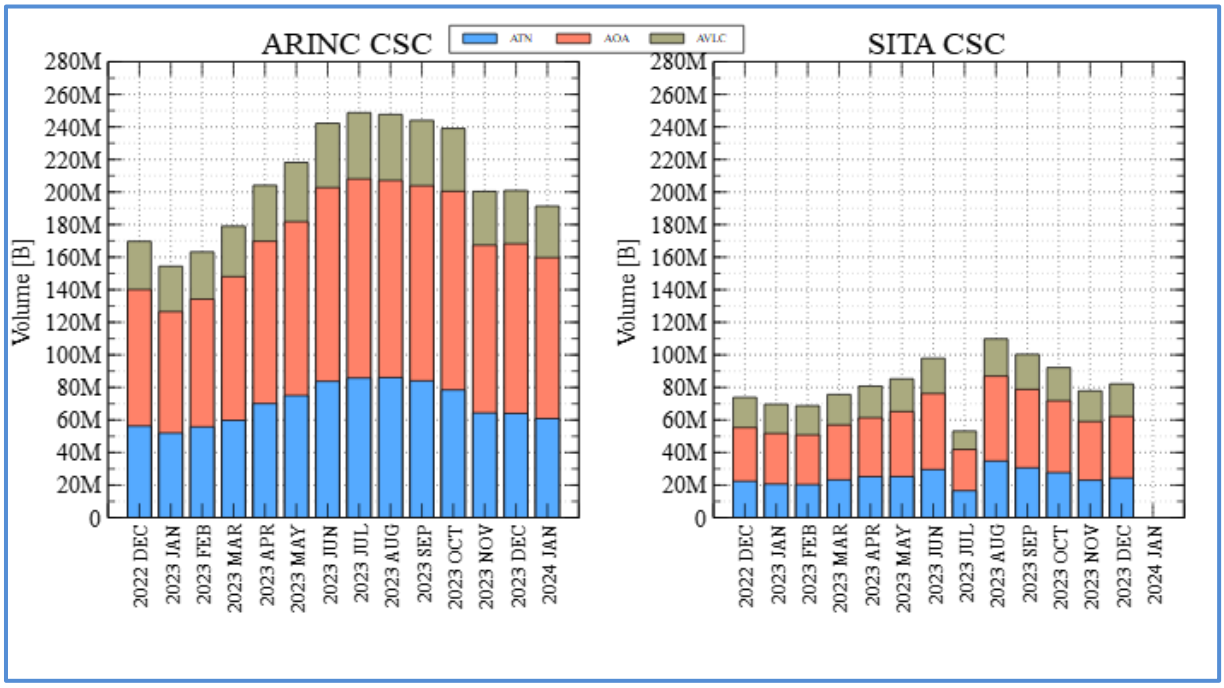

Figure 4-7: Daily average AVLC load on the CSC.

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 21 February 2024, may be different in subsequent months if additional data is uploaded by the ANSPs.

Data Available

	Null	01/01/24	02/01/24	03/01/24	04/01/24	05/01/24	06/01/24	07/01/24	08/01/24	09/01/24	10/01/24	11/01/24	12/01/24	13/01/24	14/01/24	15/01/24	16/01/24	17/01/24	18/01/24	19/01/24	20/01/24	21/01/24	22/01/24	23/01/24	24/01/24	25/01/24	26/01/24	27/01/24	28/01/24	29/01/24	30/01/24	31/01/24
EDUU		2,464	2,462	2,518	2,514	2,721	2,635	2,603	2,500	2,010	2,045	2,123	2,596	2,377	2,525	2,413	1,901	1,778	2,039	2,550	2,369	2,387	2,303	1,851	1,877	2,129	2,482	2,346	2,454	2,385	1,967	2,090
EDYY		2,725	2,776	2,831	2,836	2,949	2,899	3,026	2,799	2,278	2,320	2,479	2,932	2,786	2,941	2,667	2,121	2,064	2,346	2,769	2,590	2,668	2,555	2,110	2,150	2,426	2,804	2,748	2,899	2,812	2,300	2,421
EETT																																
EFIN									88	79	83	74	100	90	90	82	77	69	66	76	90	89	86	80	77	95	74	90	91	86	55	81
EGPX		779	716	684	732	826	733	704	690	575	597	640	750	755	852	652	490	531	633	671	701	691	738	578	573	697	698	602	776	695	664	581
EGTT		3,309	3,399	3,372	3,556	3,723	3,670	3,736	3,393	2,741	2,715	2,945	3,398	3,266	3,384	3,289	2,557	2,443	2,898	3,365	3,182	3,062	3,216	2,486	2,532	2,869	3,341	3,187	3,428	3,283	2,602	2,575
EISN																																
EKDK		786	777	805	815	827	757	856	772	593	616	693	770	694	790	693	575	555	683	778	699	761	750	597	639	711	786	690	831	788	630	680
ENOR																																
EPWW		980	958	918	981	1,000	1,043	1,025	1,016	763	749	776	975	955	952	921	738	735	787	987	921	922	940	718	715	786	951	667	941	43	11	739
ESMM		700	667	689	738	705	684	772	702	515	554	594	690	594	709	640	521	521	623	695	596	682	680	525	566	637	711	605	716	691	537	574
ESOS		285	350	336	345	353	322	435	363	292	298	309	369	300	394	342	284	283	350	378	280	378	361	288	310	360	372	294	419	372	286	331
EVRR		190	210	176	207	215	210	226	230	163	173	165	200	205	210	203	145	172	161	197	184	223	211	162	158	155	214	204	225	220	147	144
EYVC		133	161	138	142	149	185	184	163	134	133	117	148	159	157	150	120	131	132	154	133	178	140	120	110	113	144	160	169	145	114	114
GCCC		120	159	167	187	164	226	149	107	163	121	136	150	188	150	138	136	135	150	170	192	150	115	128	110	144	165	205	158	100	148	126
LBSR																																
LCCC																																
LDZO		761	815	776	788	846	886	878	766	682	688	653	753	794	809	682	612	589	637	717	778	771	638	548	628	631	711	762	748	643	574	625
LECB		1,370	1,371	1,331	1,344	1,415	1,329	1,418	1,301	1,088	991	1,044	1,292	1,121	1,280	1,168	915	884	988	1,261	1,113	1,253	1,181	856	898	964	1,213	1,052	1,211	1,152	879	889
LECM		2,389	2,525	2,337	2,539	2,422	2,659	2,544	2,302	1,939	1,851	1,940	2,208	2,359	2,358	2,037	1,682	1,570	1,855	2,081	2,297	2,249	2,034	1,644	1,641	1,800	2,193	2,284	2,324	2,071	1,726	1,663
LFBB		550	539	513	573	545	485	590	527	254	278	281	312	256	352	343	265	243	250	456	337	456	480	380	383	391	343	275	355	303	263	253
LFEE		1,362	1,367	1,411	1,436	1,502	1,549	1,550	1,313	1,010	1,037	1,105	1,229	1,395	1,364	1,084	885	915	1,012	1,210	1,340	1,307	1,123	912	1,037	1,098	1,304	1,471	1,453	1,227	961	1,039
LFFF		592	601	571	639	658	617	637	541	803	836	850	984	946	962	885	758	772	811	505	480	499	498	425	439	442	939	930	992	873	814	826
LFMM		1,469	1,496	1,470	1,453	1,574	1,569	1,623	1,359	1,085	1,033	1,062	1,299	1,264	1,377	1,249	930	872	981	1,314	1,233	1,338	1,219	905	932	1,033	1,330	1,216	1,330	1,228	961	1,008
LFRR		426	404	422	456	510	444	461	408	207	227	222	273	228	284	287	212	185	213	392	315	390	378	277	296	318	281	223	276	258	223	203
LGGG																																
LHCC		1,219	1,199		1,309	1,350	1,354	1,330	1,280	1,125	1,203	1,186	1,272	1,204	1,264	1,177	1,030	1,064	1,122	1,251	1,251	1,247	1,188	1,034	1,045	1,143	1,178	1,169	1,240	1,147	1,086	1,085
LIBB																																
LIMM																																
LIPP																																
LIRR																																
LJLA		396	391	370	407	441	452	424	379	331	342	310	401	410	429	362	319	289	344	366	391	400	303	269	285	323	380	385	374	331	285	294
LKAA		782	745	805	812	908	876	844	805	608	674	662	773	731	765	802	608	560	629	827	734	700	718	581	5	657	765	770	721	696	555	612
LMMM																																
LOVV		1,371	1,428	1,451	1,472	1,608	1,522	1,539	1,491	1,246	1,301	1,276	1,550	1,401	1,420	1,355	1,135	1,112	1,238	1,483	1,401	1,391	1,307	1,061	1,097	1,168	1,452	1,305	1,376		1,135	1,206
LPPC		1,268	1,277	1,160	1,357	1,391	1,552	1,405	1,186	1,070	955	1,053	1,102	1,236	1,178	1,041	904	837	1,015	1,123	1,288	1,226	1,002	908	811	962	1,107	1,225	1,210	1,002		891
LRBB		948	968	1,009	1,038	1,094	1,070	1,048	1,021	991	1,005	998	1,008	1,039	1,035	997	872	935	927	971	1,012	1,063	939	932	939	966	967	984	1,046	955	947	919
LSAG		825	812	799	812	877	884	916	722	567	555	579	781	797	835	688	491	486	572	756	727	756	673	455	524	619	796	812	851	701	518	563
LSAZ		875	803	863	852	886	886	894	802	624	641	668	731	733	790	649	520	480	566	714	713	746	719	556	615	654	857	793	850	759	555	598
LZBB		603	568	601	657	658	668	656	606	513	546	531	572	610	635	589	512	505	547	612	595	570	571	503	499	591	572	616	619	557	513	502