



International Civil Aviation Organization

The Fifth Meeting of the Future Air Navigation Systems Interoperability Team-Asia (FIT-Asia/5)

Bangkok, Thailand, 05 – 06 May 2016

Agenda Item 3: Review of ADS/CPDLC Operations

DATA LINK PERFORMANCE REPORT FOR INDIA

(Presented by Airports Authority of India)

SUMMARY

This paper presents performance data of the ADS-C/CPDLC data link ground station in Chennai FIR for the period February to December 2015.

1. INTRODUCTION

1.1 BOBASMA conducts the annual End-to-End Safety and system performance monitoring of the ATS Data link ground systems in India. Of the four data link ground systems operational in India, in Chennai, Mumbai, Kolkata and Delhi, it was possible to extract data only from the Chennai FIR ground system. Efforts are on to make the ground system at the other three stations to be capable of collecting data as per the data collection points recommended in Table D1 & D3 of Appendix-D of the Global Operational Data Link Document (GOLD).

1.2 Owing to certain technical difficulties in the collection and recording of Data Link data, the data for the month of January in Chennai was not extracted. Data extracted for the months of February to December 2015 were used to measure FANS1/A system performance against the Required Communication Performance (RCP) and Required Surveillance Performance (RSP) as per the guidelines contained in the Global Operational Data-Link Document (GOLD).

2. DISCUSSION

Chennai FIR CPDLC Actual Communications Performance (ACP)

2.1 The CPDLC ACP measurement was conducted using a total of 125329 CPDLC messages sent within Chennai FIR. The ACP for messages sent via Satellite and VHF meet the 95% percent criterion but marginally fall below the 99.9 percent criterion. HF messages being very minimal the ACP for messages sent via HF fell well below both the 95% and 99.9% criterion.

2.2 **Table 1** and **Figure 1** present overall CPDLC Actual Communications Performance (ACP) for messages sent within Chennai FIR by media type (satellite, VHF, HF and the combined total), for the period February to December 2015.

CHENNAI FIR CPDLC ACP				
Messages		% < 180 sec (Target 95%)	% < 210 sec (Target 99.9%)	Remarks
Satellite	44080	99.06%	99.46%	
VHF	81246	99.58%	99.71%	
HF	3	75.71%	80.48%	
ALL	125329	99.40%	99.62%	

Table1: Chennai FIR CPDLC ACP per media type

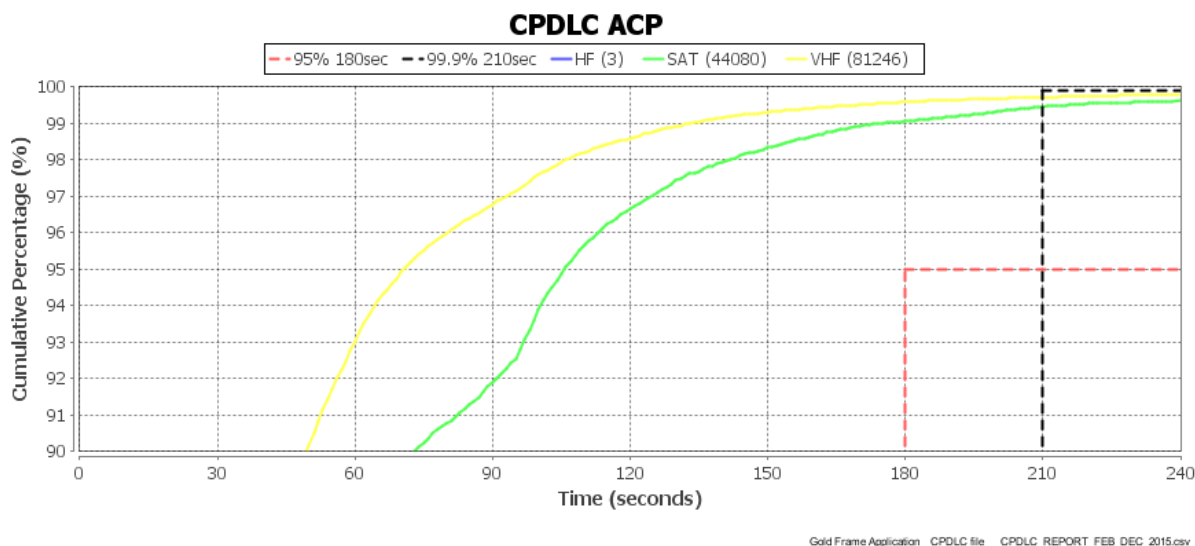


Figure 1: Chennai FIR ACP by Data Link Media Type

Chennai FIR CPDLC Actual Communications Technical Performance (ACTP)

2.3 The CPDLC ACTP measurement was conducted using a total of 125329 CPDLC messages sent within Chennai FIR. The ACTP for messages sent via Satellite and VHF meet the 95 percent criterion but marginally fall below the 99.9 percent criterion. HF messages being very minimal the ACTP for messages sent via HF fell well below both the 95% and 99.9% criterion.

2.4 **Table 2** and **Figure 2** present overall CPDLC Actual Communications Technical Performance (ACTP) for messages within the Chennai FIR by media type (Satellite, VHF, HF and the combined total for both), for the period February to December 2015.

CHENNAI FIR CPDLC ACTP				
Messages		% < 180 sec (Target 95%)	% < 210 sec (Target 99.9%)	Remarks
Satellite	44080	99.36%	99.58%	
VHF	81246	99.80%	99.89%	
HF	3	71.35%	75.73%	
ALL	125329	99.65%	99.78%	

Table 2: Chennai FIR CPDLC ACTP

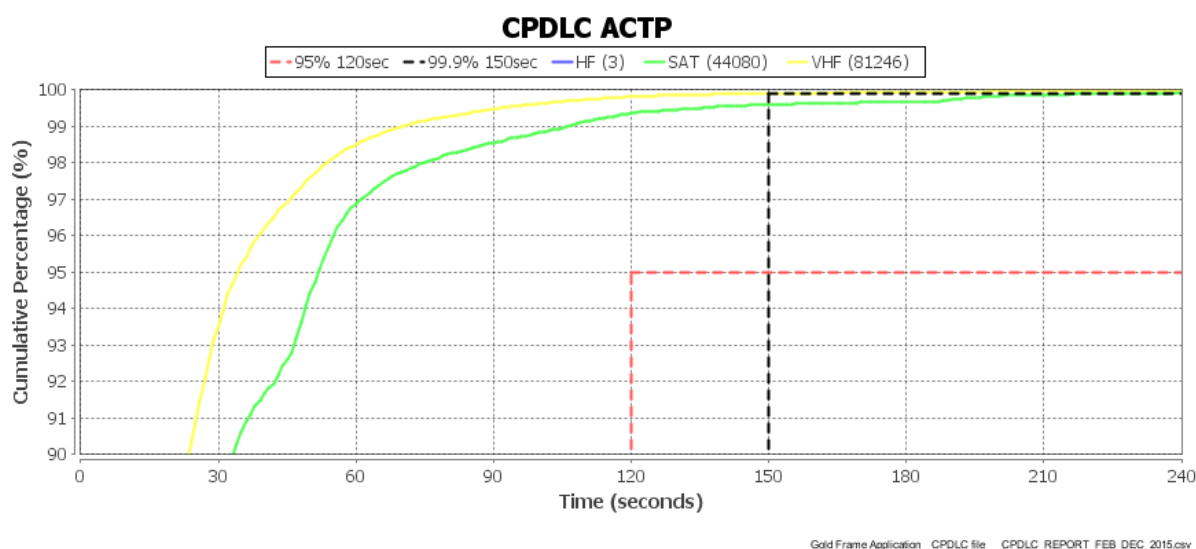


Figure 2: Chennai FIR ACTP by Data Link Media Type

Chennai FIR CPDLC Actual Communications Performance (ACP) per Operator (de-identified)

2.5 The CPDLC ACP per Operator was measured for the top ten operators within the Chennai FIR. All the top ten operators satisfy RCP240 criteria of 95 percentage transactions within 180 seconds but fall below the criteria of 99.9 percentage transactions within 210 seconds.

2.6 **Table 3** and **Figure 3** present CPDLC Actual Communications Performance per Operator (de-identified) for messages sent within the Chennai FIR, for the period February to December 2015.

CHENNAI FIR CPDLC ACP per Operator				
Operator (de-identified)	Messages	% < 180 sec (Target 95%)	% < 210 sec (Target 99.9%)	Remarks
OP1	27524	99.65%	99.75%	
OP2	19905	99.09%	99.38%	
OP3	19358	99.40%	99.88%	
OP4	14089	99.83%	99.78%	
OP5	12509	99.29%	99.54%	
OP6	5394	98.97%	99.25%	
OP7	4160	99.59%	99.84%	
OP8	2874	99.07%	99.45%	
OP9	2580	99.18%	99.46%	
OP10	2290	98.25%	98.97%	

Table 3: Chennai FIR CPDLC ACP per Operator

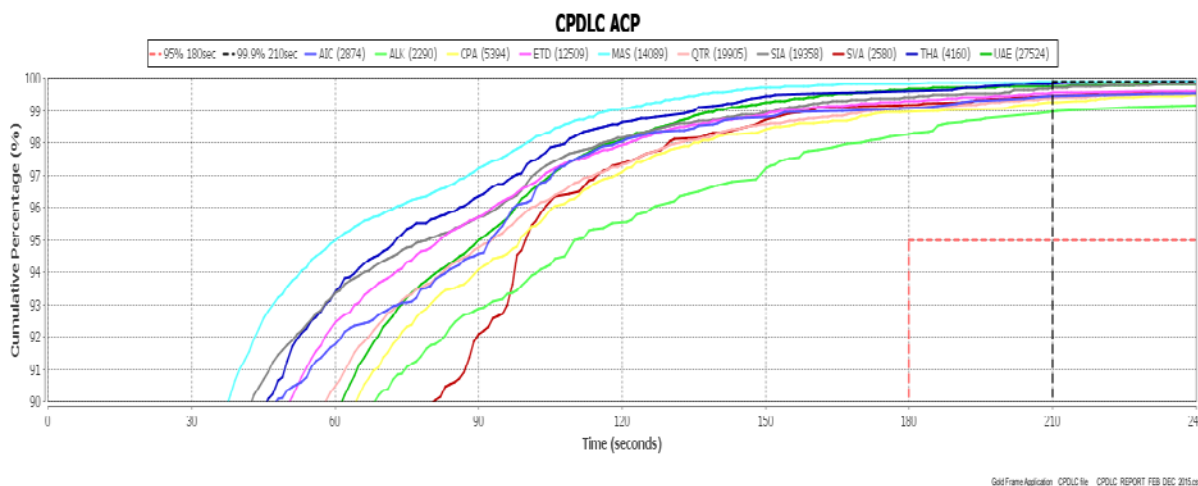


Figure 3: Chennai FIR ACP per Operator

Chennai FIR ADS-C Downlink Latency

2.7 The ADS-C Downlink Latency for Chennai FIR was measured using a total of 533504 messages. The ADS-C downlink latency for messages sent via Satellite and VHF meet the 95% percent criterion but fall below the 99.9 percent criterion. For messages sent via HF ADS-C downlink latency fell well below both the 95% and 99.9% criterion.

2.8 **Table 4** and **Figure 4** present ADS-C Downlink Latency for messages sent within the Chennai FIR per media type (Satellite, VHF, HF and the combined total) for the period February to December 2015.

CHENNAI FIR ADS-C Downlink Latency				
Messages		% < 90 sec (Target 95%)	% < 180 sec (Target 99.9%)	Remarks
Satellite	218330	95.41%	98.60%	
VHF	312981	97.98%	99.36%	
HF	2193	66.99%	84.72%	
Total	533504	96.80%	98.99%	

Table 4: Chennai FIR ADS-C Downlink Latency per Media

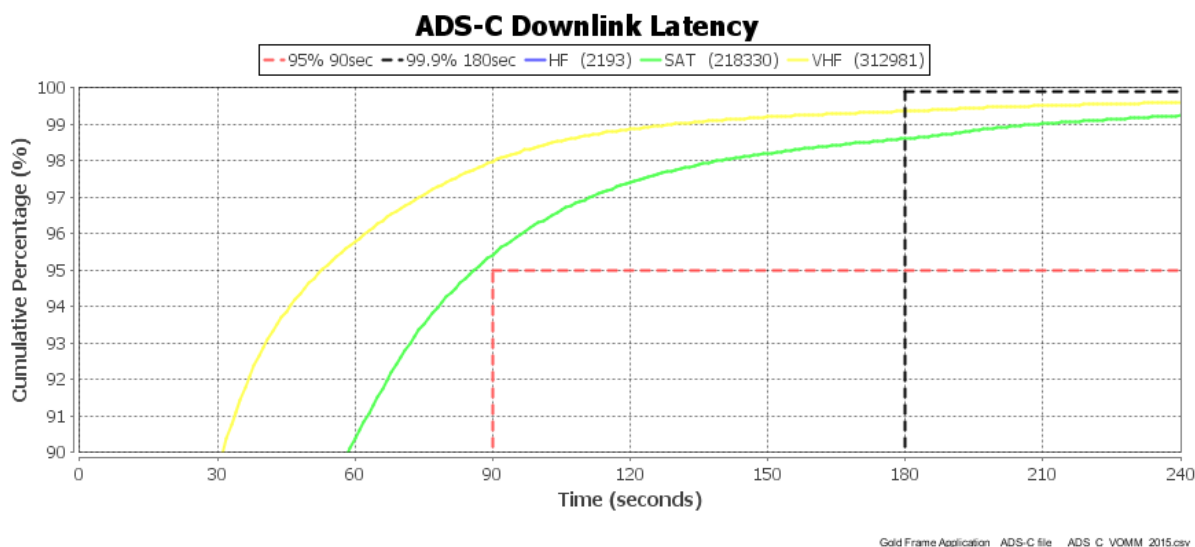


Figure 4: Chennai FIR ADS-C Downlink Latency per Media

2.9 Further data link performance analysis is provided in **Attachment A**.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

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ATTACHMENT A – ADDITIONAL ANALYSIS

1. CHENNAI CPDLC ACTUAL COMMUNICATIONS PERFORMANCE (ACP)

CPDLC Actual Communications Performance (ACP) per Month – Satellite

1.1 **Table 1** and **Figure 1** present CPDLC ACP per month for messages sent within the Chennai FIR by Satellite data link, for the period February to December 2015.

CHENNAI FIR CPDLC ACP per Month - Satellite				
Month	Messages	% < 180 sec (Target 95%)	% < 210 sec (Target 99.9%)	Remarks
February	1483	99.03%	99.60%	
March	2975	99.29%	99.60%	
April	3436	99.31%	99.65%	
May	4448	98.89%	99.38%	
June	3436	99.20%	99.58%	
July	3514	98.85%	99.43%	
August	9377	99.19%	99.47%	
September	4247	99.03%	99.39%	
October	3902	98.74%	99.22%	
November	4039	99.00%	99.38%	
December	3223	99.10%	99.54%	

Table 1: Chennai FIR CPDLC ACP per Month – Satellite

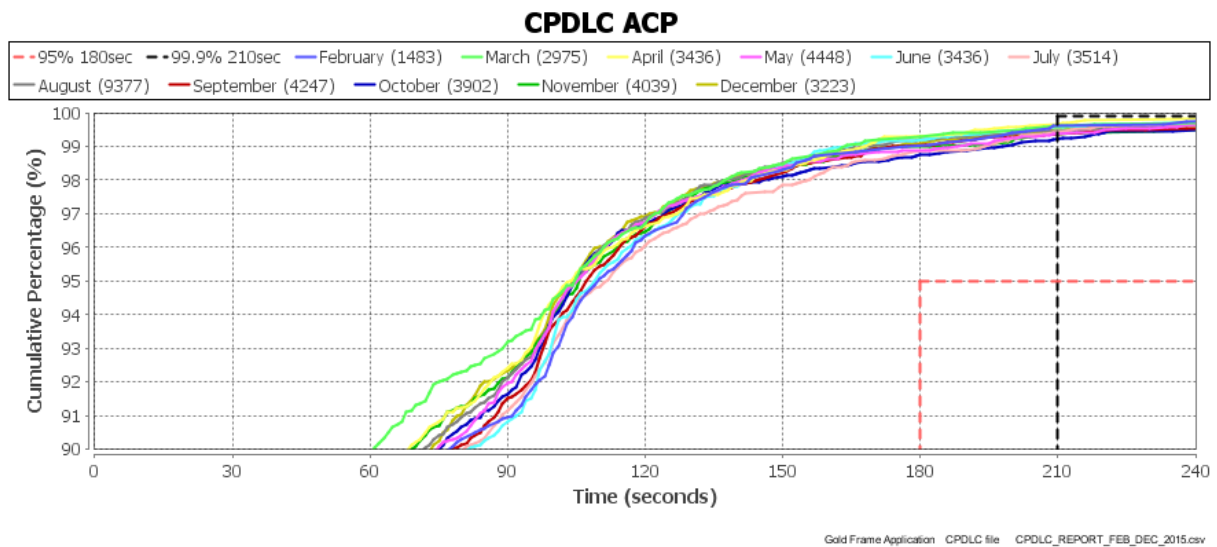


Figure 1: Chennai FIR CPDLC ACP per Month - Satellite

CPDLC Actual Communications Performance (ACP) per Month – VHF

1.2 **Table 2** and **Figure 2** present CPDLC ACP (VHF) per month for messages sent within the Chennai FIR by VHF data link, for the period February to December 2015.

CHENNAI FIR CPDLC ACP per Month - VHF				
Month	Messages	% < 180 sec (Target 95%)	% < 210 sec (Target 99.9%)	Remarks
February	3243	99.68%	99.86%	
March	5841	99.64%	99.78%	
April	6075	99.63%	99.77%	
May	7588	99.57%	99.72%	
June	6317	99.59%	99.70%	
July	6742	99.57%	99.68%	
August	17283	99.62%	99.70%	
September	7838	99.68%	99.82%	
October	7095	99.48%	99.61%	
November	7215	99.54%	99.69%	
December	6009	99.45%	99.64%	

Table 2: Chennai FIR CPDLC ACP per Month – VHF

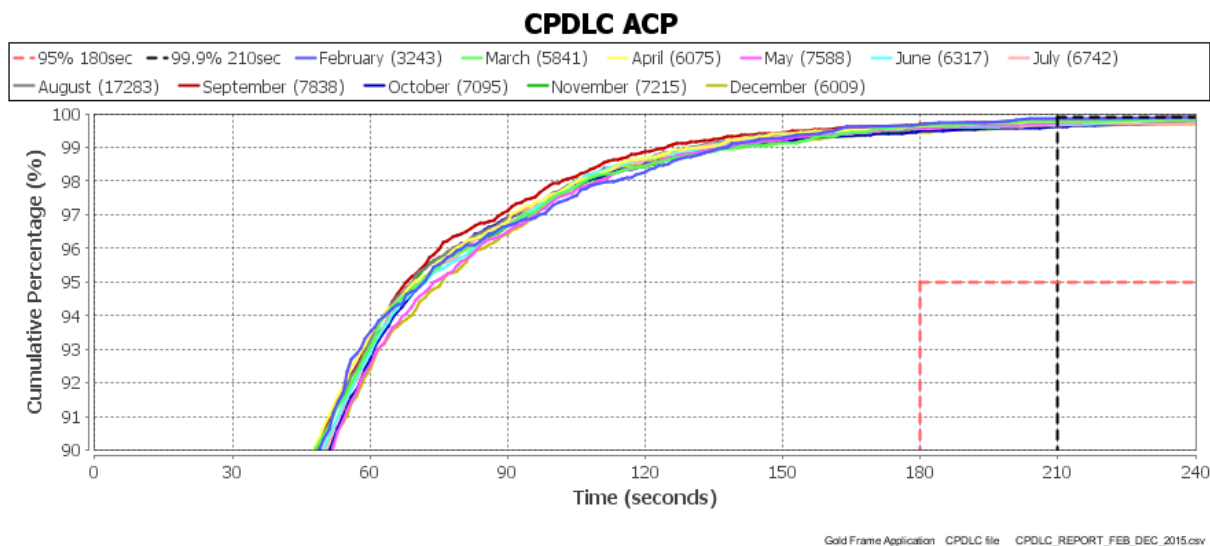


Figure 2: Chennai FIR CPDLC ACP per Month – VHF

2 CHENNAI CPDLC ACTUAL COMMUNICATIONS TECHNICAL PERFORMANCE (ACTP)

CPDLC Actual Communications Technical Performance (ACTP) per Month – Satellite

2.1 **Table 3** and **Figure 3** present CPDLC ACTP per month for messages sent within the Chennai FIR by Satellite, for the period February to December 2015.

CHENNAI FIR CPDLC ACTP per Month - Satellite				
Month	Messages	% < 120 sec (Target 95%)	% < 150 sec (Target 99.9%)	Remarks
February	1483	99.36%	99.58%	
March	2975	99.29%	99.59%	
April	3436	99.53%	99.70%	
May	4448	99.37%	99.67%	
June	3436	99.48%	99.77%	
July	3514	99.17%	99.51%	
August	9377	99.40%	99.59%	
September	4247	99.36%	99.65%	
October	3902	99.10%	99.40%	
November	4039	99.41%	99.49%	
December	3223	99.32%	99.53%	

Table 3: Chennai FIR CPDLC ACTP per Month – Satellite

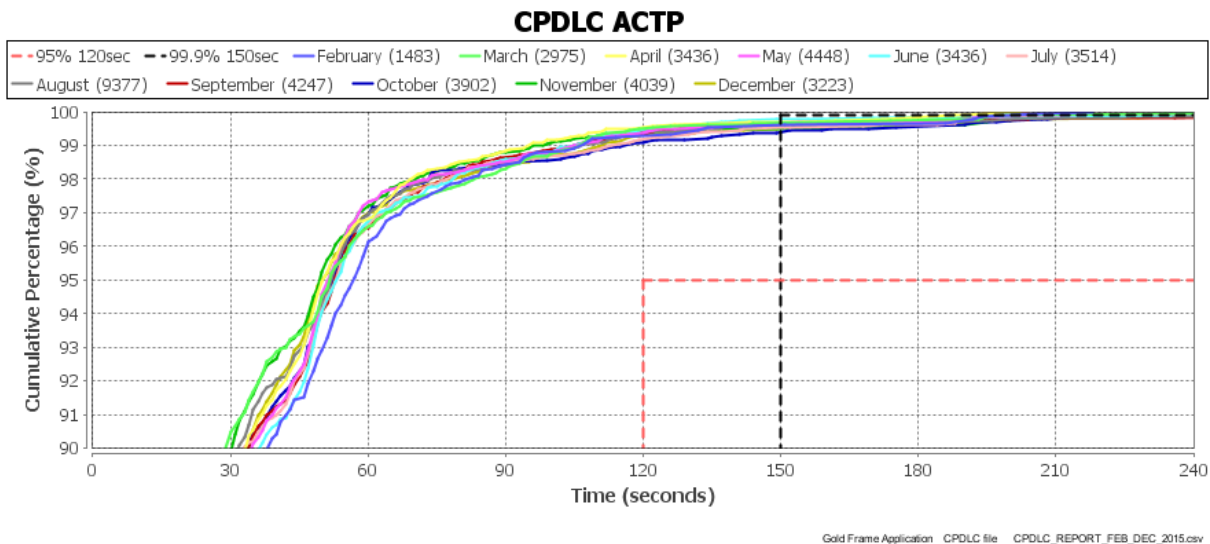


Figure 3. Chennai FIR CPDLC ACTP per Month - Satellite

CPDLC Actual Communications Technical Performance (ACTP) per Month – VHF

2.2 **Table 4** and **Figure 4** present CPDLC ACTP per month for messages sent within the Chennai FIR by VHF data link, for the period February to December 2015.

CHENNAI FIR CPDLC ACTP per Month - VHF				
Month	Messages	% < 120 sec (Target 95%)	% < 150 sec (Target 99.9%)	Remarks
February	3243	99.79%	99.89%	
March	5841	99.71%	99.89%	
April	6075	99.85%	99.91%	
May	7588	99.78%	99.91%	
June	6317	99.81%	99.91%	
July	6742	99.84%	99.85%	
August	17283	99.83%	99.92%	
September	7838	99.86%	99.94%	
October	7095	99.81%	99.91%	
November	7215	99.77%	99.88%	
December	6009	99.78%	99.85%	

Table 4: Chennai FIR CPDLC ACTP per Month - VHF

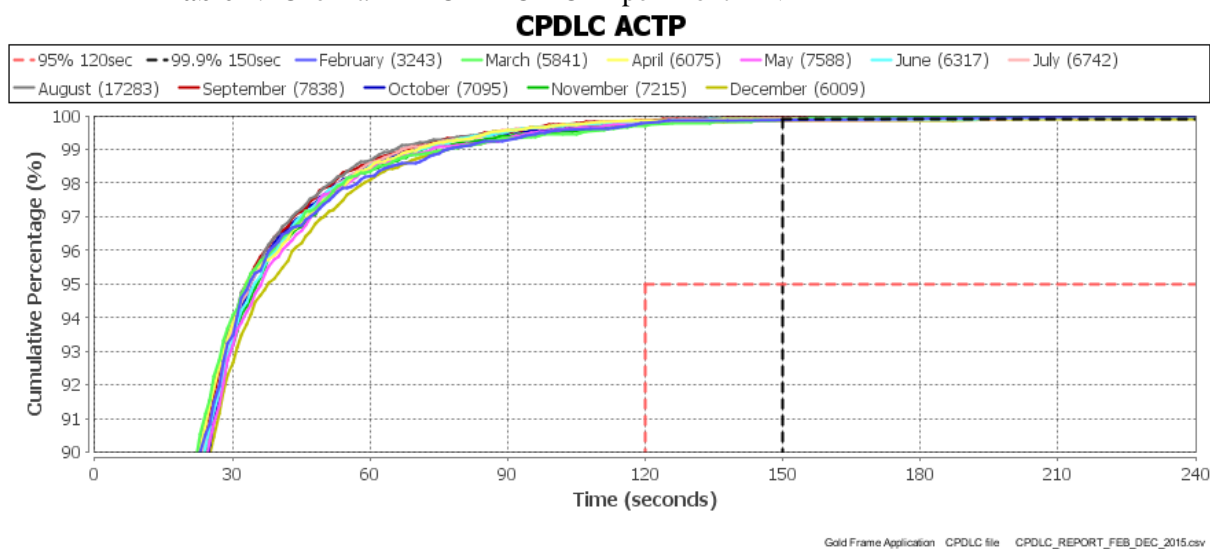


Figure 4: Chennai FIR CPDLC ACTP per Month - VHF

3 CHENNAI CPDLC COMMUNICATIONS PERFORMANCE PER OPERATOR

CPDLC Actual Communications Technical Performance (ACTP) per Operator (de-identified)

3.1 **Table 5** and **Figure 5** present CPDLC Actual Communications Technical Performance per Operator (de-identified) for messages sent within the Chennai FIR, for the period February to December 2015.

CHENNAI FIR CPDLC ACTP per Operator(De-identified)				
Month	Messages	% < 120 sec (Target 95%)	% < 180 sec (Target 99.9%)	Remarks
QTR	19905	99.51%	99.66%	
SIA	19358	99.37%	99.60%	
UAE	27524	99.71%	99.85%	
MAS	14089	99.87%	99.93%	
ETD	12509	99.57%	99.69%	
CPA	5394	99.66%	99.84%	
THA	4160	99.66%	99.89%	
AIC	2874	99.00%	99.31%	
SVA	2580	99.89%	99.90%	
ALK	2290	100%	100%	

Table 5. Chennai FIR CPDLC ACTP per Operator (de-identified)

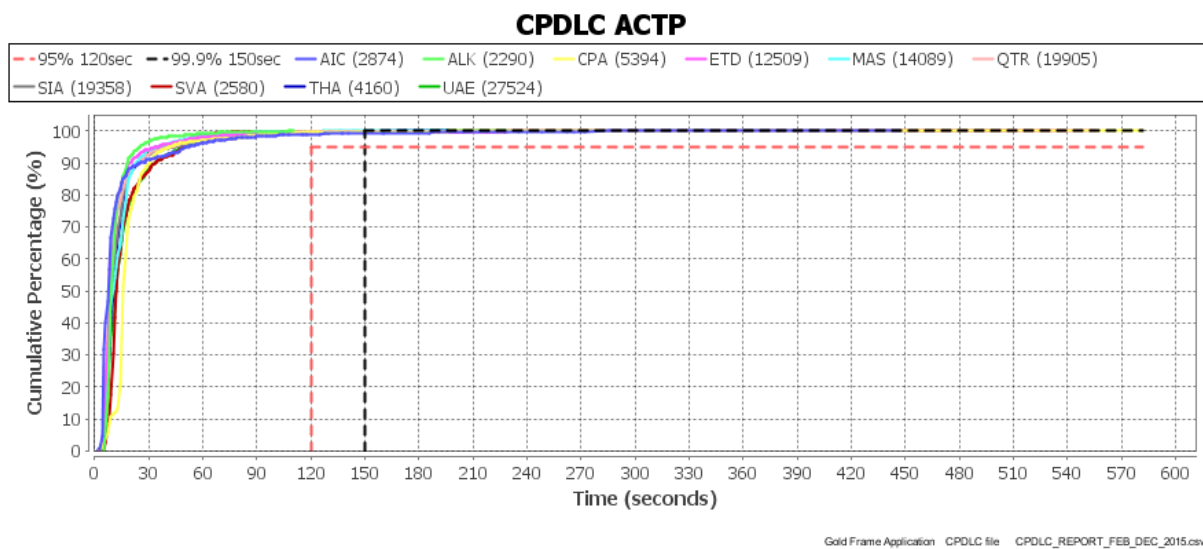


Figure 5: Chennai FIR CPDLC ACTP per Operator (de-identified)

CPDLC Pilot Operational Response Time (PORT) per Operator (de-identified)

3.2 **Table 6** and **Figure 6** present CPDLC Pilot Operational Response Time per Operator for messages sent within the Chennai FIR for the period February to December 2015.

CHENNAI FIR CPDLC PORT per Operator(De-identified)			
Month	Messages	% < 60 sec (Target 95%)	Remarks
QTR	19905	99.51%	
SIA	19358	99.37%	
UAE	27524	99.71%	
MAS	14089	99.87%	
ETD	12509	99.57%	
CPA	5394	99.66%	
THA	4160	99.66%	
AIC	2874	99.00%	
SVA	2580	99.89%	
ALK	2290	100%	

Table 6: CPDLC PORT per Operator (de-identified)

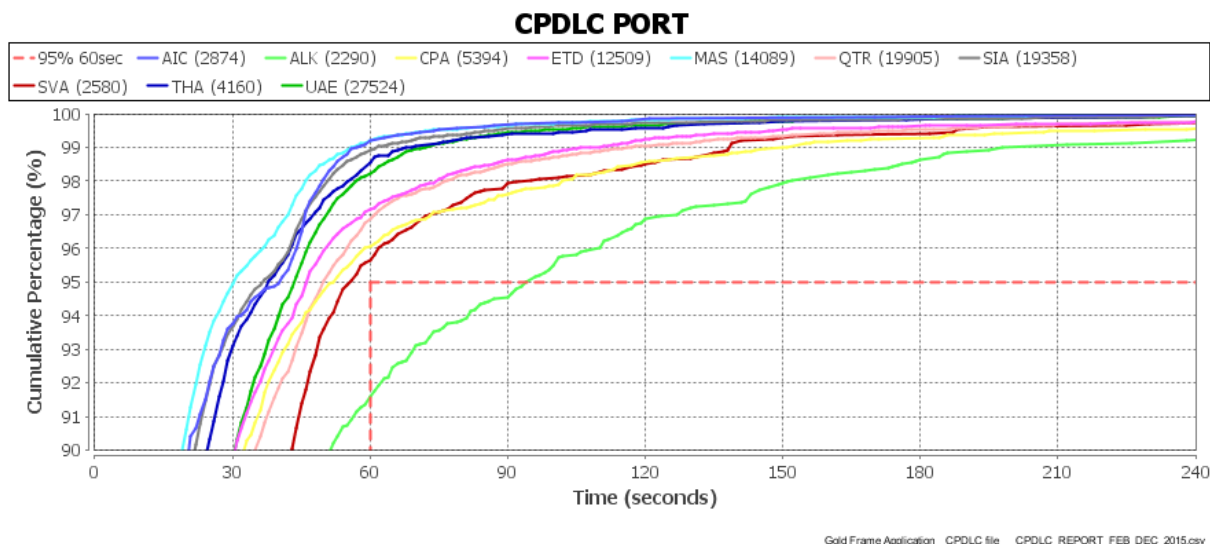


Figure 6: Chennai FIR CPDLC PORT per Operator (de-identified)

4 CHENNAI ADS-C DOWNLINK LATENCY

ADS-C Downlink Latency per Month – Satellite

4.1 Table 7 and Figure 7 present ADS-C Downlink Latency per month for messages sent within the Chennai FIR by Satellite data link, for the period February to December 2015.

CHENNAI FIR ADS-C Downlink Latency - Satellite				
Month	Messages	% < 90 sec (Target 95%)	% < 180 sec (Target 99.9%)	Remarks
February	9321	95.25%	98.94%	
March	18615	95.75%	98.88%	
April	20426	95.52%	98.76%	
May	22922	94.96%	98.56%	
June	17987	95.26%	98.41%	
July	19401	95.95%	98.85%	
August	24121	96.07%	98.74%	
September	21582	95.45%	98.39%	
October	20417	94.82%	98.09%	
November	20556	95.60%	98.65%	
December	22982	94.87%	98.55%	

Table 7: Chennai FIR ADS-C Downlink Latency - Satellite

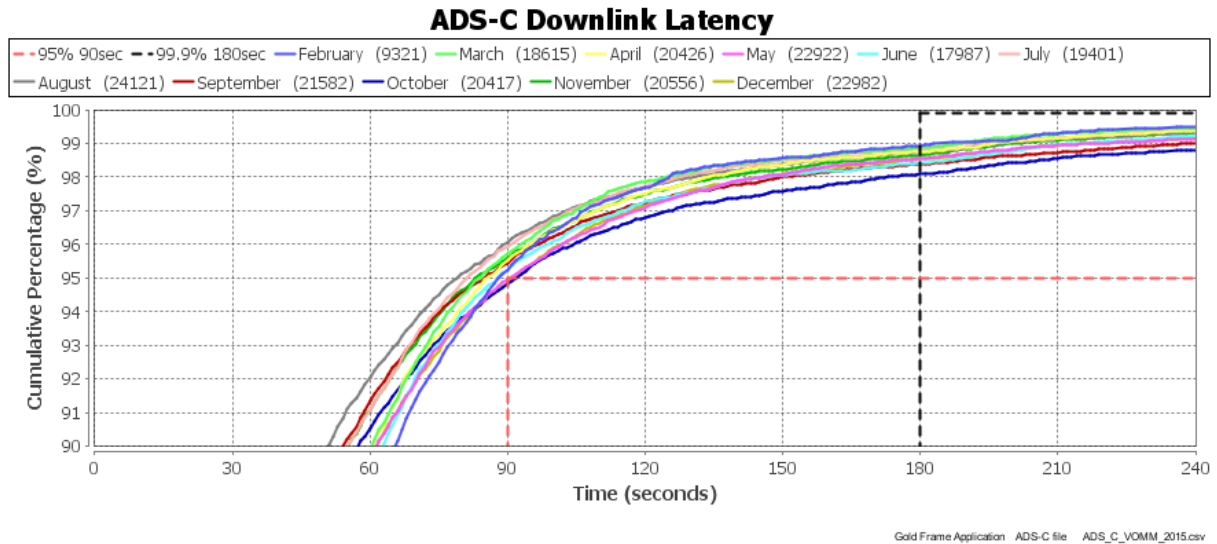


Figure 7: Chennai FIR ADS-C Downlink Latency – Satellite

ADS-C Downlink Latency per Month – VHF

4.2 **Table 8** and **Figure 8** present ADS-C Downlink Latency per month for messages sent within the Chennai FIR by VHF data link, for the period February to December 2015.

VOMM FIR ADS-C Downlink Latency - VHF				
Month	Messages	% < 90 sec (Target 95%)	% < 180 sec (Target 99.9%)	Remarks
February	12538	97.70%	99.40%	
March	26172	97.88%	99.35%	
April	27552	97.93%	99.33%	
May	29545	97.87%	99.25%	
June	23993	98.07%	99.48%	
July	26727	98.13%	99.38%	
August	33224	98.29%	99.44%	
September	31697	98.08%	99.39%	
October	28558	97.94%	99.31%	
November	28819	98.19%	99.46%	
December	29333	97.90%	99.35%	

Table 8: Chennai FIR ADS-C Downlink Latency - VHF

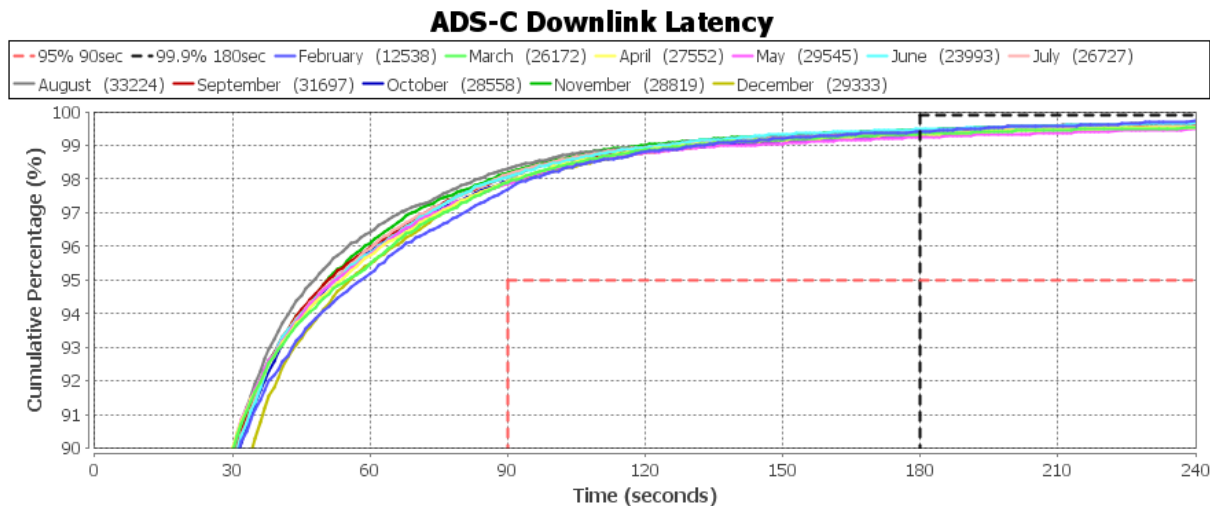


Figure 8: Chennai FIR ADS-C Downlink Latency – VHF

ADS-C Downlink Latency per Month – HF

4.3 **Table 9** and **Figure 9** present ADS-C Downlink Latency per month for messages sent within the Chennai FIR by HF data link, for the period February to December 2015.

VOMM FIR ADS-C Downlink Latency - HF				
Month	Messages	% < 90 sec (Target 95%)	% < 180 sec (Target 99.9%)	Remarks
February	134	67.55%	85.35%	
March	264	67.05%	82.27%	
April	228	71.93%	87.02%	
May	254	71.78%	89.45%	
June	180	68.52%	87.50%	
July	158	64.40%	83.70%	
August	215	57.67%	79.53%	
September	196	66.63%	86.46%	
October	202	68.12%	85.50%	
November	170	69.06%	85.59%	
December	122	61.89%	82.24%	

Table 9: Chennai FIR ADS-C Downlink Latency – HF

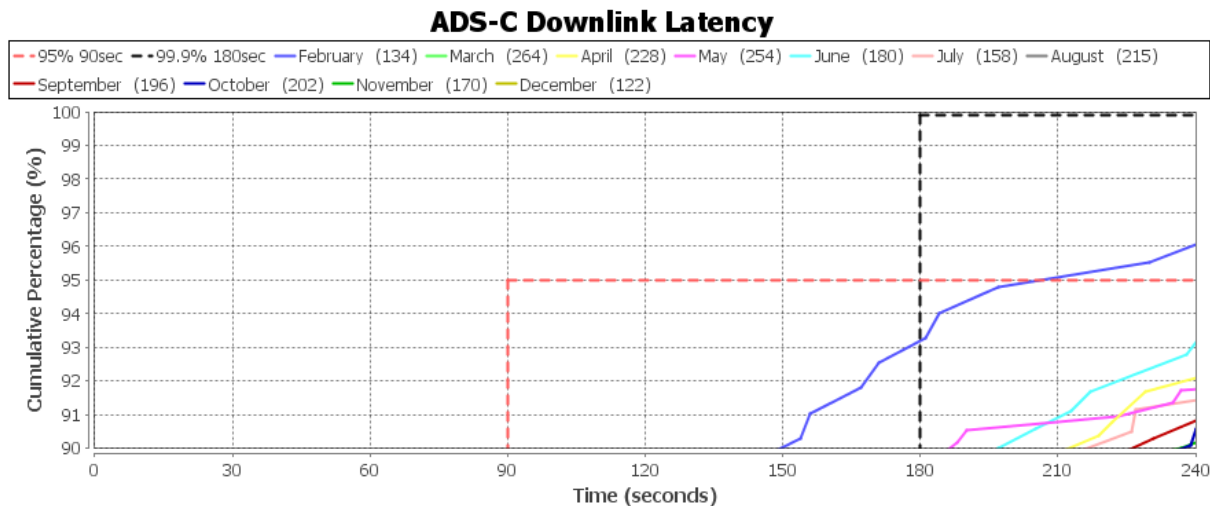


Figure 9: Chennai FIR ADS-C Downlink Latency - HF