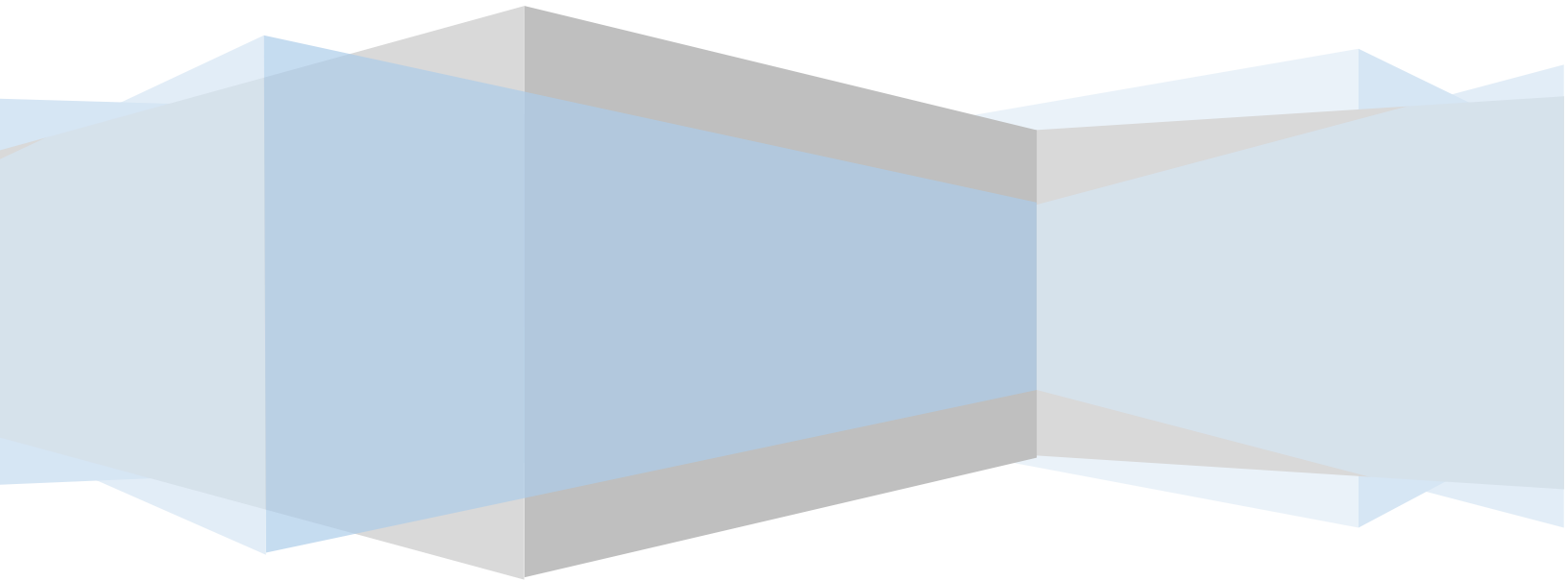


POST OPERATIONS ANALYSIS REPORT

April, 2021

CENTRAL COMMAND CENTER, C-ATFM, DELHI







Contents

A. Executive Summary	4
B. Traffic Analysis	4
I. Air Traffic Movement at 3 Major Airports in India	4
II. Comparison of total ATMs (YoY) and Monthwise	6
III. Flight Operations – Airlinewise	8
C. ATFM Post Operations – CDM Analysis.....	9
I. Introduction	9
II. ATFM Measures Overview.....	10
III. Overall Compliance	11
IV. CTOT Compliance rate – Airportwise	13
V. CTOT Compliance rate – Airlinewise	14
VI. Air Delay during the CDM Scenario period	15
D. Glossary	16



List of Figures

Figure 1: Delhi Air Traffic Movement - April 2021	4
Figure 2: Mumbai Air Traffic Movement - April 2021	5
Figure 3: Bengaluru Air Traffic Movement - April 2021	5
Figure 4: Percentage Traffic Variation (YoY)	6
Figure 5: Percentage Traffic Variation	7
Figure 6: Flight Movements –Airlinewise	8
Figure 7: ATFM Measures –Apr’21	9
Figure 8: Affected Flight Statistics –Apr’21	10
Figure 9: Overall Compliance – Apr’21	11
Figure 10: ATFM Compliance-Monthwise	12
Figure 11: Airlines Overall Compliance –Apr’21	14
Figure 12: Cumulative Air Delay during CDM period	15



A. Executive Summary

The second wave of COVID-19 in India has been devastating, with a catastrophic rise in the numbers of new infections in recent weeks. The surge has hit the aviation industry badly. Domestic Traffic has seen continuous decline since 1st April.

International Commercial scheduled flights continue to remain suspended in India till 1829 UTC of 31st May'21 (NOTAM G0489/21). In the light of the increasing cases of Covid-19, many Countries have imposed further restrictions and indefinitely postponed commencement of travel to and from India under an air bubble formed earlier. As things stand, fewer Indians took to the skies given the fresh surge in covid cases across the country for the sixth week in a row for the week ending on 1st May.

Total one (1) ATFM measure was applied to resolve Demand Capacity imbalance in April'21. Ground Stop followed by Ground Delay measure was applied in Delhi owing to bad weather. The average CTOT Compliance has been 65 percent this month.

B. Traffic Analysis

I. Air Traffic Movement at 3 Major Airports in India

Air Traffic Movement for each day of the month of April'21 is plotted for Delhi, Mumbai and Bengaluru Airport along with the percentage change w.r.t. movement on 1st April'21.

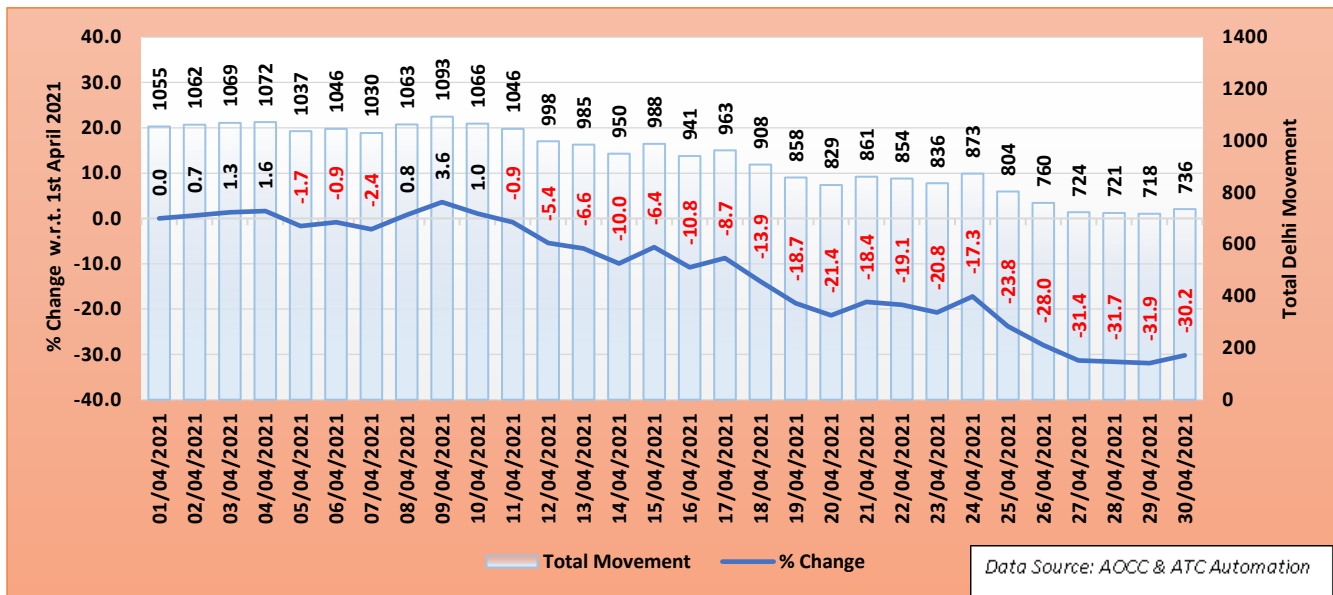


Figure 1: Delhi Air Traffic Movement - April 2021

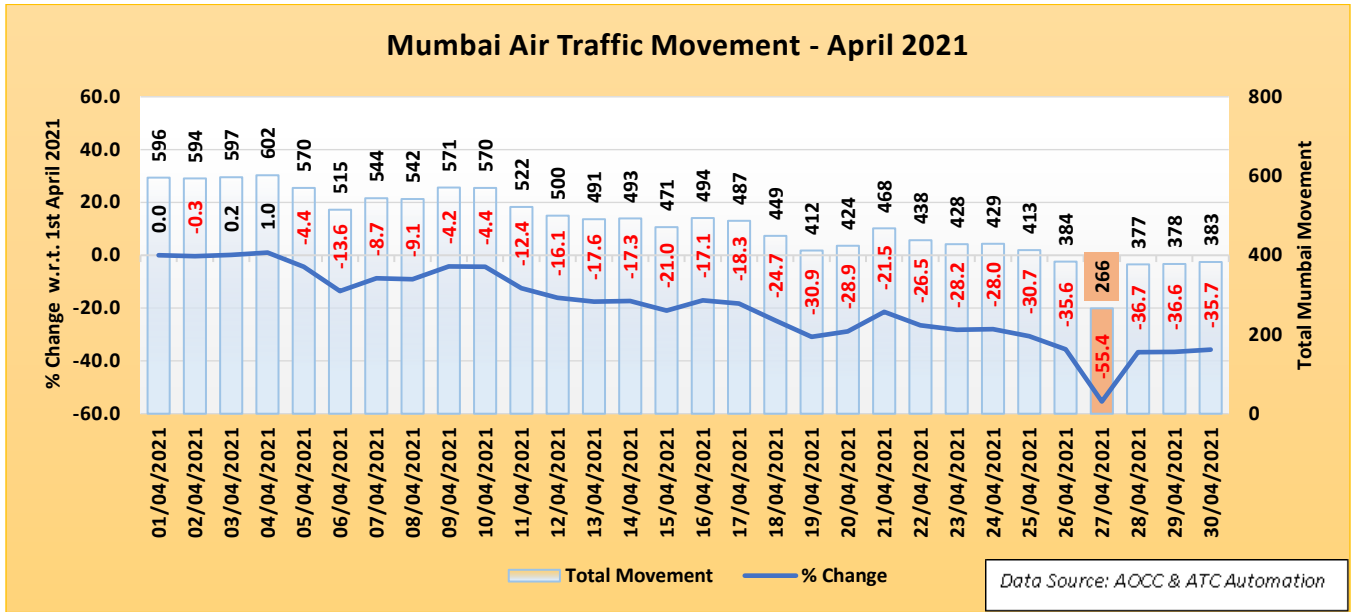


Figure 2: Mumbai Air Traffic Movement - April 2021

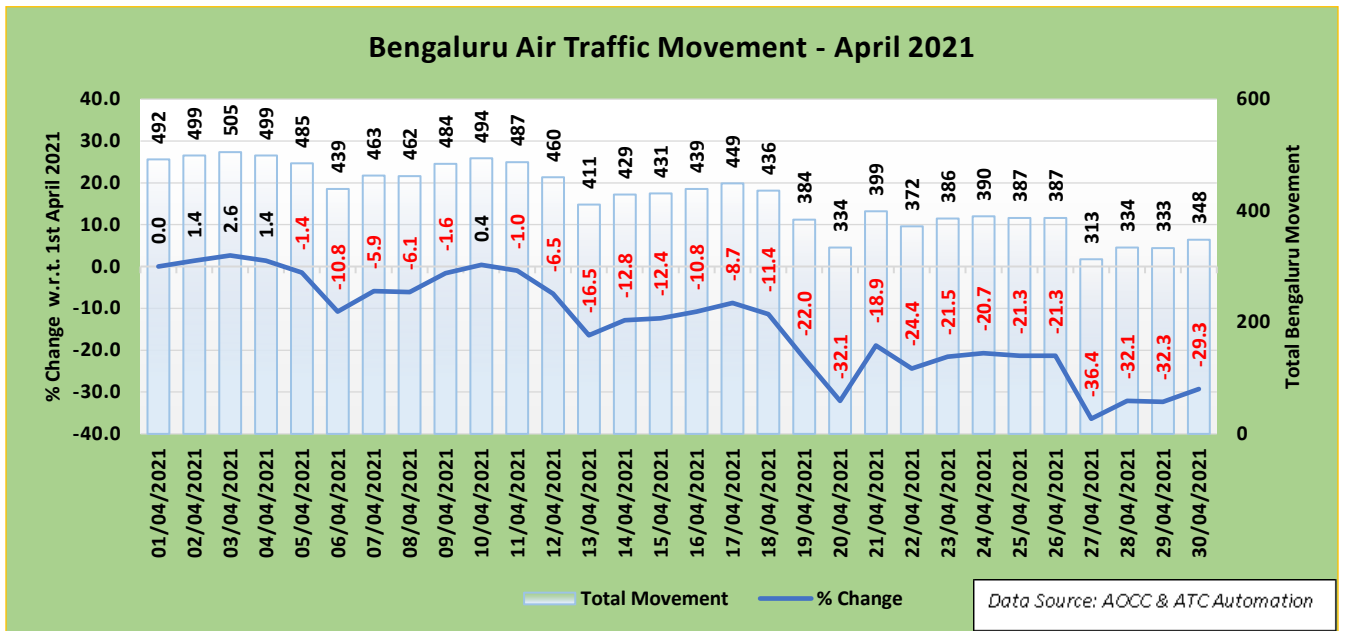


Figure 3: Bengaluru Air Traffic Movement - April 2021

It is evident from the above charts that the air traffic has seen a decline with upto 30.2% decline in Delhi, 35.7% decline in Mumbai and 29.3% decline at Bengaluru Airport on 30th April'21 as compared to the Air Traffic movement on 1st April'21.



II. Comparison of total ATMs (YoY) and Monthwise

The total Air traffic movement including Passenger and Combination of other flights i.e. All-Cargo flights, International scheduled, International non-scheduled, Domestic scheduled, Domestic non-scheduled, Air taxi & commercial business flights at six major Indian Airports namely Delhi, Mumbai, Bengaluru, Hyderabad, Kolkata and Chennai is plotted for each day of the month of April'21. Air Traffic movement is also plotted Airline wise for the month for the major Scheduled Operators.

The graph below depicts the change in total ATMs in the month of Apr'21 in comparison to the total ATMs in Apr'20 for six major Airports in India.

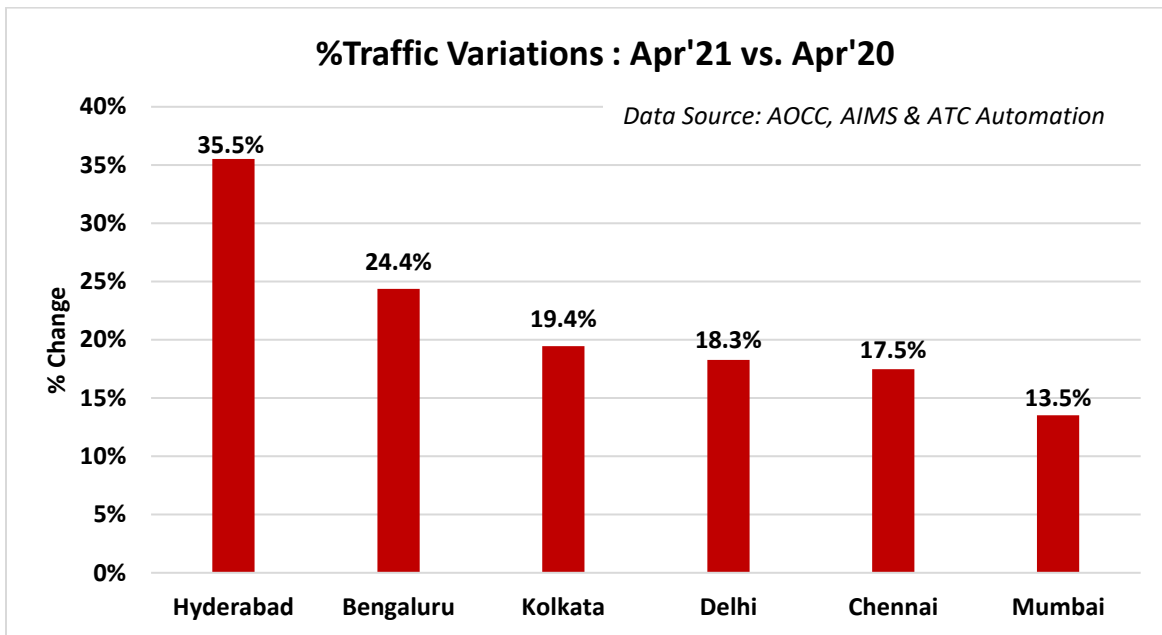


Figure 4: Percentage Traffic Variation (YoY)

Total ATMs (YoY) for six major airports		
Airports\Year	April'21	April'20
Hyderabad	9165	251
Bengaluru	12731	502
Kolkata	8708	426
Delhi	27946	1449
Chennai	8590	465
Mumbai	14408	992



The graphs below depict the percentage change in ATMs month wise taking Jan'20(Pre -Covid) as the reference value for the six metro Airports.

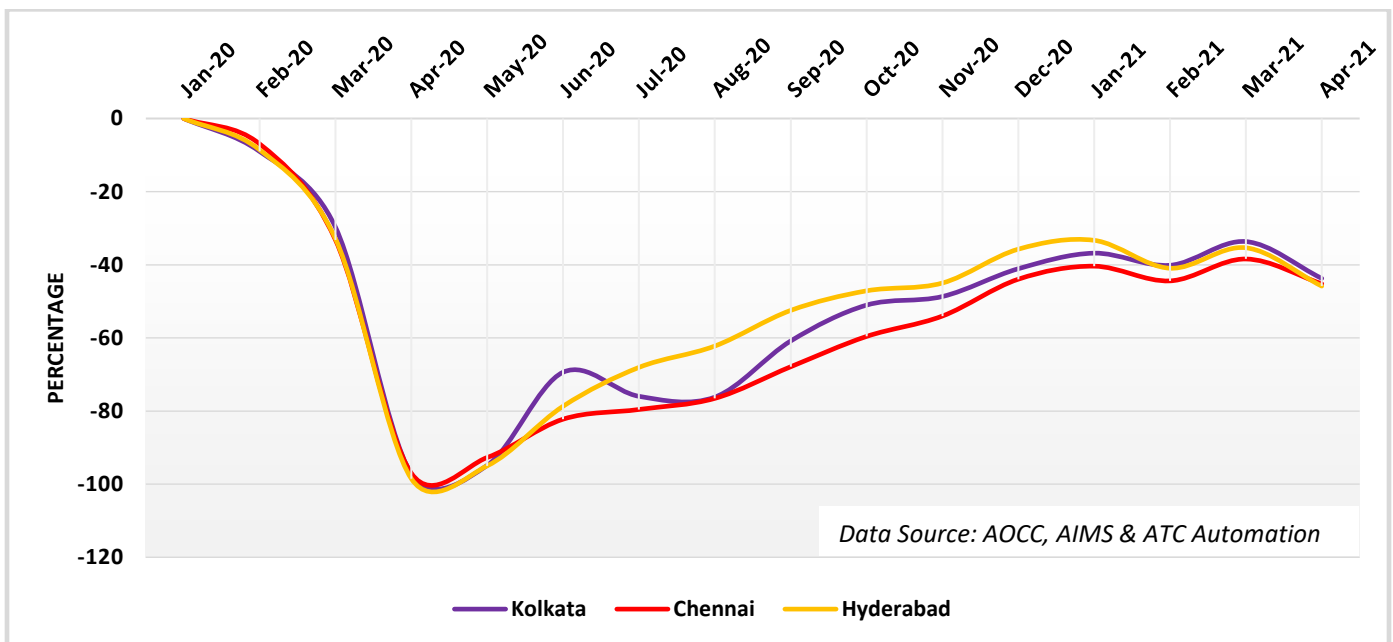
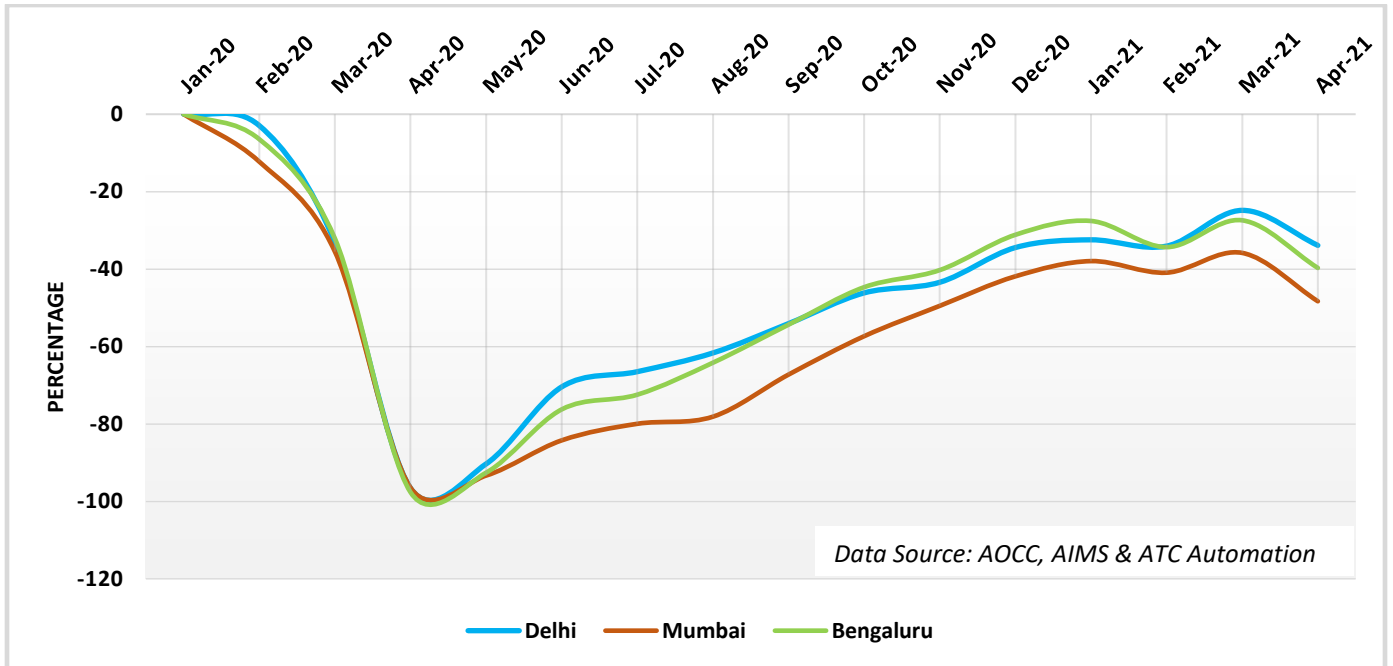


Figure 5: Percentage Traffic Variation



III. Flight Operations – Airlinewise

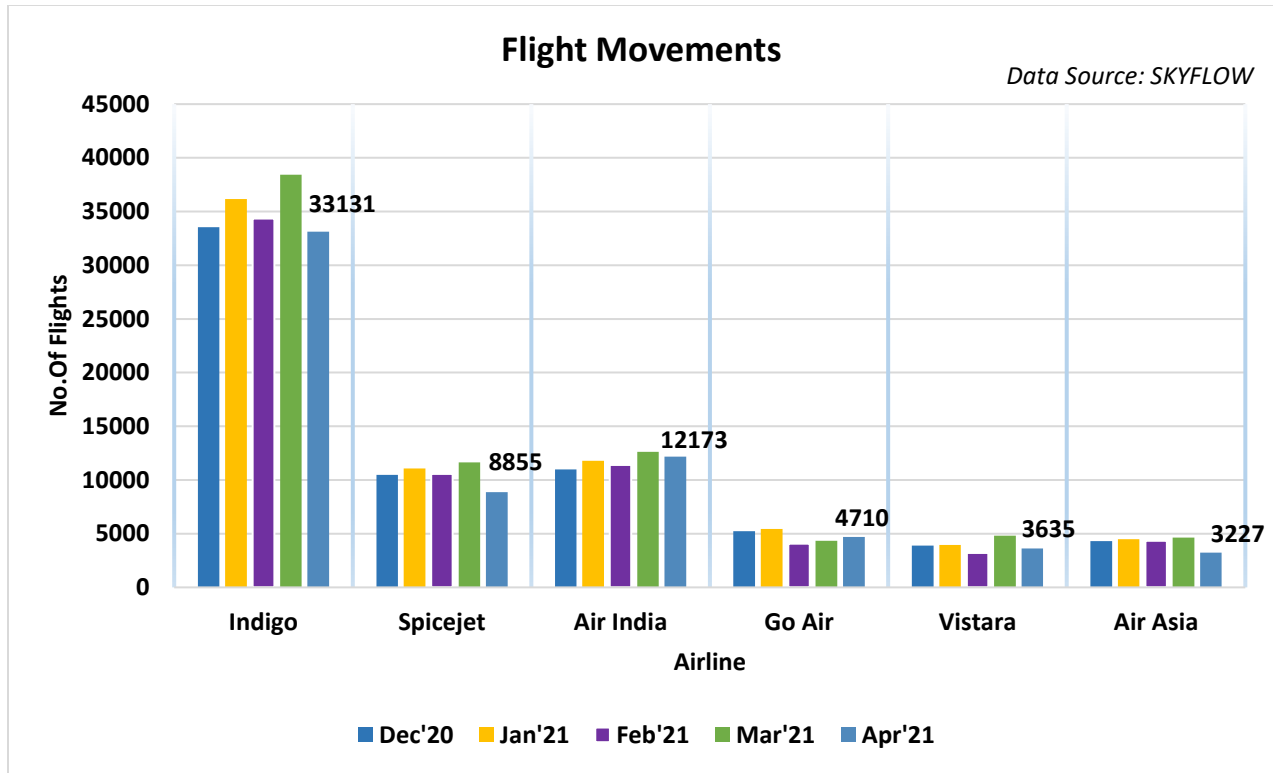


Figure 6: Flight Movements –Airlinewise



C. ATFM Post Operations – CDM Analysis

I. Introduction

Analysis Period 1st – 30th April'21

Back Ground During the above mentioned period, **one(1)** ATFM measure was applied for **Delhi Airport** due to the following reason as illustrated in the bar chart below:–

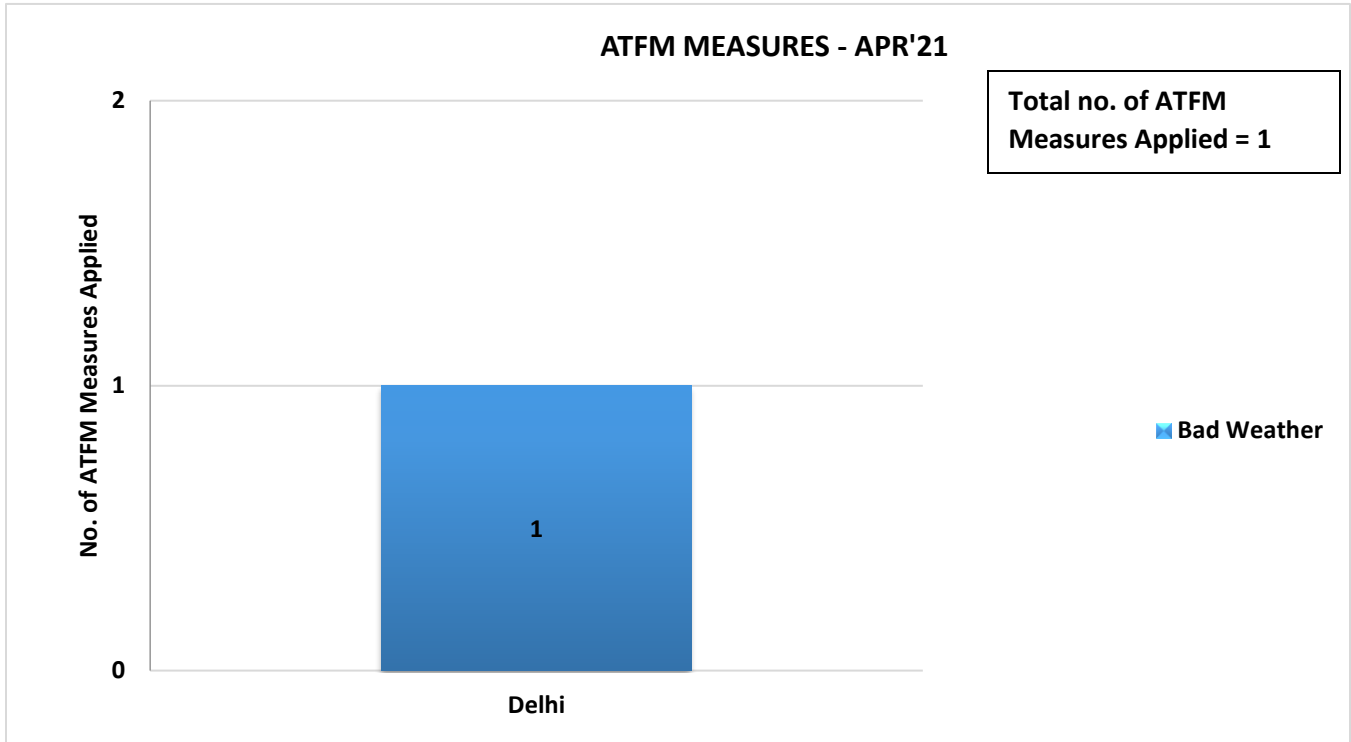


Figure 7: ATFM Measures –Apr'21



II. ATFM Measures Overview

	Delhi Airport
Number of ATFM measures applied	1
Average ATFM Ground delay due to measures*	4 min
Maximum ATFM Ground delay due to measures	17 min
% Compliance	65

$$\text{Note: * Average ATFM Delay} = \frac{\text{Total ATFM Delay}}{\text{Total Domestic Arrivals}}$$

Total Arrivals	53
Total International Arrivals(Exempted)	6
Total affected flights in scenario (Domestic Arrivals)	47
Total Domestic Arrivals with zero ATFM delay	27
Total Domestic Arrivals with ATFM delay	20

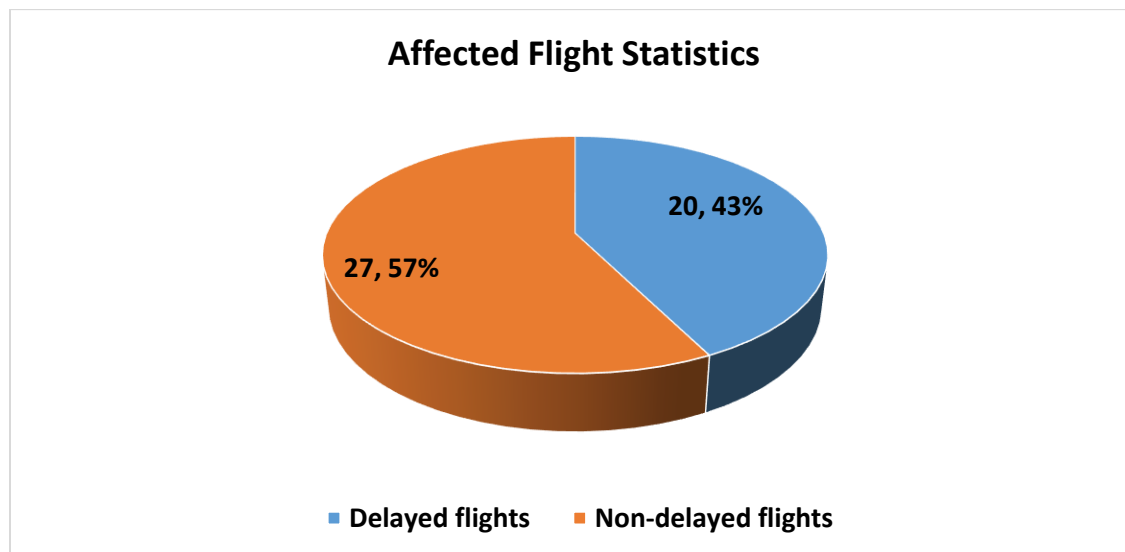


Figure 8: Affected Flight Statistics –Apr'21



III. Overall Compliance

Domestic arrivals	47
Flights with complete data (ATOT)	46
Flights with incomplete data	0
Flights Not Operated	1
Compliant*	30
Non-Compliant	16

*Total No. of Revised CTOTs issued = 6(Compliance calculation for flights which were issued revised CTOT is w.r.t. new CTOT issued)

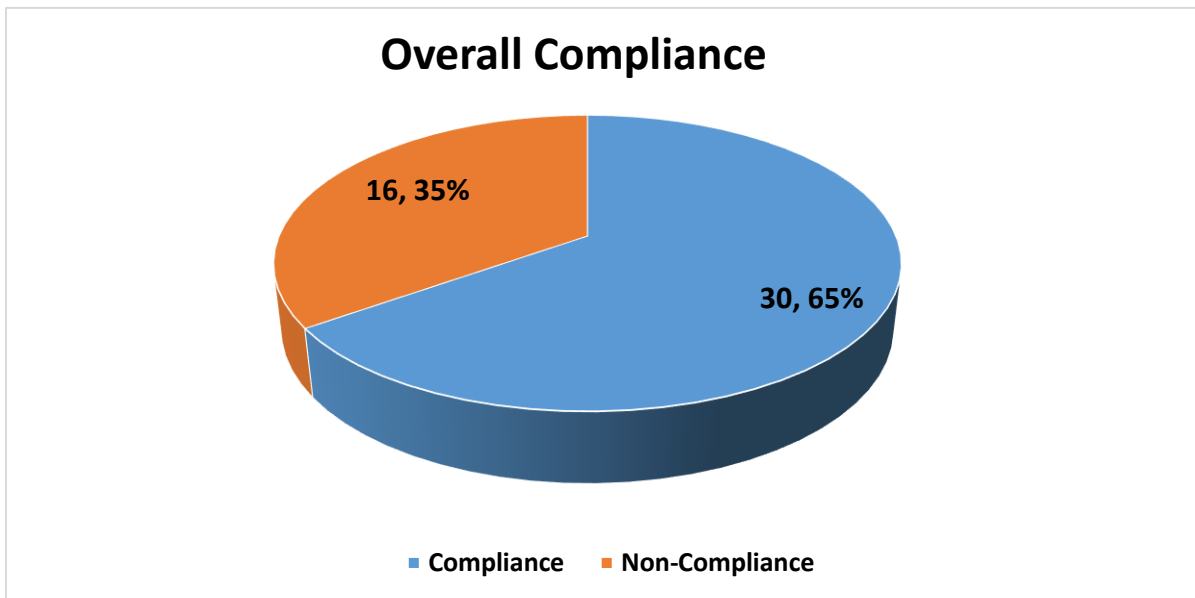


Figure 9: Overall Compliance – Apr’21

NOTE: Flights with required data (i.e. ATOT) are only considered for compliance measurement

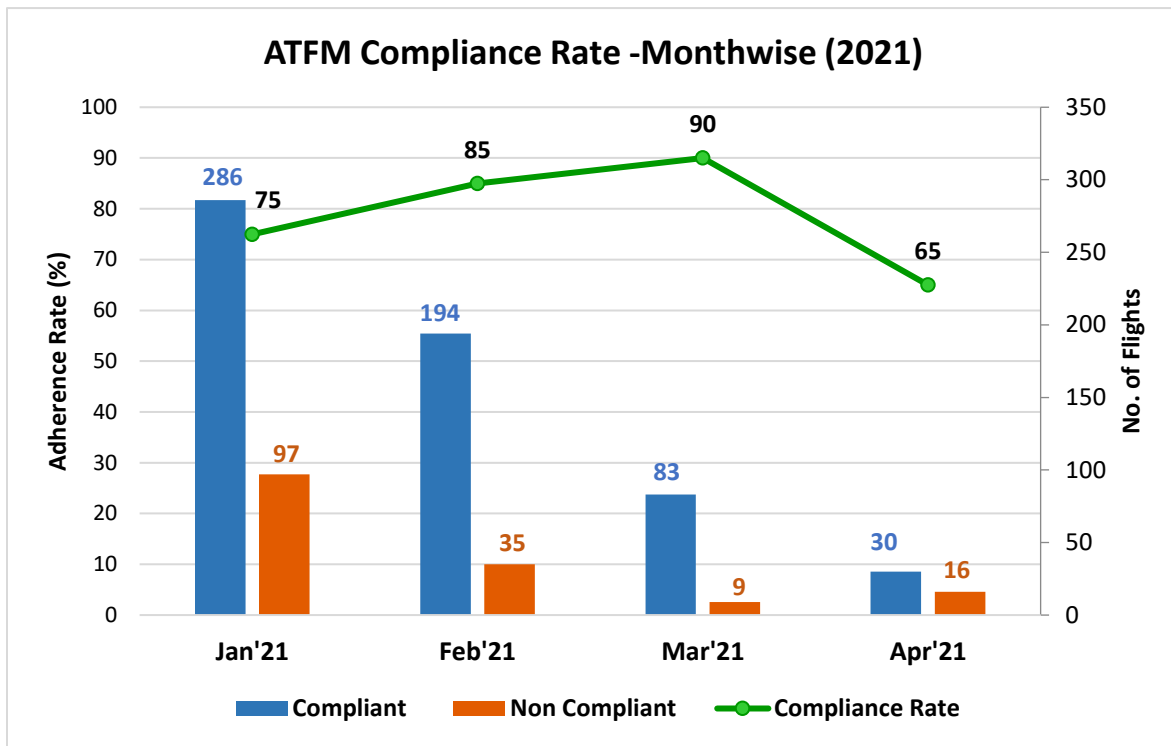


Figure 10: ATFM Compliance-Monthwise

Inference

1. Out of the total arrivals captured for the constrained Airports during the CDM scenario, 89% of flights i.e. Domestic arrivals, are participating.
2. Out of these Domestic Arrivals, 43% of arrivals are assigned ATFM ground delay.
3. Out of the total arrivals captured to the constrained Airport during the ATFM scenario, 38% of flights are assigned ATFM Ground Delay.
4. CTOT Compliance has decreased from 90% in Mar'21 to 65% in Apr'21



IV. CTOT Compliance rate –Airportwise

MUMBAI FIR (61%)*	Compliant	Non Compliant	%Compliant
Ahmedabad	2	1	67
Mumbai	1	1	50
Vadodra	0	1	0
Bhopal	2	0	100
Surat	1	1	50
Indore	1	0	100
Pune	1	1	50
KOLKATA FIR (80%)*			
Kolkata	2	2	50
Bhubhaneshwar	2	0	100
Ranchi	2	0	100
Patna	4	0	100
Raipur	0	1	0
Varanasi	2	0	100
DELHI FIR (50%)*			
Lucknow	1	1	50
Jaipur	0	1	0
Chandigarh	1	0	100
CHENNAI FIR (57%)*			
Hyderabad	1	2	33
Bangalore	5	1	83
Vijayawada	1	0	100
Calicut	0	1	0
Chennai	0	1	0
Cochin	1	1	50

*FIR wise compliance rate



V. CTOT Compliance rate – Airlinewise

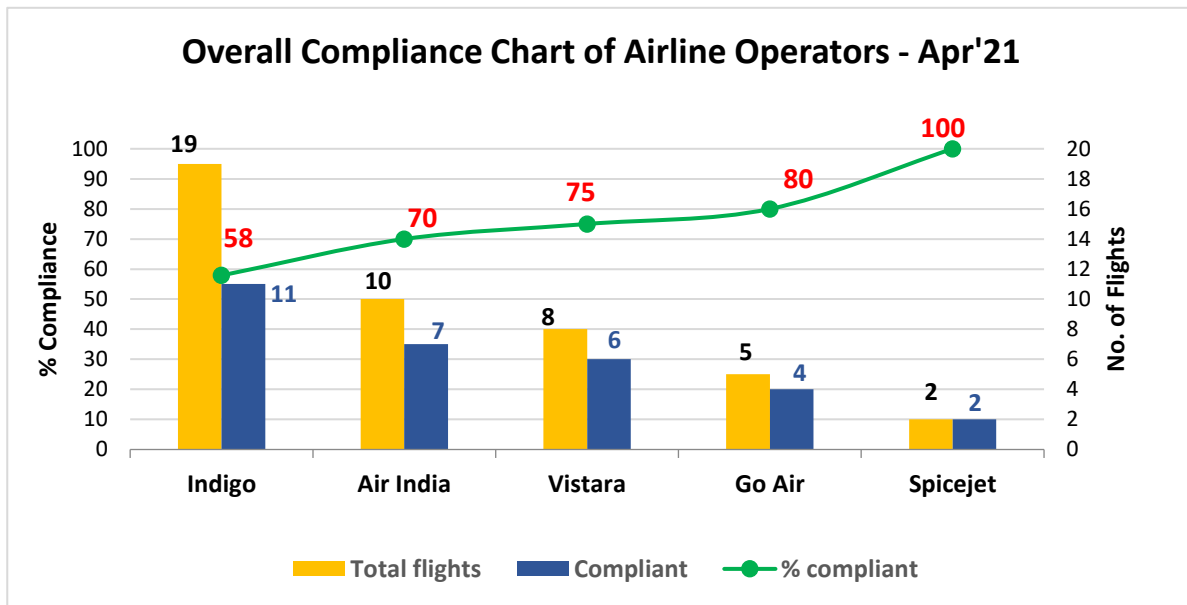


Figure 11: Airlines Overall Compliance –Apr'21

Inference

1. Out of the total domestic arrivals with complete data in the CDM scenario, 65% arrivals are compliant.
2. Delhi region has the lowest compliance rate of 50% whereas Kolkata region has the highest compliance rate of 80%.
3. Air India, Vistara, Go Air and Spicejet have a compliance rate above the average recorded 65% compliance.



VI. Air Delay during the CDM Scenario period

Average Air Delay to domestic arrivals* within the CDM Scenario period for Delhi is 11 minutes.

**Note: Only calculated for domestic arrivals with both ATOT and ALDT information*

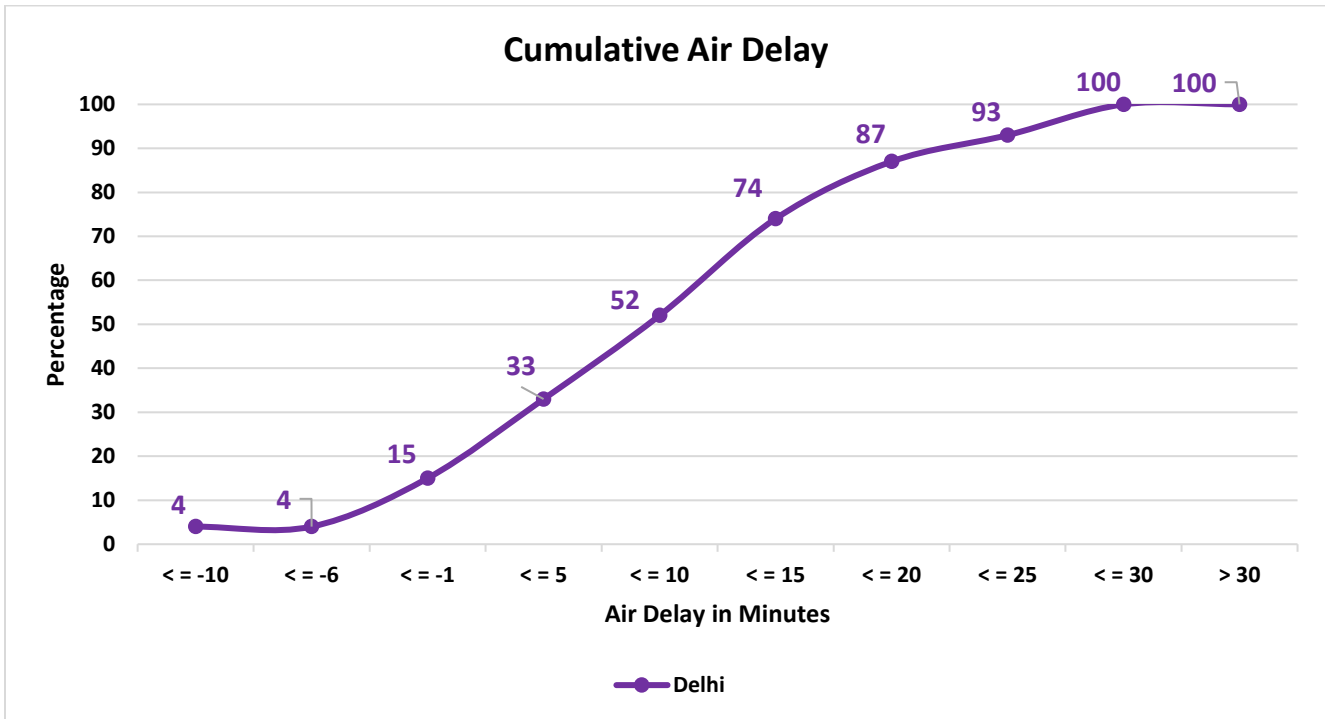


Figure 12: Cumulative Air Delay during CDM period

Inference

1. 52% of arriving flights to Delhi had an Air delay of equal to or less than 10 minutes during the CDM period.



D. Glossary

ATFM Parameters	Definition
<i>Affected Flight statistics</i>	An insight of participating traffic in the scenario i.e. ratio of the domestic arrivals to the constrained airport affected by ATFM measures (assigned delay by the Ground Delay Program) to the domestic arrivals not affected by ATFM measures (not assigned any delay) within the CDM scenario.
ATFM Ground delay	ATFM ground delay defined as CTOT-ETOT (Calculated take off time – Estimated take off time)
<i>Average ATFM delay</i>	<i>$\frac{\text{Total monthly ATFM delay (in minutes)}}{\text{Total Domestic Arrivals}}$</i>
<i>Maximum ATFM delay</i>	Maximum ATFM delay (in minutes) assigned in the month
<i>Overall compliance rate</i>	Defined as monthly ATFM departure slot adherence rate of regulated flights. Flights having ATOT within the ATFM Slot Tolerance Window (STW) of minus 5 to plus 10 minutes of CTOTs, are considered as compliant flights
<i>CTOT Compliance rate of Airline operators</i>	An overview of CTOT compliance rate of various Airline operators
<i>CTOT Compliance rate of Airports within different Regions</i>	An overview of CTOT compliance rate of Airports within 4 FIRs
Air delay statistics	<p>Air delay defined as difference between AET & EET, where AET (actual elapsed time) can be obtained from (ALDT-ATOT) and estimated elapsed time (EET) can be obtained from FPL/RPL or (CLDT-CTOT). Therefore, Air delay = AET-EET</p> <p>Average Air Delay is calculated as:</p> <p style="text-align: center;"><i>Average Air Delay</i> <i>$= \frac{\text{Total Air Delay to domestic arrivals (with values greater than zero)}}{\text{Total Domestic Arrivals}}$</i></p> <p><i>CLDT: Calculated Landing Time</i> <i>CTOT: Calculated Take off Time</i> <i>ALDT: Actual Landing Time</i> <i>ATOT: Actual Take off Time</i></p>