International Civil Aviation Organization

The Fifth Meeting of the South Asia/Indian Ocean ATM Coordination Group (SAIOACG/5)

Bangkok, Thailand, 03-06 March 2015

Agenda Item 4: Implementation of CNS/ATM Systems

KOLKATA UPPER AIRSPACE HARMONISATION AND BENEFITS

(Presented by India)

SUMMARY

This paper presents India's one of the major ANS initiatives in enhancing safety, efficiency and increasing airports & airspace capacity through implementation of new State-of-the-art Automation system, enhanced & Overlapping ATS surveillance/VHF coverage enabling harmonization of upper airspace in Kolkata FIR and its befits to user of the airspace.

1. INTRODUCTION

1.1 The unprecedented growth in Air Traffic in the last few years in the APAC region in general and India in particular as well as the forecast growth call for enhancement in safety, efficiency and increase of capacity of airspace.

1.2 India has taken many major ANS initiatives in accordance with ICAO Global Plan Initiative and recommendations of a various high level committees to enhance safety, efficiency, increase of airports & airspace capacity through implementation of ATS Automation system, improved ATS surveillance coverage with installation ADS-B ground receivers, surveillance sensor integration, Data link Clearance for departure, PBN based RNP10, RNAV 5/RNAV2 city pair ATS routes, RNAV1 SIDs &STARs , establishment of a single continuum of upper airspace for uniform application of rules and procedures.

2. DISCUSSION

Establishment of a Single Continuum of Upper Airspace in Kolkatta and the Benefits

2.1 As per the Master plan for restructuring of entire Indian airspace, each FIR will have only one Upper ACC centre with multiple sectors to be operated from four major cities thereby amalgamating 12 ACCs into four ACCs initially and subsequently into 2 ACCs.

2.2 India has adapted a phased implementation approach due to the vast and complex airspace structure . The Chennai UAH has been successfully implemented. The Kolkata UAH will commence in the near future. The Delhi air space restructure plan is completed and the new automation system implementation is in progress. The Mumbai air space restructuring is in a planning stage. (Fig-1)

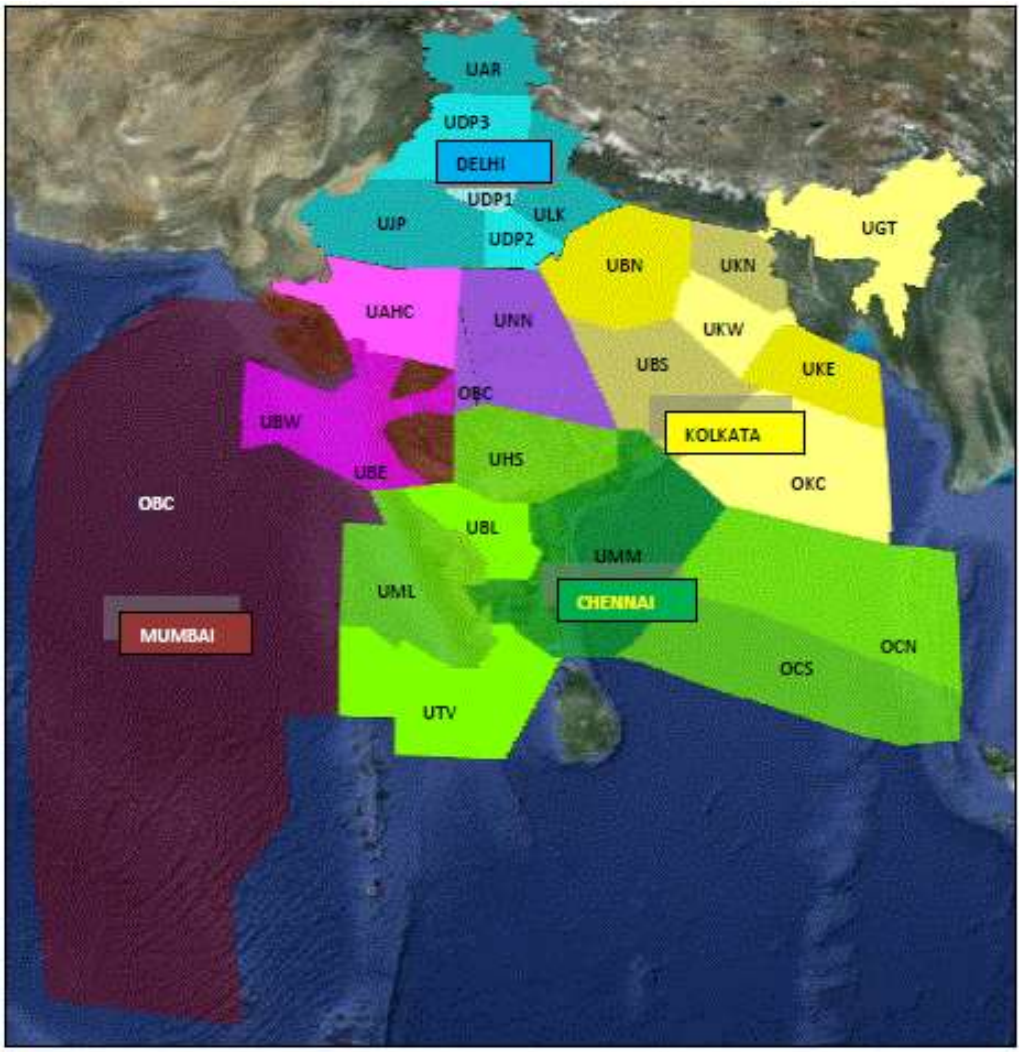

Fig-1

2.3 The upper Airspace of Kolkata FIR above FL255 has been restructured as a single continuum of airspace with the introduction of advanced ATS automation system along with integration of **nine radars & eight ADS-B stations.** The new automation system is already working from 11th August 2014. The new technique of cross coupling of VHF facilitates creation of multiple sectors to be operated from Kolkata dynamically. The testing of the VHF system is in its last phase. The Kolkata VHF network is employing IP Radio and IP based VCS system for the first time in the country and will be one of the largest networks using IP based system in the world. ATS Inter Facility Data Communication (AIDC) permits automatic exchange of aeronautical data among ATC units thereby reducing ATS coordination significantly.

2.4 Kolkata airspace has been divided into 6 upper area control and one Oceanic control sectors. The airspace has acquired some of the airspace from Delhi and Mumbai FIR with the consideration of providing seamless ATC. There will be 8 lower area control centers containing CTRs and TWRs which will handle traffic from ground level to FL255. (Fig-2 and Fig-3).

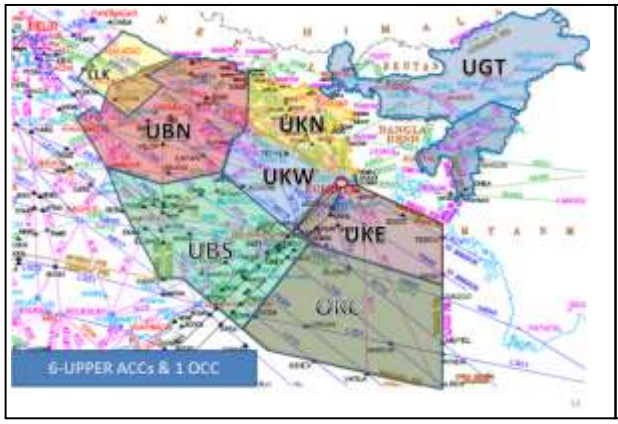

Fig-3

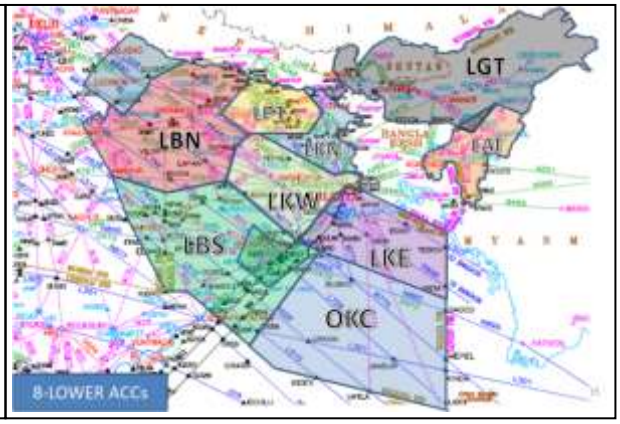

Fig-4

2.5 The Kolkata UAH has been validated by the TAAM simulation tool developed jointly by Jeppesen and Boeing.

2.6 Benefits of the Upper airspace harmonization include harmonized ATM procedures, Reduction in separation between aircraft resulting in increased airspace capacity utilization and enabling aircraft to get Preferred Flight level and more direct routing. The sensor integration greatly facilitates CDO and CCO, thereby saving precious fuel and reduce carbon emission. The UAH also facilitate even distribution of workload reducing controllers' stress and fatigue and effective utilization of Manpower by consolidating and deconsolidating Sectors dynamically depending on Traffic density.

2.7 Major Direct routings which can be facilitated with UAH implementation:

SEGMENT	**LENGTH (NM)**	DIRECT	**LENGTH (NM)**	**DISTANCE SAVED(NM)**	**NO of ACFT /MONTH**	**TOTAL NM SAVED**	**FUEL SAVED PER MONTH (Kg)**
MEPEL-BUBKO-LEGOS-CEA	485	MEPEL-CEA	445	40	390	15600	134727.3
MEPEL-LEGOS-JJS-BBN	776	MEPEL-BBN	762	14	120	1680	14509.09
SAGOD-BBS-KKJ	805	SAGOD-KKJ	792	13	120	1560	13472.73
IKOSI-BBS-BUBKO-SAGOD	598	IKOSI-SAGOD	594	4	270	1080	9327.273
IKOSI-BBS-BUBKO-MEPEL	662	IKOSI-MEPEL	639	23	60	1380	11918.18
KKJ-JJS-CEA-SUMAG	519	KKJ-SUMAG	515	4	90	360	3109.091
DIVTA-OTABA-JJS-CEA`	447	DIVTA-CEA	443	4	3000	12000	103636.4
GGT-RAJ-CEA-JJS-DIVTA	743	GGT-DIVTA	665	78	60	4680	40418.18
KKJ-LAPAN-JJS-DOPID-IBITA	768	KKJ-IBITA	761	7	60	420	3627.273
						38760	**334745.5**
						~ $ 332402/month	

Table-1

2.8 50NM and 40NM longitudinal separation in certain routes are already in vogue .These direct routings along with RNAV-5 city pair route between Chennai-Kolkata and proposed RNAV-2 city pair routes between Delhi-Kolkata and Mumbai-Kolkata with 20NM spacing under surveillance coverage and 40NM LOA spacing between adjacent ATSU will increase airspace capacity to a great extent.

2.9 After the installation of automation system and surveillance sensors integration 70% of aircraft are getting their planned flight level. 98% of aircraft are getting levels within ± 2000 ft of their planned levels.

2.10 The estimated benefits in the RNAV-2 city pair routes are given in Table-2 which is mainly due to allocation of preferred flight level.

RNAV 2 CITY PAIR	SAVING FUEL(KG) PER MONTH	NO OF FLIGHTS PER MONTH	FUEL COST SAVINGS PER MONTH (in million US Dollars)@ $0.993/Kg	TIMELINE STATUS
VECC-VIDP	6203200.0 KG, considering the saving of 28% mainly due to allocation of preferred FLIGHT LEVELS	1200	6.59	PROPOSED TO BE IMPLEMENTED
VABB-VECC	22994000.0 KG, considering the saving of 28% mainly due to allocation of preferred FLIGHT LEVELS	4200 (INCLUDES OVERFLYING)	22.83	PROPOSED TO BE IMPLEMENTED

Table-2

2.11 Fuel saved in CDO/CCO trial runs at Kolkata from 30-01-2015 to 24-02-2015 is 23981Kg . Thus on an average 920 Kg of fuel are saved per day. This figure is estimated to rise to an average of 2000 Kg per day once CDO/CCO will be fully operational through AMAN Manager.

2.12 That translates into 730000 Kg fuel saving per year, reducing carbon emission by 2299500 Kg per year and saving $0.993 x 730000 = $ 728490000 per year for airlines.

2.13 Controller workload will decrease due to AIDC coordination, silent coordination between sectors through the automation system, less R/T load due to total surveillance picture, less traffic load per sector (Fig 4 and Fig 5) which in turn will increase surveillance time per aircraft. In conjunction with advanced safety net feature of the automation system the safety will increase many fold.

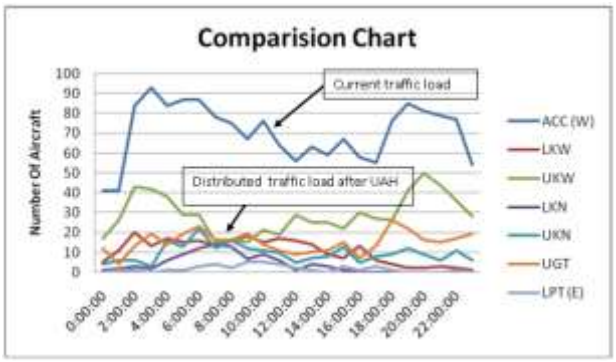

Fig-4

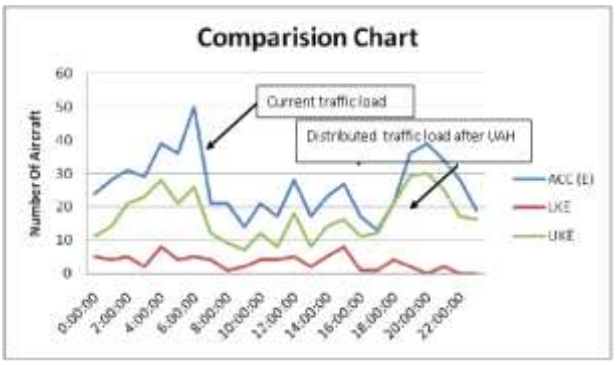

Fig-5

3. ACTION BY THE MEETING

3.1 The Meeting is invited to note the information contained in this Paper.

a. India's efforts to establish single continuum of airspace in the sub-region enabled through ATS Automation and radar/ADS-B networking and its benefits

b. Collaborate with India in bringing out seamless RNAV-5/RNAV-2 ATS routes across the border in the region.

c. To motivate neighbouring countries in Asia Pacific region to install advanced automation system and implement AIDC coordination to reduce workload.

d. Discuss any relevant matters as appropriate.

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