

Analysis the Trend of CTOT Paper Trial between Japan and Hong Kong

Air Traffic Control Division
Air Navigation Services Department
Japan Civil Aviation Bureau

29–30 November 2018

1. Backgrounds

ATFM/SG 8
In Delhi
May 2018

- It was proposed and agreed that ICAO APAC RSO would coordinate and facilitate the ongoing work of ATFM/IR/SWG in order to ensure regional ATFM network interoperability

ATFM/IR/SWG
in Beijing
Aug. 2018

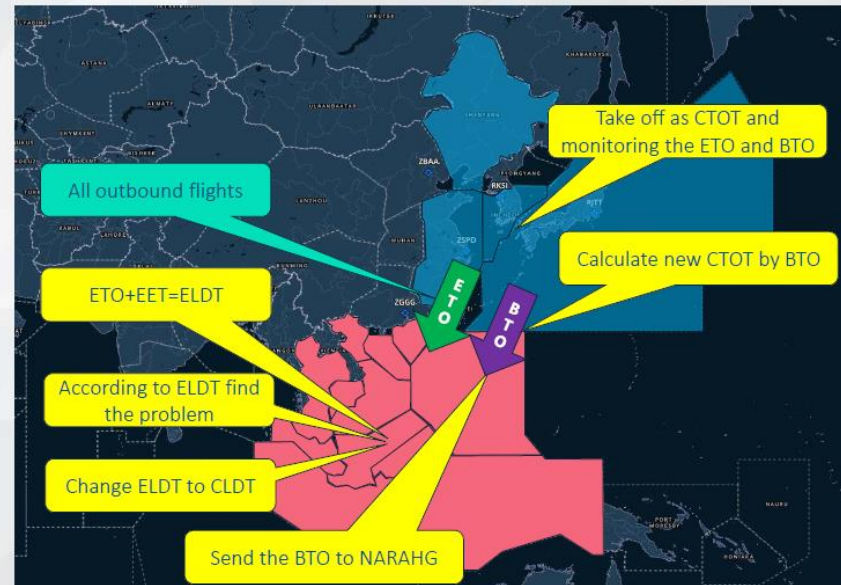
- The meeting discussed how to harmonize the operations of two projects with the different concepts of operations. One of the outcomes in the discussion is to analyze the trend of CTOT on paper trial between Hong Kong and Japan.
- Besides, joint work plan for Multi-node and NARAHG was presented in the meeting as shown below.

NARAHG 7
In Dalian
Nov. 2018

- One of the objectives of the paper trial was to see the gap between EDCT (i.e. CTOT) calculated by Fukuoka ATMC and CTOT calculated by Hong Kong.
- ICAO RSO suggested the NARAHG providing more information on this paper trial, which could be discussed at the ATFM/IR/SWG/2 being held by the end of November, 2018.

BTO: Boundary Time Overfly

Discussion



2. Analysis of the gap between actual EDCT and simulated CTOT

(1) Objectives

- As the first step for seeking our interoperability, we began with comparing simulated CTOT with actual EDCT.
- This comparison aims to just confirm whether there is any gap that would become a hindrance for further study. It never means to determine the superiority or inferiority of these two.

2. Analysis of the gap between actual EDCT and simulated CTOT

(2) Results

EDCT	2018/8/9	2018/8/10	2018/8/13	2018/8/14	2018/8/15	TOTAL
The number of times(ACFT)	7	13	12	18	17	67
Max. diff. with CTOT	0:56	0:59	1:15	1:10	1:00	
Avg. diff. with CTOT	0:25	0:24	0:41	0:24	0:25	0:27
Total time diff. with CTOT	3:01	5:14	8:14	7:18	7:21	31:08

Table1. In case actual EDCT is earlier than simulated CTOT

CTOT	2018/8/9	2018/8/10	2018/8/13	2018/8/14	2018/8/15	TOTAL
The number of times(ACFT)	12	24	6	24	9	75
Maximum diff. with EDCT	1:03	1:07	1:11	1:41	0:25	
Avg. diff. with EDCT	0:18	0:27	0:36	0:40	0:14	0:29
Total time diff. with EDCT	3:45	10:57	3:38	16:17	2:09	36:46

Table2. In case simulated CTOT is earlier than actual EDCT

	2018/8/9	2018/8/10	2018/8/13	2018/8/14	2018/8/15	TOTAL		AVERAGE
The number of ACFT compared	19	37	18	42	26	142	a	(b/a)
Total time differences (EDCT-CTOT)	-0:44	-5:43	4:36	-8:59	5:12	-5:38	b	-2.4 minutes

Table3. Summarized of Table1 & 2

CTOT is 2.4 minutes earlier than EDCT on average from the data of 142 aircrafts.

2. Analysis of the gap between actual EDCT and simulated CTOT

(3) Other factors to be considered and conclusions

- The data used to the analysis are very limited, and there are more factors to be taken into consideration for more accurate analysis. They would affect the results of each date.
 1. Change of flight planning route of the day
 2. Other flow controls (GDP) for domestic airspace etc.

	2018/8/9	2018/8/10	2018/8/13	2018/8/14	2018/8/15
Route Change (These aircraft data were omitted from the data above)	10	5	5	3	0
Other related GDPs implemented for domestic airspace	2 times	2 times	4 times	2 times	2 times

Table. 4 Other factors to be considered

- Although it is difficult to compare precisely, it is thought that there is no big gap between EDCT and CTOT.

3. For further considering interoperability

(1) Summary of GDP(EDCT)

For further consideration, there are several things which are necessary to be organized and considered in advance. One of them is the difference of GDP operation. The table below shows the outline of the current GDP in Japan.

	GDP(EDCT)	
Category	For AIRPORT	For AIRSPACE
Criteria to be prioritized	ELDT at airport	EIT(Estimated Inbound Time) of sector
Items to be considered when calculating the above time	EOBT from FLIGHT PLAN+ TAXI TIME from SMAP(Spot information Management And Planning system)+ TAS+ALTITUDE(from FLIGHT PLAN)+ WIND FACTOR (from system)	
EDCT distribution means	FDPS, ATW(ATM workstation), FIHS(Flight Information Handling System)	
EDCT distribution timing	PREDICTED EDCT : 60 MINUTES BEFORE EOBT FIXED EDCT : 40 MINUTES BEFORE EOBT	
Slot swapping	CDM AIRLINES CAN SWAP THEIR SLOT USING ATW. (Exc. For airspace)	
GDP results in 2017(FY)	Approx. 1200 times	Approx. 2000 times

3. For further considering interoperability

(2) Challenges

- The current domestic GDP has high accuracy in prediction, and therefore it functions very efficiently and effectively.
- Besides, GDP (EDCT) for converting MINIT tends to make various problems since the accepting state can not predict demand and capacity.
- It is thought that CTOT/BTO is one option to solve the problem, but at the same time, it is essential to organize the current operations well to avoid any unnecessary confusion. Also it is important to make practical method.

4. Pros and Cons of the current MINIT method and CTOT/BTO method

	MINIT (Conversion into EDCT)	CTOT or EDCT based on BTO
For ATSU (Japan)		ATC Work load
For ATSU (Taipei ACC)		ATC Work load
For ATSU (Hong Kong)		ATC Work load ?
For AU		Air born holding or vectoring
		Predictability
For ATFMU		Work load for coordination with AU ?
		Work load for coordination with ATSU
		Work load for coordination with ATFMU ?
		DCB (Post-operations analysis) ?

5. Conclusion

- Considering the unique airspace/route structure between Japan and Hong Kong, it is thought that CTOT/BTO operation has some advantages from several perspectives.
- When introducing CTOT/BTO, it is essential to consider the influence on all stakeholders including AU and ATSU and also the increase of manual workload due to the change of the method.
- We would like to explore the possibility of practical interoperable operation cooperatively.