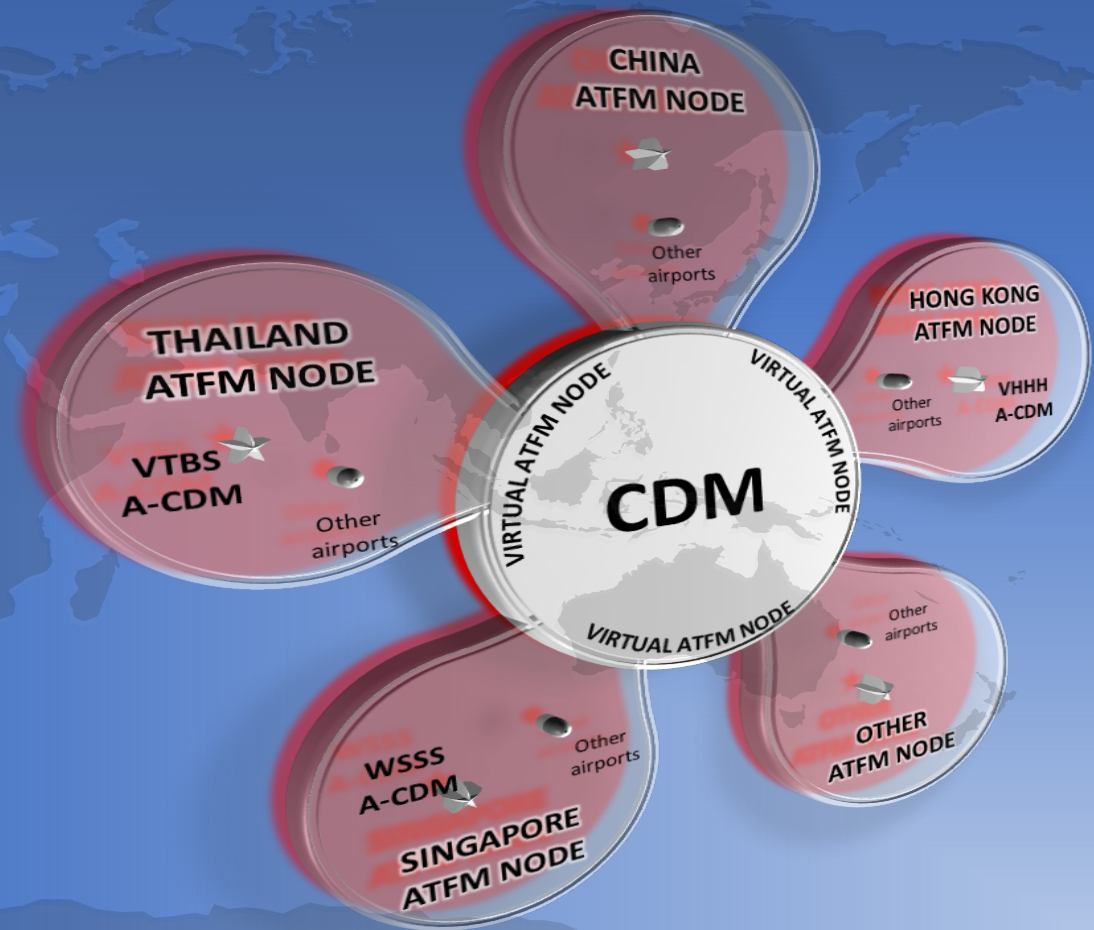
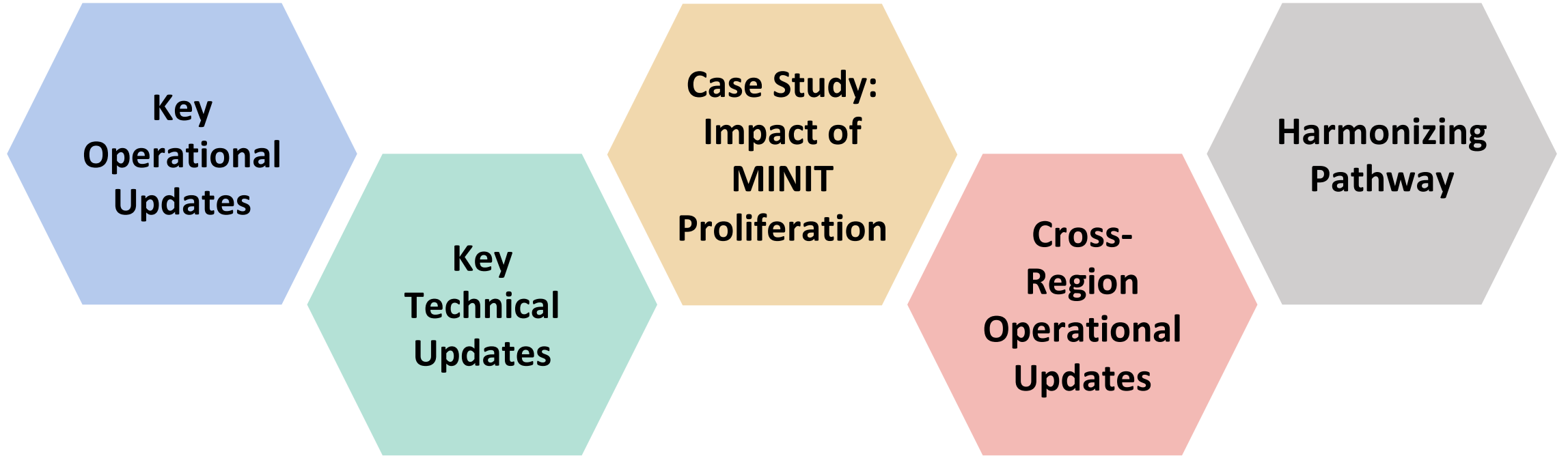


Asia-Pacific Multi-Nodal ATFM Collaboration Progress Update



Agenda



DISTRIBUTED MULTI-NODAL ATFM NETWORK



2019 Post-Operations: Network Analysis

Key
Operational
Updates

Link to Dashboard: [HERE](#)

Key Technical
Updates

Case Study:
Impact of
MINIT
Proliferation

Cross-Region
Operational
Updates

Harmonizing
Pathway



DISTRIBUTED MULTI-NODAL ATFM NETWORK



ATFM DAILY PLAN (ADP) EXCHANGE

Key
Operational
Updates



Method: **E-Mail with attached PDF file**

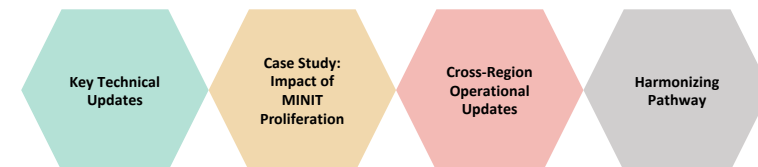


E-Mail Title: **ADP_[FIR Name]_[yyyymmdd]_[version]**

File Title: **ADP_[FIR Name]_[yyyymmdd]_[version]**



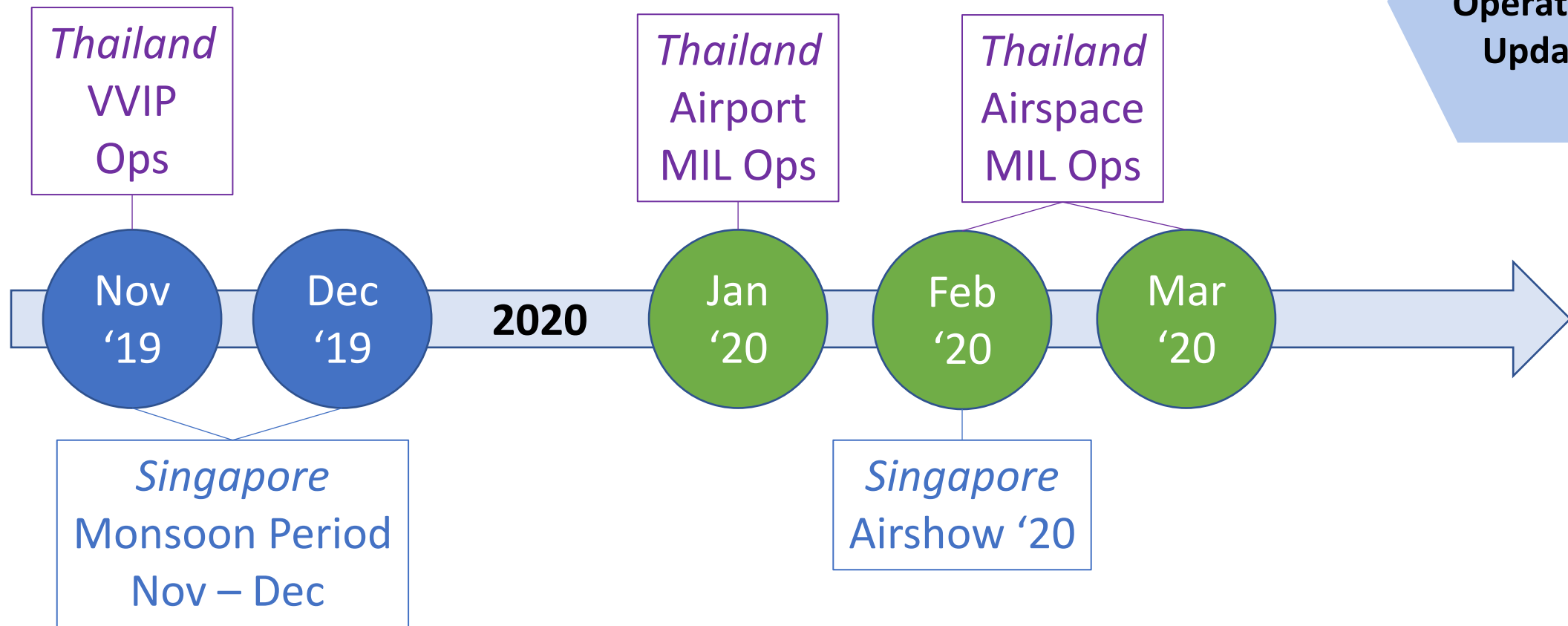
Frequency: **When ATFM measure is needed**



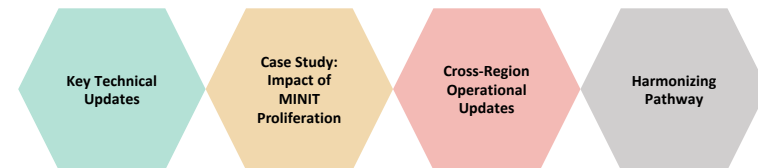
DISTRIBUTED MULTI-NODAL ATFM NETWORK



Planned Operations in Q4/2019 – Q1/2020



Key Operational Updates



DISTRIBUTED MULTI-NODAL ATFM NETWORK

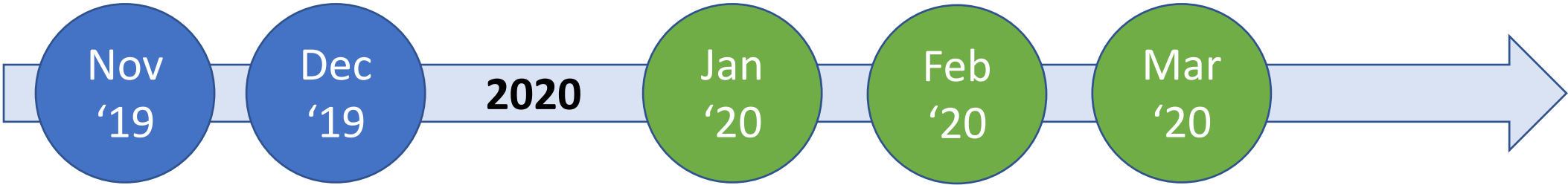


Expected Operations in Q4/2019 – Q1/2020

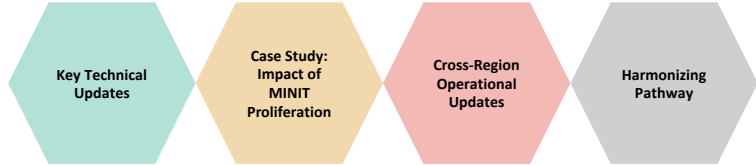
Key Operational Updates

Thailand: Bangkok ACC Capacity Management

Thailand: ZPKM FIR Restrictions



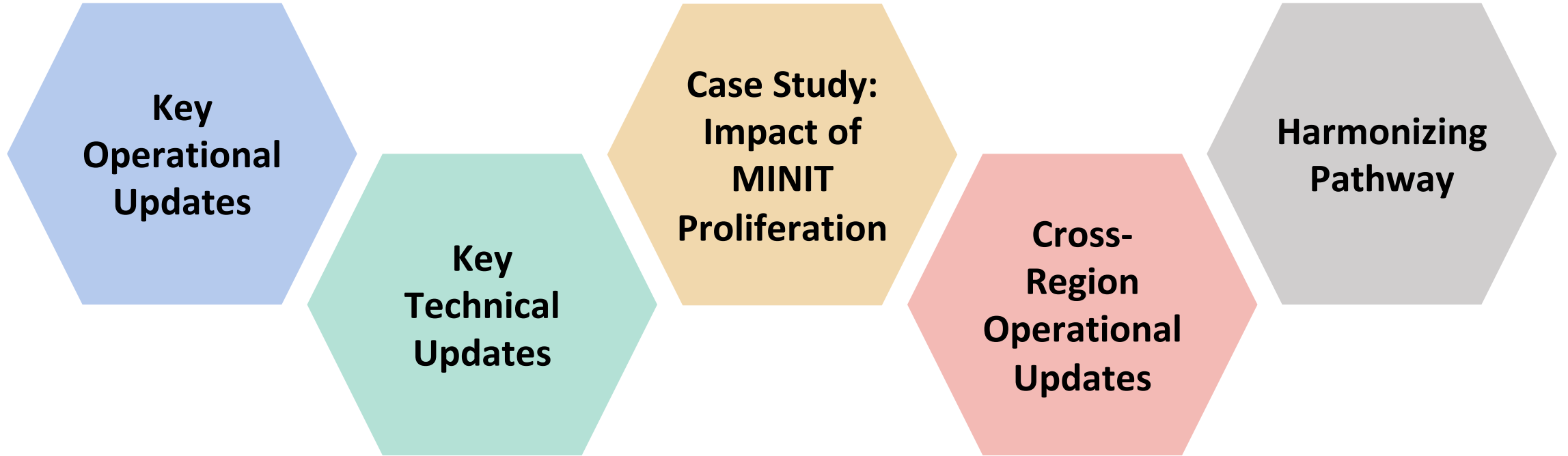
Tactical Monitoring and Tactical ATFM Measures



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Agenda



DISTRIBUTED MULTI-NODAL ATFM NETWORK



ICD for ATFM Information Exchange

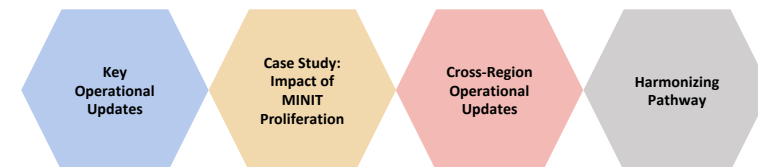
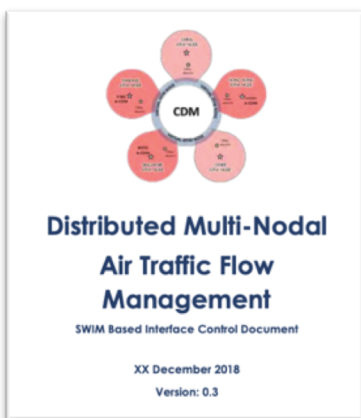
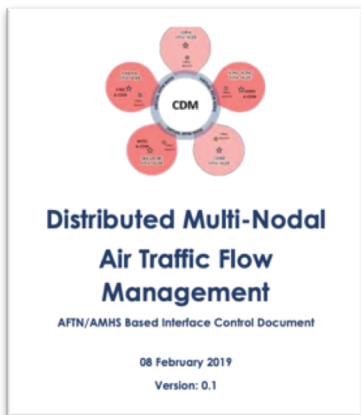
Key
Technical
Updates

AFTN/AMHS – based ICD

- Provisions for SAM / SRM / SLC messages
- Endorsements from ATFM/SG/9, ACSICG/6, CNS SG/23
- Draft version available on ICAO website

SWIM-based ICD

- Ongoing discussion on specifications and interface characteristics
- Technical tests being conducted



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Slot Allocation Message (SAM) Status

Key
Technical
Updates

ATFM Node	ANSP	SAM Distribution
Cambodia	CATS	✓
China (Sanya)	CAAC ATMB	✓
Hong Kong China	HKCAD	Q1 - 2020
Singapore	CAAS	Q1 - 2020
Thailand	AEROTHAI	✓

Key
Operational
Updates

Case Study:
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Cross-Region
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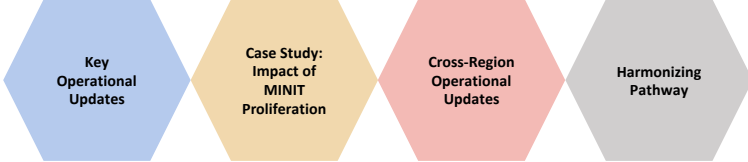
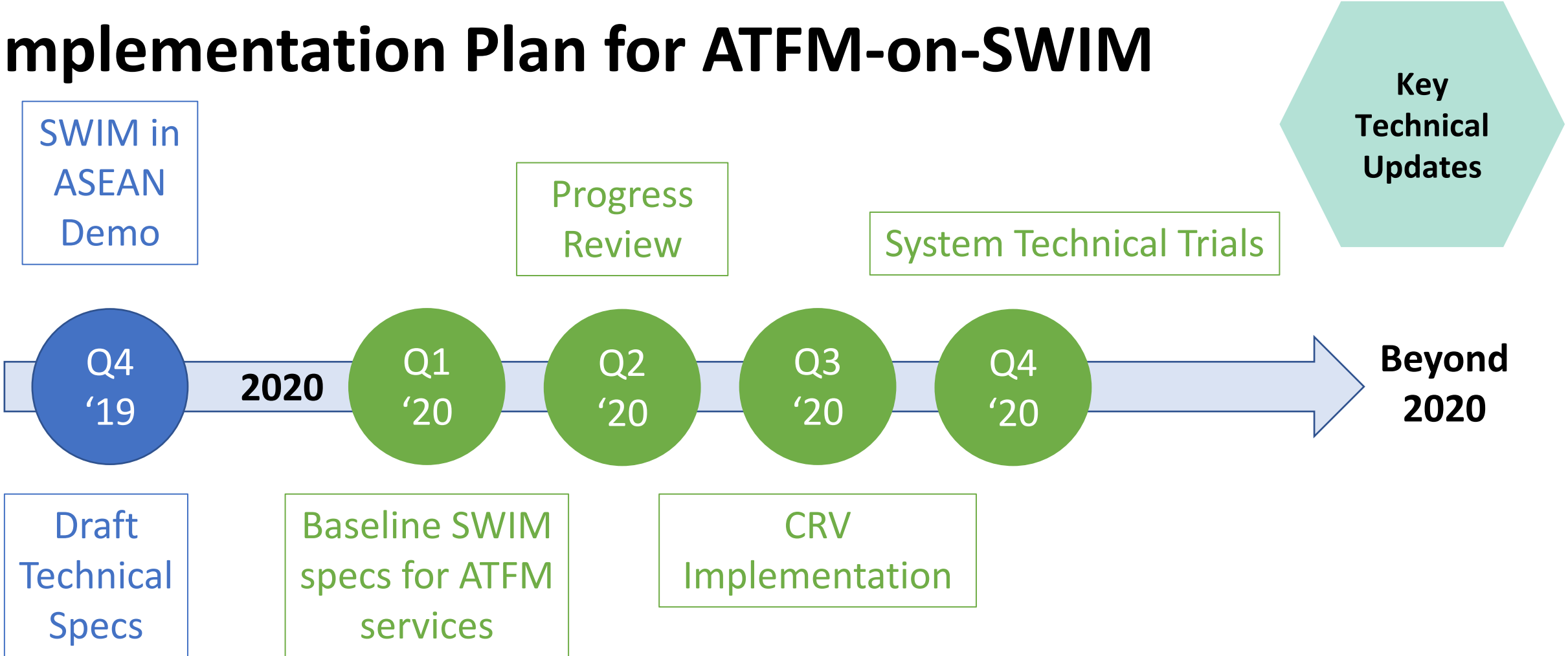
Harmonizing
Pathway



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Implementation Plan for ATFM-on-SWIM



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Implementation Plan for ATFM-on-SWIM

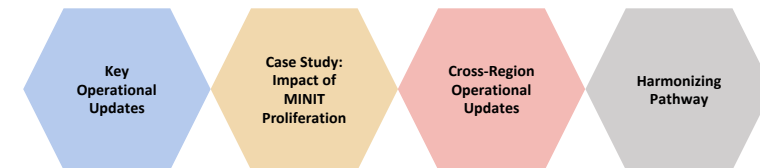
Key
Technical
Updates

System Technical Trials

- ❑ Limited operational trial with at least 2 ATFMUs involved
- ❑ Provision of ATFM services on SWIM infrastructure
- ❑ Flight information exchange via SWIM on CRV
- ❑ CTOT distribution, CTOT revision, CTOT cancellation services



DISTRIBUTED MULTI-NODAL ATFM NETWORK



SWIM in ASEAN Demonstration

Key
Technical
Updates



SWIM in ASEAN Demonstration

12 November 2019, Bangkok, Thailand

15 November 2019, Singapore

Key Relevant Outcomes

- ✓ **ATFM-on-SWIM proof-of-concept through GDP scenarios**
- ✓ **Validated APAC FIXM extension for ATFM/A-CDM operations**
- ✓ **Demonstrated model of SWIM implementation for ASEAN & APAC**

Key
Operational
Updates

Case Study:
Impact of
MINIT
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Cross-Region
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Updates

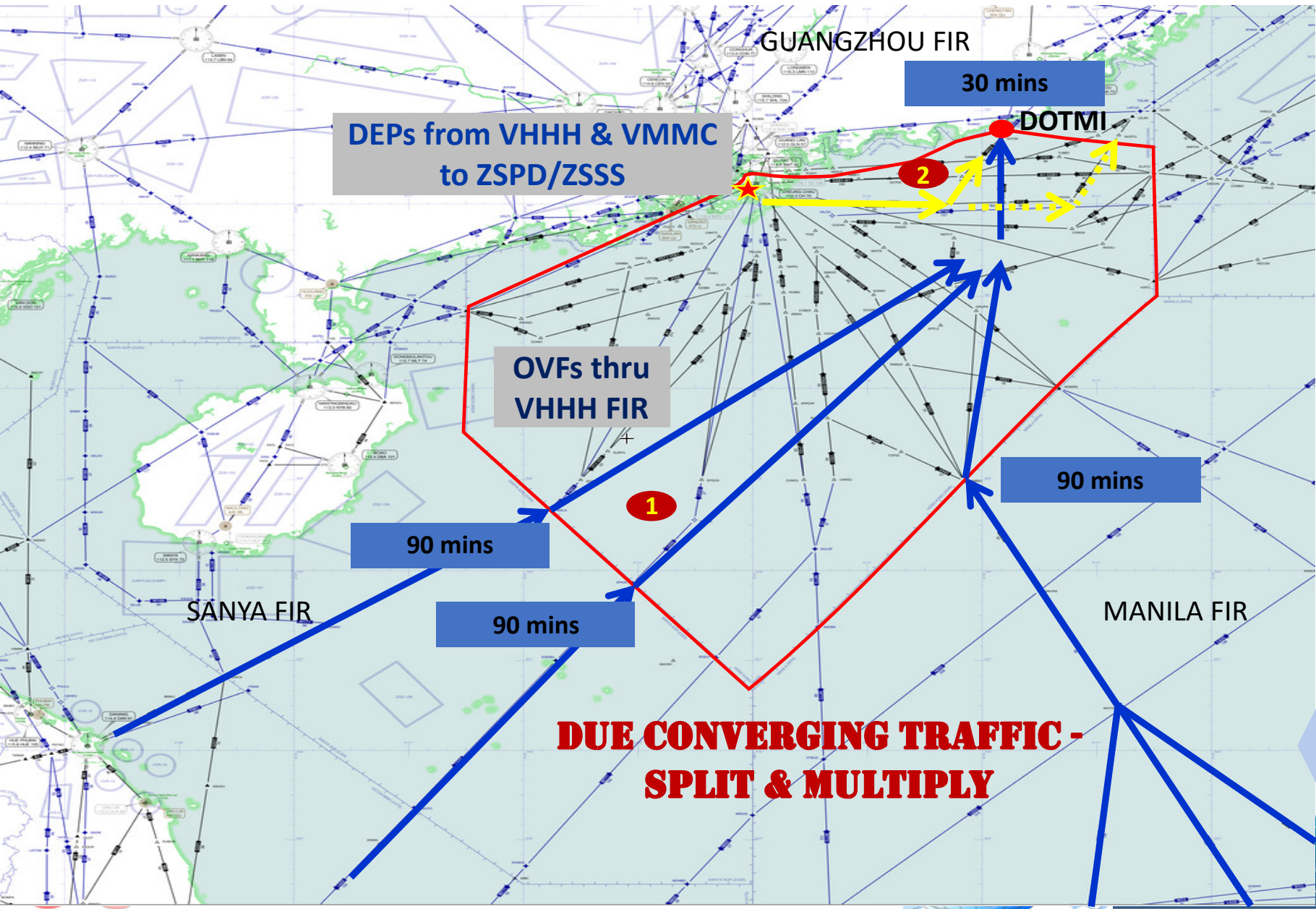
Harmonizing
Pathway



DISTRIBUTED MULTI-NODAL ATFM NETWORK



DOTMI Restriction – Trend Analysis



Key Technical Updates

Key Operational Updates

Case Study: Impact of MINIT Proliferation

Cross-Region Operational Updates

Harmonizing Pathway



DOTMI Restriction – Oct 2019 Analysis

Key
Technical
Updates

- Flow control is now separated into 3 streams
 - VHHH DEPs, VMMC DEPs, OVFs (including long-hauls)
- Number of changes within a day (to ZSPD) – average 8/day
 - Several days NO flow restrictions
- The magnitude of MINIT – 2 days of 60 mins (cap at 30 mins)
- Average MINIT = ~17 mins for traffic OVF DOTMI

PROPOSAL – Impose a daily flow restriction of 10-15 mins in the early morning, in anticipation of flow restrictions from Shanghai e.g. 0000-1600UTC

Key
Operational
Updates

Case Study:
Impact of
MINIT
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Pathway



DISTRIBUTED MULTI-NODAL ATFM NETWORK



601A 07 SIM OK ILS 34 2018.06.26 09:41
26/09:40 - 26/10:39

FPL 3-HR FCST ACD Sector Cap ISA ISA FPL WPT IWA APP Cons AREA Cons Help -1Hr -10Min Home +10Min +1Hr

DOTMI LELIM ELATO ENVAR KAPLI NOMAN SABNO ASOBA DOSUT EPKAL
IKELA SIKOU SIERA TAMOT BEKOL

Different entry/exit fixes

DOTMI

Restriction Summary

FIX	Flight Type/Aerodrome	Group	ADES	Date	Time	Flow	Select
DOTMI	DEP+OVF/ALL	GP7	ZSSS ZSPD	180626	0550	10	

Different AD or MINIT combination

Create a Restriction

Flow 10 Min

Date /Time in UTC
 Today
 Tomorrow
 Time 0550

Flight Type/Aerodrome
 DEP OVF DEP+OVF
 DEP: ALL VHHH VMMC
 DES Group: GP7
 Aerodrome: ZSSS ZSPD
 Create Group

Apply Flow Calculation Cancel

CTO differs by at least 10 mins

Restriction	Status	Callsign	ADEP	ADES	ETOT	ATOT	ETO	CTO	CTOT	CTOT Locked	Delay
GP7		AMU138	VMC	ZSSS	1035	1035	1100	1100	1035		0
GP7		CSH886	WMKK	ZSPD	0900	0903	1230	1227	0900		-3
GP7		CES569	WSSS	ZSPD	0905	0910	1234	1237	0913		3
GP7		CES568	WSSS	ZSPD	0910	0931	1250	1247	0928		-3
GP7		GAP9747	RPVK	ZSPD	1043	1118	1305	1247	1100		-18
GP7		VJC5270	VWCR	ZSPD	1055	1123	1320	1257	1100		-23
GP7		GAP9745	RPVK	ZSPD	1105	1143	1330	1307	1120		-23
GP7		GAP9746	RPVK	ZSPD	1108	1153	1340	1317	1130		-23
GP7		VJC5268	VWCR	ZSPD	1100	1153	1350	1327	1130		-23
GP7		VJC5269	VWCR	ZSPD	1101	1203	1400	1337	1140		-23
GP7		HDA623	VHHH	ZSPD	1310		1332	1347	1325		15
GP7		HDA624	VHHH	ZSPD	1310		1332	1357	1335		25
GP7		HDA622	VHHH	ZSPD	1310	1348	1410	1417	1325		7
GP7		HDA625	VHHH	ZSPD	1410		1432	1437	1415		5

Export Cancel

Manual input CTO

CTO [] Update CTO Lock/Unlock CTO Apply Flow Calculation

Lock/unlock CTO

Technical
updates



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Updates Proliferation Updates



**Key
Technical
Updates**

ETO vs ATO

Demand-Capacity Balancing

**Key
Operational
Updates**

**Case Study:
Impact of
MINIT
Proliferation**

**Cross-Region
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**Harmonizing
Pathway**



DISTRIBUTED MULTI-NODAL ATFM NETWORK



DOTMI ETO vs ATO

- Methodology

- ETO DOTMI = EOBT + STT + EET (from FPL)
 - ❖ For preliminary Demand & Capacity prediction
 - ❖ Not very accurate
- ETO DOTMI (updated) = **ATD** + EET (from FPL)
 - ❖ More accurate
 - ❖ Use this to compare with the ATO from ATM system

Key
Technical
Updates

Key
Operational
Updates

Case Study:
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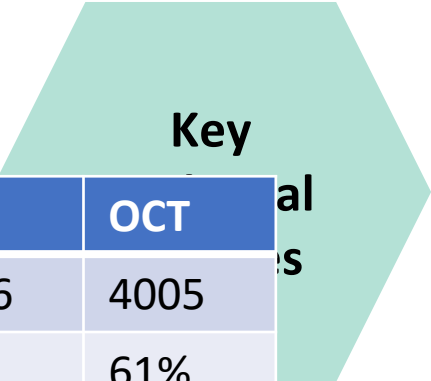
Harmonizing
Pathway



DISTRIBUTED MULTI-NODAL ATFM NETWORK

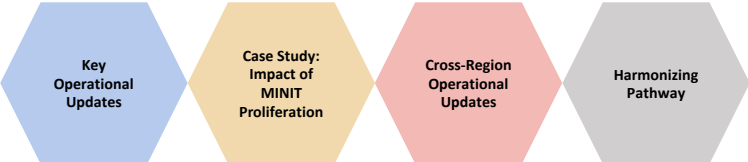


DOTMI ETO vs ATO: Apr – Oct 2019



	APR	MAY	JUN	JUL	AUG	SEP	OCT
Number of valid DOTMI flights	4190	3818	4375	4484	3119	2896	4005
Within +/- 5mins Window	64%	65%	70%	68%	64%	60%	61%
Average Deviation from ETO (mins)	3.9	3.2	6.1	5.9	7.3	5.3	3.4

- All VHHH/VMMC DEP and OVF via DOTMI
- 60-70% of flights within +/- 5 mins window
 - Some of them are short cut or vectored to achieve the required MINIT/MIT
 - Can be further improved if CTOs are given
- Average deviation from ETO is low and close to 5 mins
 - What kind of window are we looking for?
 - Possibility of CTOT distribution?



DISTRIBUTED MULTI-NODAL ATFM NETWORK



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DISTRIBUTED MULTI-NODAL ATFM NETWORK



Case Study: Impact of MINIT Proliferation

Case Study:
Impact of
MINIT
Proliferation

ACFT landing ZZZZ



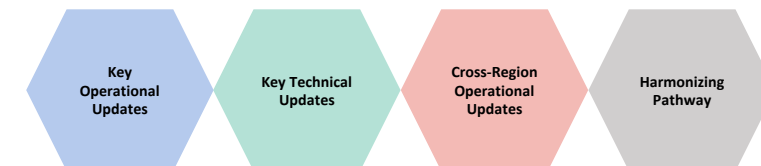
FIR A



FIR B

5 mins, FL260 only

Capacity = 12 flights per hour



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Case Study: Impact of MINIT Proliferation

Case Study:
Impact of
MINIT
Proliferation

ACFT landing ZZZZ



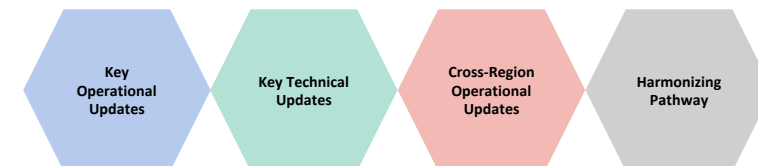
FIR B



FIR C

5 mins, FL320 or below

Capacity = 12 flights per hour



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Case Study: Impact of MINIT Proliferation

Case Study:
Impact of
MINIT
Proliferation

ACFT landing ZZZZ



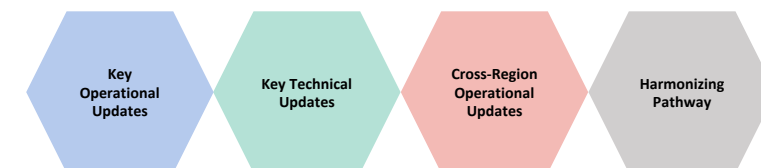
FIR C



FIR D

5 mins, FL300 or below

Capacity = 12 flights per hour



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Case Study: Impact of MINIT Proliferation

Case Study:
Impact of
MINIT
Proliferation

ACFT landing ZZZZ

DE 1



10 mins, FL340 or below

FIR D

Capacity = 6 + 2 = 8 flights per hour

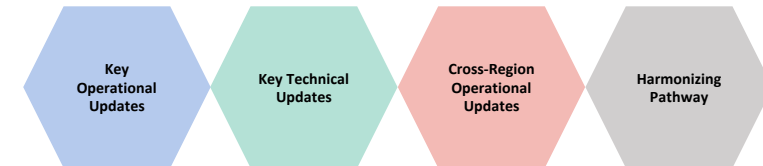
FIR E

30 mins, FL340 or below

DE 2



ACFT landing ZZZZ



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Case Study: Impact of MINIT Proliferation

Case Study:
Impact of
MINIT
Proliferation

EF 1

ACFT landing ZZZZ



12 mins, FL340 or below

FIR E

Capacity = 5 + 1.7 = 6.7 flights per hour

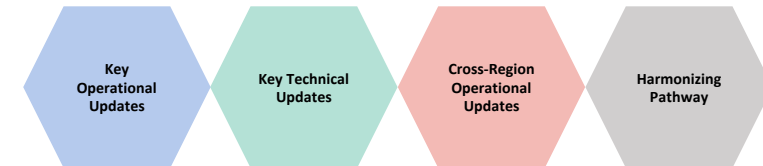
FIR F

EF 2

35 mins



ACFT landing ZZZZ

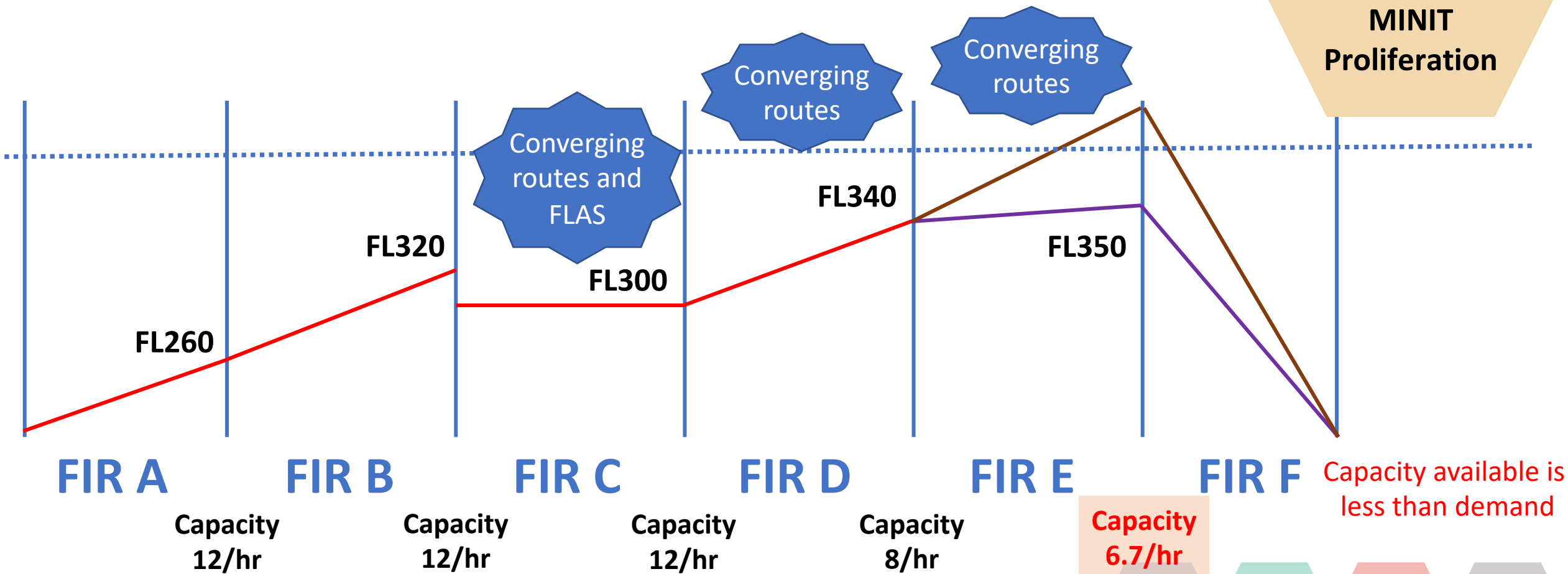


DISTRIBUTED MULTI-NODAL ATFM NETWORK



Case Study: Impact of MINIT Proliferation

Case Study:
Impact of
MINIT
Proliferation

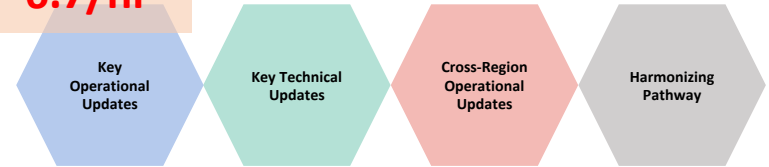


Capacity available is less than demand

4 mins @F260
Capacity 15/hr
4 mins @F300

Recently Changed

Capacity 6.7/hr



DISTRIBUTED MULTI-NODAL ATFM NETWORK

Case Study: Impact of MINIT Proliferation

Case Study:
Impact of
MINIT
Proliferation



Discussion Points

- ❑ Max demand of FIR F = 7-8 flights/hour
- ❑ FIR A limited the capacity landing ZZZZ
- ❑ Each FIR cap the level (may add buffer)
- ❑ On a normal day; no WX & no special activity

Demand > Capacity!

Key
Operational
Updates

Key Technical
Updates

Cross-Region
Operational
Updates

Harmonizing
Pathway



DISTRIBUTED MULTI-NODAL ATFM NETWORK



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**Case Study:
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Pathway**



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Thailand – Japan ADP Exchange

Cross-Region Operational Updates

- ✓ Sharing of ADP between Bangkok ATFMU <-> Fukuoka ATMC
- ✓ Shared via e-mail with attached PDF
- ✓ Distributed to ATS Units
- ✓ Correctly-formatted subject line
 - Unformatted file name due to system limitation

ATFM DAILY PLAN		NAME OF ATFM UNIT	[UTC DATE] [START TIME]	[UTC DATE] [END TIME]
CAPACITY AND CONSTRAINTS		ATMC	2019/09/11 23:55	2019/09/12 07:00
LOCATION (AD OR SECT)	APPLICABLE PERIOD	AAR* (LANDINGS PER HOUR)	CONSTRAINT/REMARK	
NIL				
ATFM MEASURES (ONGOING)				
LOCATION (AD OR SECT)	APPLICABLE PERIOD	MEASURE/REMARK		
VVDN	2340-0540	12MINIT AT MUGUS/ATOTI&FL340 AT OR BELOW		
VVDN	2340-0540	35MINIT AT RUGMA		
POSSIBLE/DEVELOPING ISSUES				
LOCATION (AD OR SECT)	APPLICABLE PERIOD	MEASURE/REMARK		
NIL				

Key Operational Updates

Key Technical Updates

Case Study: Impact of MINIT Proliferation

Harmonizing Pathway



DISTRIBUTED MULTI-NODAL ATFM NETWORK



**Cross-Region
Operational
Updates**

Hong Kong Collaboration with Northeast FIRs

Fukuoka, Incheon, Manila FIRs

Key
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Case Study:
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Pathway



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Handling the traffic increase at HKIA and HK FIR
MIT, MINIT vs CTOT – **“HYBRID MODE”**

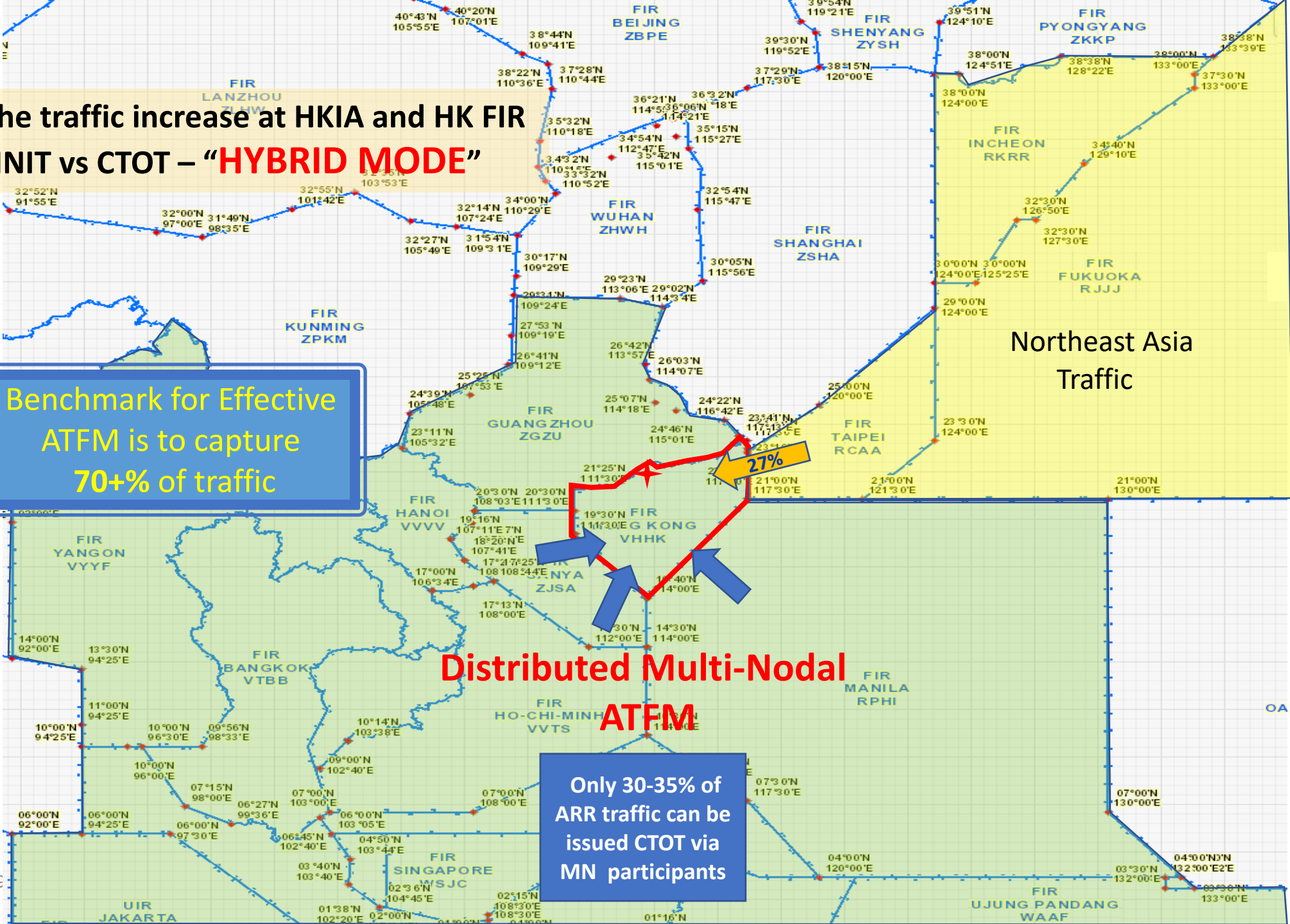
Benchmark for Effective
ATFM is to capture
70+% of traffic

**Distributed Multi-Nodal
ATFM**

Only 30-35% of
ARR traffic can be
issued CTOT via
MN participants

27%

Northeast Asia
Traffic



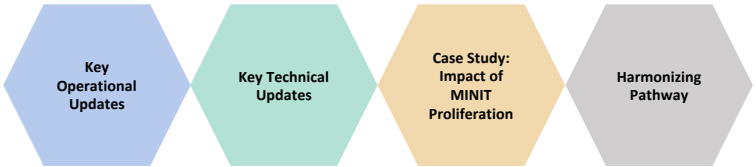
Flow Reference Table

Cross-Region Operational Updates

Flow Control Reference Table (C)
0800 - 1159 UTC

Waypoint	DOTMI	LELIM	ELATO						SIERA	NOMAN	DOSUT	IKELA	SIKOU
FIR			Taipei			Fukuoka		ROK	China	Manila	Singapore Malaysia Indonesia	Vietnam Malaysia Phnom Penh	Bangkok Sanya
AAR			RCTP	RCKH	RCMQ	via A1 BULAN	via G581 IGURU	via B576 SALMI					
34	20	30	25	60	60	12	12	45	20	45	25	60	15
33	25	30	25	60	60	12	12	45	25	50	25	60	15
32	25	35	25	60	60	12	12	45	25	50	25	60	20
31	25	35	25	60	60	12	12	50	25	50	25	60	20
30	25	35	25	60	60	12	12	50	25	55	25	60	20
29	25	35	25	60	60	12	12	50	25	55	30	60	20
28	30	40	30	60	60	15	15	55	30	60	30	60	20
27	30	40	30	60	60	15	15	55	30	60	30	60	20
26	30	40	30	60	60	15	15	60	30	60	30	60	20
25	30	45	30	60	60	15	15	60	30	60	35	60	25
24	35	45	35	60	60	15	15	60	35	60	35	60	25
23	35	45	35	60	60	15	15	60	35	60	35	60	25
22	35	50	35	60	60	15	15	60	35	60	35	60	25
21	40	50	40	60	60	20	20	60	40	60	40	60	30
20	40	55	40	60	60	20	20	60	40	60	40	60	30
19	40	55	45	60	60	20	20	60	40	60	45	60	30
18	45	60	45	60	60	20	20	60	45	60	45	60	35

CTOT can be used instead of Minutes-In-Trail



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Hong Kong – Japan – ROK Collaboration

Cross-Region
Operational
Updates

- Study group for commencing trials between the FIRs
- JCAB ATMC
 - 10+ paper trials with satisfactory results
- ROK ATCC
 - Target trial commencement by end-2019
- Manila ATFMU – can comply to CTOTs

Tentative Time Frame	Tasks
End of 2019	Confirmation of accepting CTOTs for International traffic and/or issuing CTOTs
Q1 2020	Completion of paper trials
Q2 2020	Completion of controlled operational trials
Q3 2020	Face-to-Face meeting to discuss way forward

Agenda

**Key
Operational
Updates**

**Key
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MINIT
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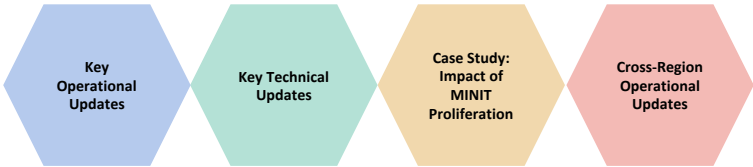
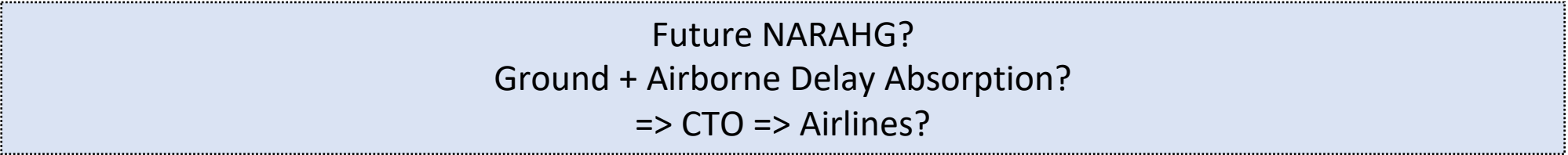
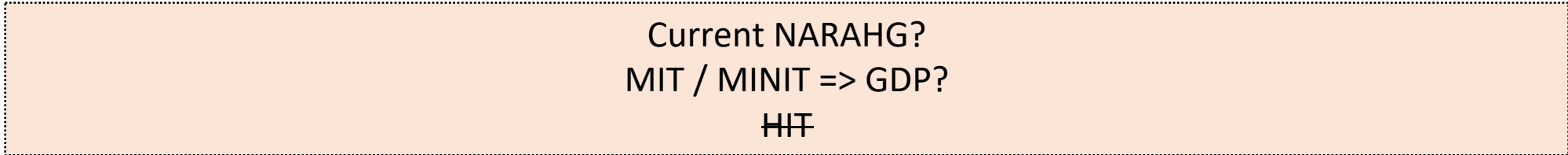
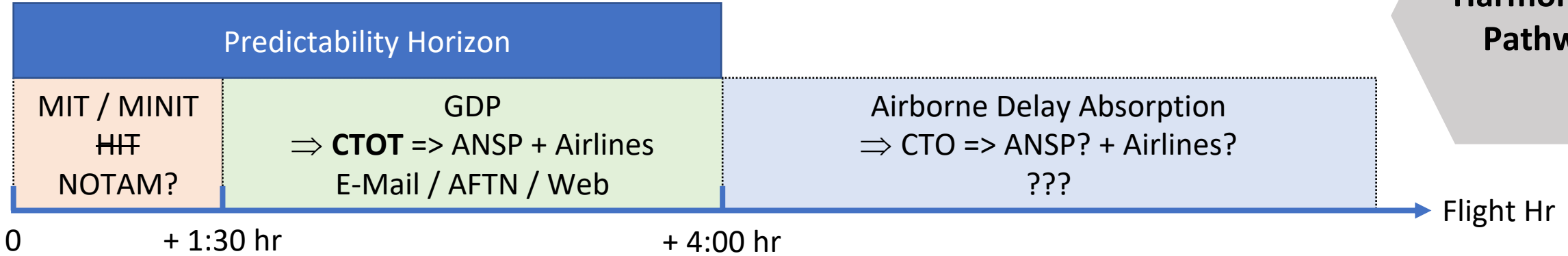
**Harmonizing
Pathway**



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Concept Diagram for Harmonization



DISTRIBUTED MULTI-NODAL ATFM NETWORK



Thank You!

