



Policy Implementation Plan

CARATS (Long-Term Vision for Air Traffic Systems) – Direction of Reform to Meet the Goals

- 1 Realizing Trajectory-based Operation (TBO)
- 2 Improved Predictability
- 3 Promotion of Performance Based Operation (PBO)
- 4 Implementation of Satellite Navigation in All Flight Phases
- 5 Improved Airborne/Ground Situation Awareness
- 6 Maximum Use of Human/Machine Capability
- 7 Ensuring Info. Sharing and Collaborative Decision Making
- 8 Achieving high-density operation in the congested airports and congested airspace

Priority measure : Priority measure

◆ : IOC (Initial operation capability) Fiscal Year of Decision Making

▭ (dashed border) : Decision made in FY 2018

▭ (solid border) : Considering

Project	Measures	Current (until now)	Short-Term (Until FY2020)	Mid-Term (FY2021 - 2024)	Long-Term (From FY2025)					
Airspace Organization	Flexible Airspace Management	<ul style="list-style-type: none"> Mixture of cruise, climb and descent Flight along fixed, published paths <p>Appendix 1-2: PBO</p>	<p>Controlled Airspace Restructure (FY2018 - 2024)</p> <p>Urban Airspace Restructure</p> <p>Dynamic Terminal Airspace Management (OI-3)</p> <p>From FY 2020</p> <p>Point Merge System (OI-3: ◆2013)</p>	<p>Vertical Separation of Airspace (OI-4) UPR at High Altitude (OI-5) Real-Time Airspace Shift (OI-6)</p> <p>From FY2022</p> <p>Vertical Separation of Domestic Airspace (Western Japan) (OI-4: ◆2013)</p> <p>Direct Published Routes (OI-5: ◆2013)</p> <p>Regional Airspace Shift (OI-6: ◆2013)</p>	<p>High Altitude: Cruising-Centric</p> <p>Low Altitude: Focus on Climb/Descent</p> <p>From FY2025</p> <p>Variable (Altitude)</p> <p>Variable (Horizontal)</p> <p>TBO-Oriented Airspace Structure (OI-7)</p> <p>High Altitude Airspace UPR+DARP (OI-5: ◆2013)</p> <p>Boundary Alt. + Vertical Shift (OI-6: ◆2013)</p>					
	Pre-flight Collaborative Trajectory Options	<p>Pilots</p> <p>select from published routes</p> <p>Publish co-ordinated routes</p> <p>ATC Services</p> <table border="1"> <tr><td>経路1</td><td>RJTT-SEKID Y20...</td></tr> <tr><td>経路2</td><td>RJTT-YANAG Y28...</td></tr> <tr><td>経路3</td><td>RJTT-JYOGA Y56...</td></tr> </table>	経路1	RJTT-SEKID Y20...	経路2	RJTT-YANAG Y28...	経路3	RJTT-JYOGA Y56...	<p>Trajectory, Weather Information, Operational Constraints Sharing (OI-14)</p> <p>From FY2019</p> <p>Operation Data Sharing Standardized by XML etc. (OI-14: ◆2014)</p>	<p>Conflict-Free Trajectory Options (OI-17)</p> <p>From FY2025</p> <p>Collaborative Trajectory Options prior to operation (OI-15)</p> <p>System-based Rerouting (OI-15: ◆2017)</p> <p>Pilots</p> <p>ATC Services</p> <p>SWIM-based Int. Coordination (OI-15: ◆2017)</p>
経路1	RJTT-SEKID Y20...									
経路2	RJTT-YANAG Y28...									
経路3	RJTT-JYOGA Y56...									
Flight Operation	Real-Time Rerouting	<p>ATFM (Time management-ground base)</p>	<p>Initial CFDT based Time Management (OI-18)</p> <p>From FY 2020</p> <p>Initial CFDT (reintroduction) (OI-18: suspended since 2012)</p> <p>Accelerate at 20kt per hour</p> <p>Decelerate at 10kt per hour</p>	<p>Multi-Area CFDT-based Time Management Enhancement (OI-16)</p> <p>From FY 2022</p> <p>Multi-Area CFDT</p> <p>Accelerate at 10kt per hour</p> <p>Decelerate at 20kt per hour</p> <p>Decelerate at 10kt per hour</p>	<p>System-enabled real-time rerouting (OI-22)</p> <p>Realization of TBO</p> <p>Avoid storms</p> <p>From FY2025</p> <p>Datalink-based air-to-ground Trajectory Sharing (OI-21)</p>					
	Operations over Congested Areas	<p>Separation and scheduling based on ATC instructions after take-off</p> <p>Possibility of conflict</p> <p>Pilot/ATC voice communication</p> <p>Limited information sharing between pilots and air traffic controllers (traffic, aviation/weather)</p>	<p>Shortening of Turbulence-Derived Separation</p> <p>From FY2019</p> <p>Recategorization/Fixed Separation (OI-26: ◆2013)</p> <p>Efficient Airport Management & ACDM (OI-23)</p> <p>From FY2019</p> <p>AMAN/DMAN/SMAN (OI-23-1: ◆2014)</p> <p>ACDM (Urban Airports) (OI-23-2: ◆2014)</p>	<p>Metering at Meeting Point (OI-19)</p> <p>From FY2022</p> <p>Fixed Metering Fix (OI-19: ◆2013)</p> <p>Automation of Standard Communication (OI-29)</p> <p>From FY2021</p> <p>Enhancement (OI-23-1)</p> <p>Extension into Other Airports (OI-23-2)</p> <p>Inland CPDLC (en-route) (OI-29-2: ◆2013)</p> <p>D-TAXI etc. (OI-29-1~3)</p>	<p>Dynamic Metering Fix (OI-19: ◆2013)</p> <p>Dynamic RECAT (OI-26)</p> <p>From FY2025</p> <p>4D TRAD FLIPINT</p> <p>En-route 3NM ATC Sep. (OI-27)</p> <p>3NM 3NM 3NM</p>					
Supporting Technology Elements	Aviation Weather	<p>5km-mesh (Meso-Scale Model)</p> <p>1hr-interval</p> <p>Up to 39hr description</p> <p>3hr in update</p>	<p>Observation Information Enhancement (EN-4)</p> <p>From FY 2019</p> <p>New Satellite Observation Information (EN-4-4: ◆2016)</p> <p>Low Alt. Radar Echo (EN-4-2: ◆2012)</p>	<p>Prediction Information Enhancement (EN-5)</p> <p>From FY2023</p> <p>Quantification of Prediction Error (EN-5-4: ◆2017)</p>	<p>D-TRAD FLIPINT</p> <p>From FY2025</p> <p>DAPs Met-Data utilize</p> <p>5-1: ◆2017</p> <p>Translation from Weather Forecast into Operational Impact and Capacity (EN-6)</p>					
EN (Enabler)	Information Management	<p>Operational information DB (EN-2) From 2015</p> <p>GIS information database (EN-2) From 2016</p>	<p>DB etc. Information Platform Development (EN-2)/ Information Platform (EN-3)</p> <p>From FY2019</p> <p>IP Network Development with Overseas (EN-3: ◆2014)</p> <p>SWIM-like Handling (EN-3: ◆2014)</p> <p>Adoption of International Standard Data Format (EN-2: ◆2014)</p>	<p>D-NOTAM (EN-2: ◆2018 TBC)</p> <p>FF-ICE (EN-2)</p> <p>4D Met-DB (EN-2)</p> <p>From FY2025</p> <p>SWIM (EN-3: ◆2018 TBC)</p>	<p>Priority measure</p> <p>Priority measure</p> <p>Priority measure</p>					
	Surveillance Communication	<p>Improved Parallel Runways Capability (EN-11)</p> <p>DAPs for SSR (EN-12,13: ◆2014)</p> <p>Narita WAM/PRM from 2015</p>	<p>Employment of DAPs (EN-12)</p> <p>From FY2018</p> <p>DAPs for WAM (EN-12,13: ◆2018 TBC)</p> <p>Onward</p> <p>WAM equipment</p>	<p>Met Observation Data Downlink (EN-13)</p> <p>From FY2022</p> <p>Wind Direction/Speed Calculation Capability (EN-13: ◆2017)</p> <p>VHF Datalink (EN-14)</p> <p>From FY2021</p> <p>FANS-1/A+(POA/M2) (EN-14: ◆2013)</p>	<p>ADS-B ATC employment (EN-9,10)</p> <p>Future Communication Equipment (EN-15)</p> <p>AeroMACS (Ground Ops) (EN-15: ◆2019)</p> <p>Priority measure</p> <p>AeroMACS (onboard communication) L-DACS (EN-15)</p>					



PBN Implementation Plan

【Target Periods and Goals】
 Short-Term (Until FY2020) : Development of RNAV/RNP Routes
 Mid-Term (FY2021 - 2024) : Realizing Satellite-based Navigation for All Flight Phases
 Long-Term (From FY2025) : Realizing Trajectory-based Operation (TBO)

Priority measure : Priority measure

- ◆ : IOC (Initial operation capability) Fiscal Year of Decision Making
- ▭ (dashed) : Decision made in FY 2018
- ▭ (blue) : Considering

Current (until now)

Project **Measures** **Implemented**

En-Route

From 1992 : Trial Operation (3 RNAV routes set up)
 From 1995 : Evaluation (interim standard developed)
From 2008 : Formal RNAV5 operations (RNP: ±5NM)
RNAV5 Routes : 254 routes as of 2018.7

Sky Highway (From FY2010)
 VOR and RNAV operations vertically separated at altitude of 9,000ft or above, introducing RNAV routes nation-wide

Terminal

From 1999 : Interim Operations (for mid-night flights arriving at HND)
 From 2004 : Interim RNAV routes set up (5 airports: Hakodate, Osaka, Takamatsu, Fukuoka, Kagoshima)
From 2007: RNAV1 SID/STAR operations (RNP: ±1NM)

RNAV1 : 34 airports, 336 routes
RNP1 : 40 airports, 138 routes as of 2018.7

	RNAV1	RNP1	Total
SID	70	59	129
TR	103	17	120
STAR	163	62	225
Total	336	138	474

**Basic RNP1 currently set to be changed in name to RNP1*

Approach

From 2005 : RNAV APCH (3 airports: Shin-chitose, Naha, Hakodate)
 From 2006 : Baro-VNAV APCH (3 airports: Shin-chitose, Naha, Hiroshima)
 From 2012 : RNP AR APCH (5 airports: Haneda, Odate-Noshiro, Hakodate, Kochi, Kitakyushu)

Non-Precision Approach
 RNAV ACPH : 20 airports, 25 routes
 RNP ACPH : 25 airports, 38 routes
 RNP AR APCH : 30 airports, 55 routes as of 2018.7

Example for Odate-Noshiro
 Flight Distance: 16NM (30km) reduced (roughly 5 minutes reduced)

Required Navigation Performance - Authorization Required

General Aviation

Low Altitude RNAV Route 2014 Oshima - Hachijojima

Procedure for helicopters implemented at Fukushima Airport for trial operation from 2018.4.26

Short-Term (Until FY2020)

Development of RNAV/RNP Routes

GNSS Navigation Service Provision across All Flight Phases (EN-7)

Airspace Restructure (FY2018 – 2024)

RNP2 implementation, RNAV5→RNP2

RNP2 (OI-10: ◆2018 TBC)

RNAV5 → **RNAV5 / RNP2 (Overlay)** → **RNAV5→RNP2 (Gradual Transition)**

Precise, Flexible Departure/Arrival/Approach Procedures (OI-9)

Development of RNP1

RNP 1

Expansion of RNP1 for terminal (4 to 6 airports per year following RNP APCH)

RNAV1 → **RNAV introduced airports (34airports)** → **RNAV1 → RNP1 (4 to 6 airports per year)**

PBN-based Precision Departure Approach along Curved Path (OI-9: ◆Undecided (consideration to resume from 2018))

Development of RNP APCH/RNP AR APCH

RNP APCH•RNP AR APCH

Expansion of RNP APCH/RNP AR APCH airports (4 to 6 airports per year)

RNAV APCH → **RNAV introduced airports (20airports)** → **RNAV APCH → RNP APCH (4 to 6 airports per year)**

Priority measure **From FY2024**
SBAS- LP/LPV APCH (OI-9,12,EN-7: ◆2017)

Priority measure **From FY2020**
GLS(CAT- I) APCH (OI-9,EN-8: ◆2014)

Priority measure **From FY2023**
RNP to GLS APCH (OI-9,EN-8: ◆2014)

Priority measure **From FY2018**
RNP to ILS APCH (OI-9,EN-8: ◆2018 TBC)

GBAS based precision approach (GLS)
 From 2019: evaluation period

Low Altitude En-Route Setting (OI-11), Arrival/Approach Procedures Setting for Small Aircraft (OI-12)

From 2018, Gradual Nation-wide Expansion (towards Pacific Ocean, Japan Sea, Hokkaido) (OI/11)

From FY2018 **PinS (OI-12: ◆2010)** **CAT-H (OI-12: ◆2010)** **Procedures for Helicopter (PinS, CAT-H)**
 From 2018 evaluation additional implementation planned later on

Mid-Term (FY2021 - 2024)

Realizing Satellite-based Navigation for All Flight Phases

GNSS Precision Approach along Curved Path (EN-8)

Priority measure **From FY2024**
SBAS- LP/LPV APCH (OI-9,12,EN-7: ◆2017)

Priority measure **From FY2023**
RNP to GLS APCH (OI-9,EN-8: ◆2014)

Priority measure **From FY2018**
RNP to ILS APCH (OI-9,EN-8: ◆2018 TBC)

GNSS Precision Approach along Curved Path (EN-8)

Priority measure **From FY2024**
SBAS- LP/LPV APCH (OI-9,12,EN-7: ◆2017)

Priority measure **From FY2023**
RNP to GLS APCH (OI-9,EN-8: ◆2014)

Priority measure **From FY2018**
RNP to ILS APCH (OI-9,EN-8: ◆2018 TBC)

GNSS Precision Approach along Curved Path (EN-8)

Priority measure **From FY2024**
SBAS- LP/LPV APCH (OI-9,12,EN-7: ◆2017)

Priority measure **From FY2023**
RNP to GLS APCH (OI-9,EN-8: ◆2014)

Priority measure **From FY2018**
RNP to ILS APCH (OI-9,EN-8: ◆2018 TBC)

Low Altitude En-Route Setting (OI-11), Arrival/Approach Procedures Setting for Small Aircraft (OI-12)

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From FY2018 **PinS (OI-12: ◆2010)** **CAT-H (OI-12: ◆2010)** **Procedures for Helicopter (PinS, CAT-H)**
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Long-Term (From FY2025)

Realizing Trajectory-based Operation (TBO)

Eventual transition to 'Advanced RNP' towards future TBO implementation

High-precision, time-factor included RNP (OI-10)

Advanced RNP (OI-10: ◆2020)

Including RTA from departure to Arrival
RTA: Required Time of Arrival

RNP APCH to be expanded into IFP airports nation-wide

SBAS-based vertical guidance APCH (LPV)
 Improved SBAS performance applicable to 7 QZSS

Priority measure **From FY2024**
SBAS- LP/LPV APCH (OI-9,12,EN-7: ◆2017)

Priority measure **From FY2023**
RNP to GLS APCH (OI-9,EN-8: ◆2014)

Priority measure **From FY2018**
RNP to ILS APCH (OI-9,EN-8: ◆2018 TBC)

GLS(CAT-III) APCH (OI-9,EN-8: ◆2020)

Low Altitude En-Route Setting (OI-11), Arrival/Approach Procedures Setting for Small Aircraft (OI-12)

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