

CANSO ATFM Data Exchange Network for Cooperative Excellence (CADENCE)

For: ICAO APAC ATFM/SG/13

Date: April 3-7, 2023

By: Midori Tanino, CADENCE TF Co-Chair

Introduction

The CANSO ATFM Data Exchange Network for Cooperative Excellence Task Force (CADENCE TF) belongs to the CANSO Operations Programmes.

The CADENCE TF is a strategic initiative to help develop/enhance, a network for **operational coordination** and **information sharing** among ANSPs and aviation stakeholders around the world.

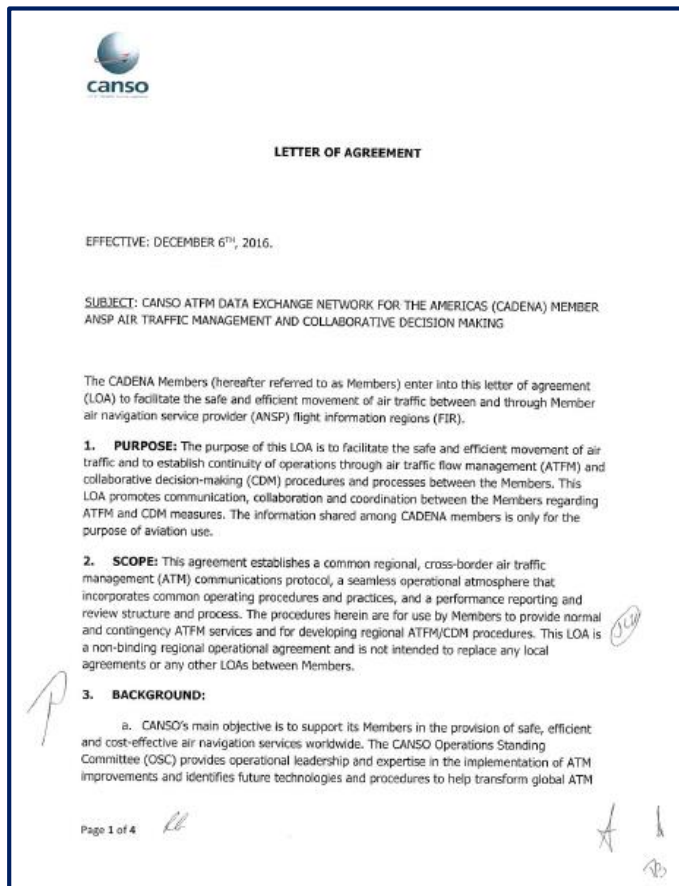


Background of CADENCE - CADENA

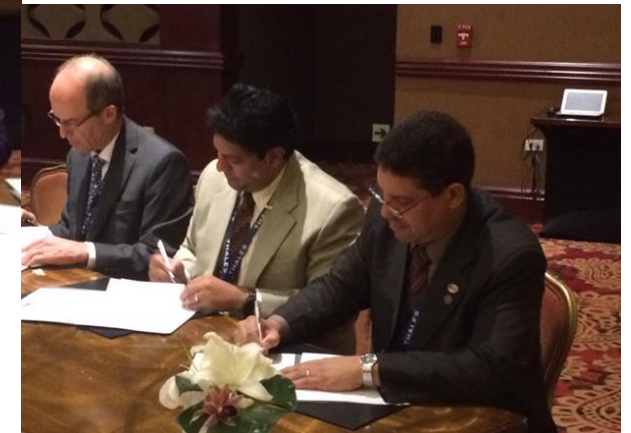
- The core capabilities offered by the CADENCE are based on the successful operational work **accomplished** by the CANSO ATFM Data Exchange Network for Americas, **CADENA**.
- CADENA is a multi-nodal, regional ATFM/CDM system developed using “**step-by-step**”, “**simple-to-achieve**”, and “**do the best you can**” approaches.
- CADENA operates under the policy of **transparency**, **inclusiveness**, and **collaboration**.
- CADENA became operational **quickly** and all ANSPs can participate with relatively **small investment**.

Management Support

Dec 6, 2016: CADENA member CEOs/COOs signed the historic “CADENA Member ANSP Air Traffic Management and Collaborative Decision Making Letter of Agreement”



SENEAM, FAA, EANA, DC-ANSP



COCESNA, TTCAA, IDAC

“This Letter of Agreement promotes communication, collaboration and coordination between the Members regarding ATFM and CDM measures.”

CADENA Key Regional Stakeholders

ANSPs

- EANA (Argentina)
- BANSA (Bahamas)
- COCESNA (Central America)
- UAEAC (Colombia)
- ECNA (Cuba)
- DC-ANSP (Curacao)
- IDAC (Dominican Republic)
- DGAC (Ecuador)
- FAA (USA)
- ZMA, SJU, ZHU, ATCSCC
- Space Operations Office
- OFNAC (Haiti)
- JCAA (Jamaica)
- SENEAM (Mexico)
- TTCAA (Trinidad & Tobago)
- INAC (Venezuela)

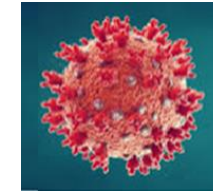
State/Territory/Group

- ANSA (Aruba)
- DGAC (Costa Rica)
- MWCR (Cayman Islands)
- TNCM (Sint Maarten)
- CARRG (Caribbean Aviation Resilience and Recovery Group)



Background of CADENCE - CADENA

ATFM/CDM is needed the most when:



The value of information exchange and collaboration is most recognized during irregular operations.

CADENA's effectiveness to improve ATFM/CDM is proven in the Latin America and Caribbean Regions.

CADENA – Major Accomplishments


2016	Aug: 1 st CADENA RIG Meeting Dec: Weekly Ops Webex
2017	May: 1 st Hurricane Training Aug: CADENA OIS v1.0
2018	Oct: PASA DB established
2019	Oct: Contingency Procedures

2020	Aug: PASA E2E via CADENA OIS Dec: 1 st Vaccine Flight
2021	Jul: PASA E2E Route Opt Trials started Nov: Virtual Support System
2022	Sep: First Trial Routes published Oct: SDR Trial started
2023	Jan: Twice Weekly Ops Webex

Accomplishments are recognized by IATA

CADENA PASA E2E Route Optimization 90-Day Trials


Quote of Peter Cerdá, Regional VP for the Americas of the IATA on April 7, 2022 at the opening of the 12th edition of the IATA Wings of Change Americas conference in Santiago, Chile.

Delta Airlines  DELTA

KATL↔SPJC

Jul 9 - Oct 6, 2021

Savings	90-Day	1-Year
Flight min:	515	2,089
Fuel (lb):	145,425	589,779
CO2 (kg):	208,445	845,360
Cost (\$):	94,693	384,033



“The savings in time, fuel and carbon emissions that we have seen so far on the first 6 routes tested are remarkable and demonstrate aviation's commitment to a sustainable industry. As an example, the tests of the route between Atlanta and Lima have provided, in three months, a reduction of 515 minutes in flight time, 66 thousand kilograms of fuel and more than 200 thousand kilograms of CO2. On this same issue, IATA has identified another 49 routes that could be implemented, generating savings and a more sustainable growth of air transport.”

Accomplishments are recognized by ICAO

Best Practices – CADENA’s Training and Operational Support for regional ATFM

Juan Carlos Salazar, Secretary General of ICAO, thanked CANSO for its global ATFM role and mentioned CADENA by name during his speech at the CANSO Global Leadership Summit 2022 on April 7, 2022.



“CANSO’s global ATFM role is also demonstrating through the training and support it provides to the states and by sharing the experiences and best practices it gained from the implementation of the CADENA, (CANSO) ATFM Data Exchange Network for the Americas.”

Key Messages

You can accomplish **A LOT**

- Relatively inexpensively
- Relatively quickly

CADENCE TF could help to accomplish it!

Operational Coordination and Information Sharing

CADENA became operational quickly and all ANSPs/airlines can participate with a small investment

- 2016 Jun – Established
- 2016 Aug – 1st CADENA meeting
- 2016 Dec – Started regional ATFM/CDM Operational Planning Web Conferences
- 2017 Aug – Initial version of the CADENA Operational Information System (OIS) launched



You need only:

1. Computer
2. Internet Access
3. Human Resource

CADENCE Operational Information System (OIS)

THE NEXT CADENA WEB CONFERENCE WILL BE HELD ON THURSDAY, FEBRUARY 23-2023, AT 1500 UTC

UTC: 21/Feb/2023 20:47:25

Exchange:

- MS documents (Word, PPT, Excel)
- Text, pdf, and picture

Enter:

- ATM Solutions
- Advisories/Notices
- Airport delay
- ATFM Daily Plan
- Calendars
- PASA Route Request

Store:

- Routes (PASA, UPR)
- Forms (Contingency)
- Capacity info (Airport/Airspace)

<https://www.cadenoais.org> Public domain for read only. Member domain to read and upload information.

WhatsApp CADENA OPS Group

~ Scott Pressley - [Redacted]
Do we know what the RWY closure at MMMX is for? 8:53 PM

Joe Hof
Checking 8:54 PM

Mario Hernandez
Good morning everybody, this RWY closure at MMMX is done for routine revision purposes only. Airport operator do this weekly for both RWYs. one on Tuesdays and the other one on Wednesdays... That 30 minutes closure impacts operations deeply because they program same S operations during the 1600 to 1700 period. 9:14 PM

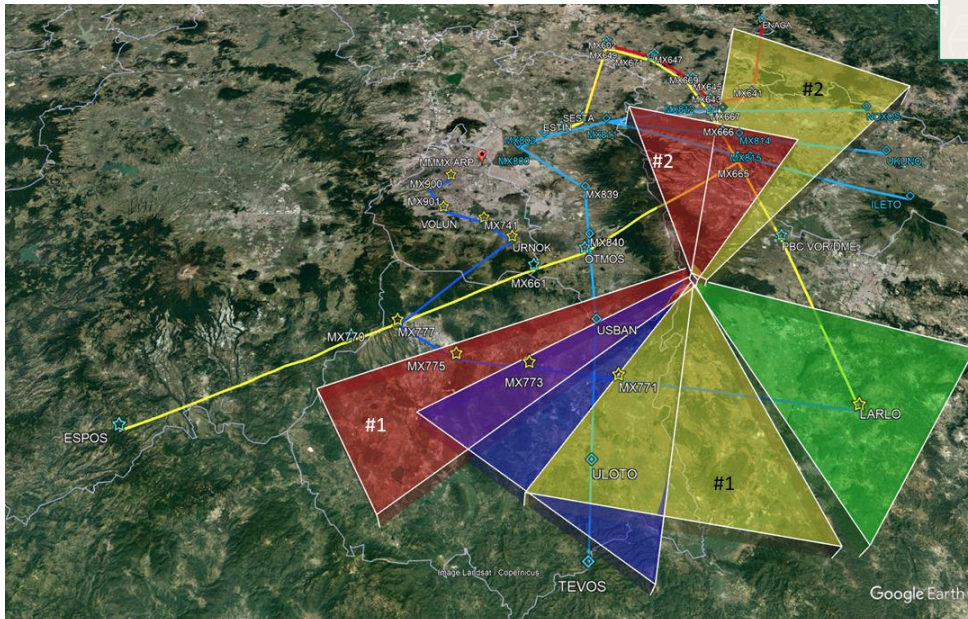
~ Scott Pressley - [Redacted]
Thank you! 9:14 PM

~ Brandon Tal +1 (786) 580-1856
Good afternoon guys we are hearing in the command center that MUHA is closed. Does anyone have any further details? Thank you. 12:41 AM

Ricardo Martínez González
Good afternoon. MUHA is closed due operational reasons, expected time to resume ops 18:30 12:45 AM

Deano Ledford
Forwarded
Good afternoon all,
Nassau has regained limited functionality to our radar processors and are now accepting arrivals with 20nm in-trail and are releasing all departures at a minimum of 4mins intervals. 5:47 AM

Mario Hernandez
Thanks for the update Deano!!! 5:48 AM



OBSERVED ASHES AT FL230 BY 07/2000Z

#2 RED POLYGON: OBSERVED ASHES AT FL300 BY 07/2000Z

#1 YELLOW POLYGON: ASH DISPERSION FCST AT FL230 BY 08/0800Z

#2 YELLOW POLYGON: ASH DISPERSION FCST AT FL300 BY 08/0800Z

BLUE POLYGON: ASH DISPERSION FCST AT FL230 AND FL300 BY 08/0800Z

GREEN POLYGON: ASH DISPERSION FCST AT FL230 BY 08/1400Z

SOURCE: WASHINGTON VAAC ADVISORY NR: 2023/284 AT 07/1923Z

NEXT ADVISORY: 08/0130Z

IMAGE PROVIDED BY: GOOGLE EARTH

Ricardo Martínez González

~ Flavia [Redacted]
Buenos días.
At the moment, RESISTENCIA FIR (SARR) is without communications. No frequencies available on the entire FIR. A NOTAM will be issued where no ATS SERVICE will be provided. Stand by for the Notam number 8:32 PM

~ Al Castillo + [Redacted]
Thank you Flavia 8:33 PM

Joe Hof
CADENA has been advised that a departure from the HAV airport had to return due to an emergency. The flight landed and has been towed off the runway. The airport is now open and operations are returning to normal 1:37 AM

IMPORTANT: THIS ILLUSTRATION IS MERELY INFORMATIVE AND FOR SITUATIONAL AWARENESS ONLY. SHALL NOT TO BE USED FOR FLIGHT PLANNING PURPOSES.

No Country Left Behind (NCLB)

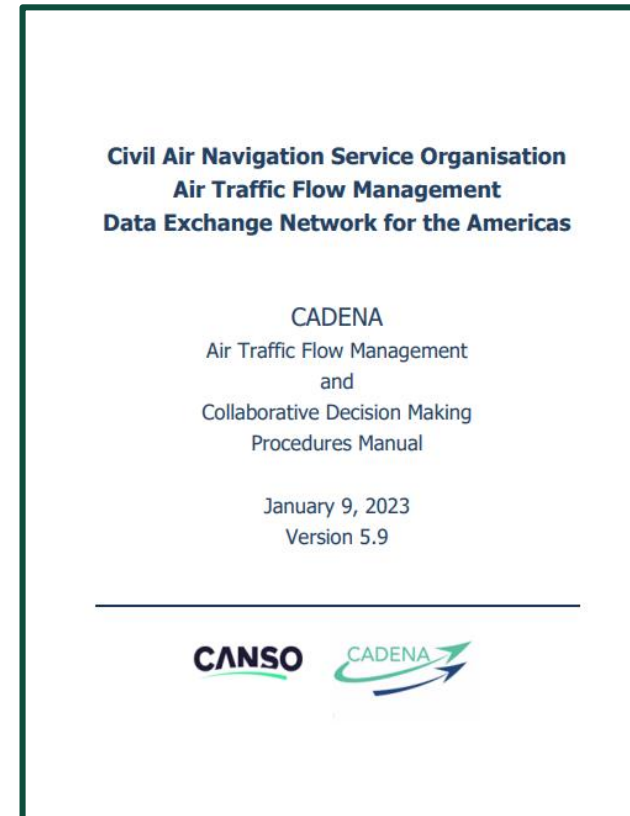
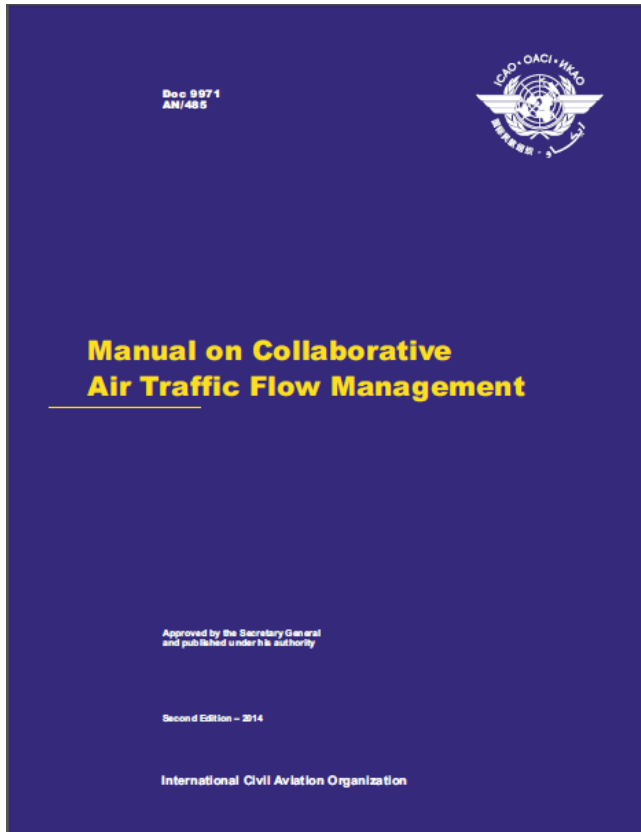
The **No Country Left Behind** (NCLB) initiative highlights ICAO's efforts to assist States in implementing ICAO Standards and Recommended Practices (SARPs). The main goal of this work is to help ensure that SARP implementation is better harmonized globally so that all States have access to the significant socio-economic benefits of safe and reliable air transport.

The NCLB effort also promotes ICAO's efforts to resolve Significant Safety Concerns (SSCs) brought to light through ICAO's safety oversight audits as well as other safety, security and emissions-related objectives.



In Concert with ICAO

CADENCE is designed to implement the processes and procedures from ICAO DOC 9971.



BENEFITS – Examples

Qualitative Benefits - understood intuitively

- More information sharing, better decisions
- Better coordination, better decisions
- Better decisions, more benefits

Quantitative (monetary) Benefits

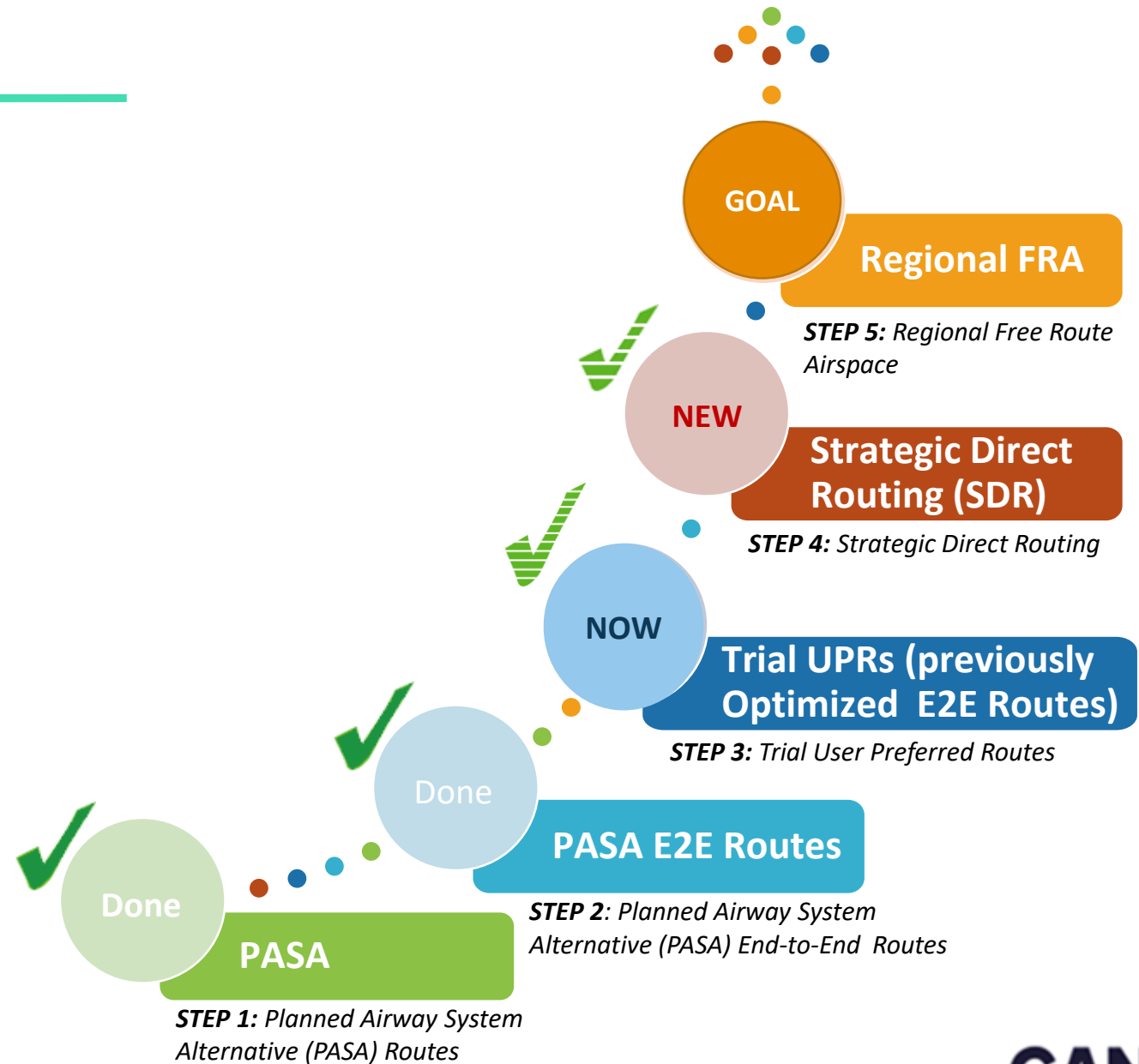
- UAL - Hurricane Maria Recovery Operation Case Study – \$1.0M-\$5.4M
- JBU - Return Home from Hurricane Maria Case Study – \$182.0K
- AAL - Jamaica Loss of Radar Surveillance Case Study – \$225.0K
- CPA - Jamaica Loss of Radar Surveillance Case Study – \$175.5K
- UAL - Colombia Loss of Satellite Comm Case Study – \$192.0K
- VOL - Filed FPLs via CADENA OIS while AFTN outage - \$690.8K
- DAL - PASA Optimization Trial (ATL-LIM) - \$384.0K/yr, 835,360kg of CO2
- BWA - PASA Optimization Trial (POS-MIA) - \$160.2K/yr, 271,934kg of CO2
- UAL - PASA Optimization Trial (IAH-PVR) - \$296.0K/yr, 307,168kg of CO2
- ARG - PASA Optimization Trial (EZE-MIA) - \$209.4K/yr, 375,944kg of CO2
- VIV – SENEAM SDR Trial – \$677.1K/yr, 675,040kg of CO2



Numbers in this briefing should not be interpreted literally, however, **the savings achieved by stakeholders are real**

Approaches

- step-by-step
- simple-to-achieve
- do the best you can



Aligning the Regional Goal with ICAO GANP/ASBU

Direct Routes (FRTO-B0/1)

DCTs are established at national and regional levels and made available for flight planning (with published conditions of use).

DCT is an early iteration of the FRA.

- ✓ Reduced flight time
- ✓ Fuel savings
- ✓ CO2 savings

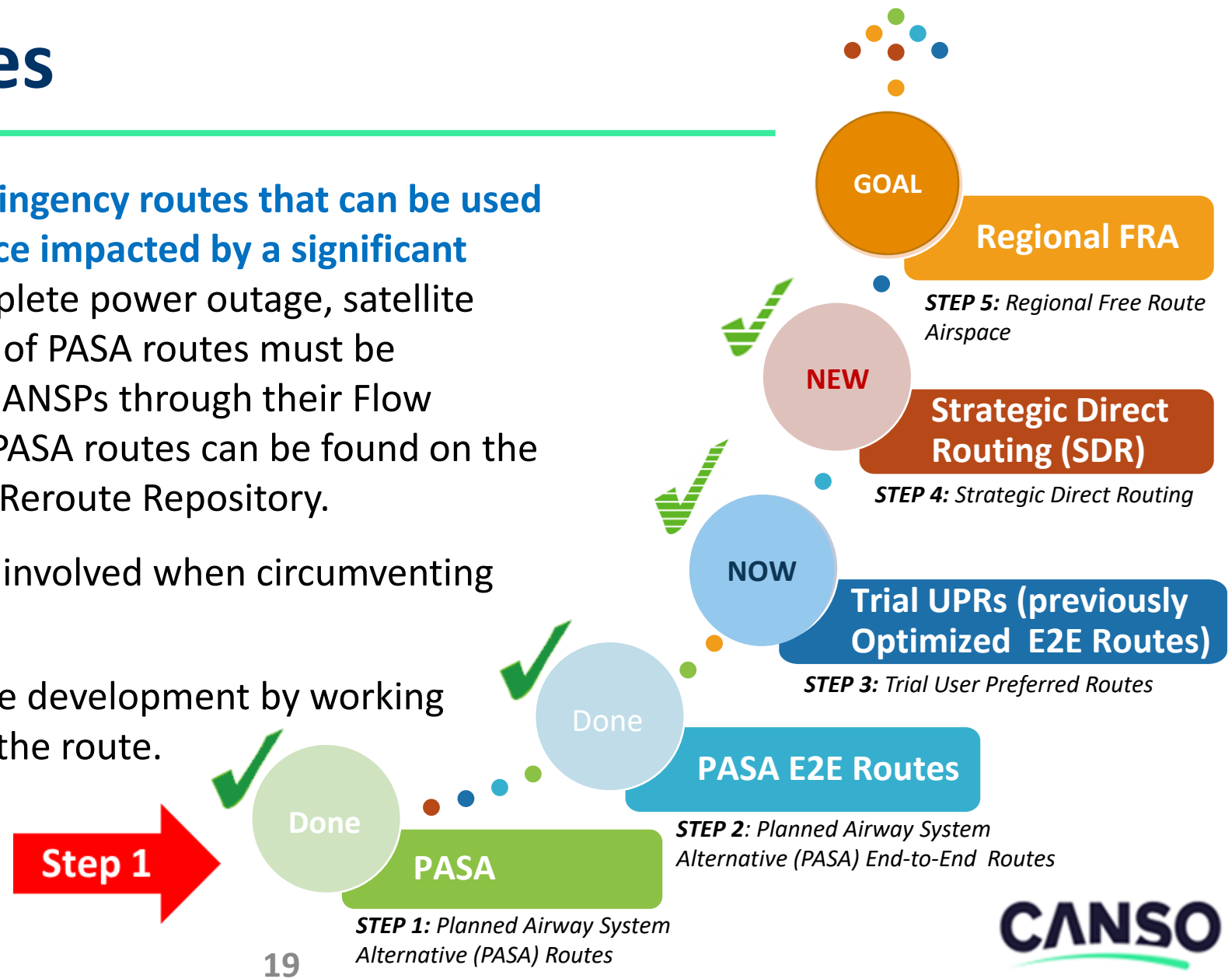
Free Route Airspace (FRTO-B1/1)

FRA enables airspace users to fly as close as possible to what they consider the optimal trajectory without the constraints of a fixed route network structure.

Step by Step Approach to FRA:

Step 1 PASA Routes

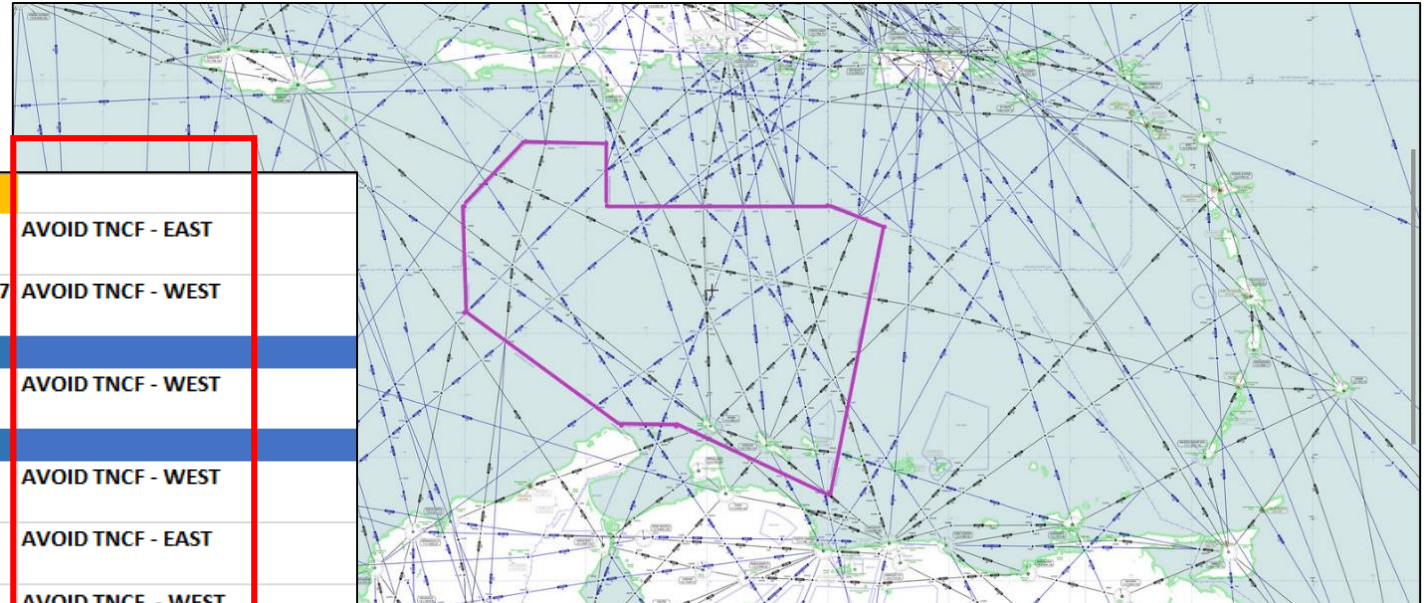
- **PASA Routes** are established **contingency routes that can be used temporarily to circumvent airspace impacted by a significant event** (e.g., major hurricane, complete power outage, satellite outage etc.). The implementation of PASA routes must be coordinated with the appropriate ANSPs through their Flow Management Units prior to use. PASA routes can be found on the CADENA OIS under Information > Reroute Repository.
- PASA Routes mitigate risk the risk involved when circumventing airspace becomes necessary.
- Risk is mitigated during PASA route development by working closely with all ANSPs involved in the route.



CADENA OIS PASA Routes Repository

ORIG	DEST	NORTHBOUND	
SBGR	KMIA	... UKBEV UZ26 BSI UZ26 BEL UA555 TRAPP UL454 ILURI A555 COY RTE4 BQN A636 KATOK UA636 PTA L463 JUELE ...	AVOID TNCF - EAST
SBGR	KMIA	... UKBEV UL201 ASTOB UL201 ISVOM UM656 BUVKA UM656 BNS UR640 MLY UL417 LENAX UL795 BEXEN UM347 ZEUSS ...	AVOID TNCF - WEST
SBGR	KATL	... UKBEV UL201 ASTOB UM417 MOTVI UM549 MTU UM782 LONAX UL417 LENAX UL795 BEXEN UM347 ZEUSS Y217 OCTAL Q77 ETORE SHRKS LAIRI ...	AVOID TNCF - WEST
SBGR	KJFK	... UKBEV UL201 ASTOB ABIDE UM782 MTU UQ108 OTAMO UA301 MLY UL417 BORDO B760 ZBV RAMJT AR18 DIW ...	AVOID TNCF - WEST
SBGR	KJFK	... UKBEV UZ26 BSI UL452 ACARI UA312 LEPOD UG449 ANADA G449 DDP G431 ELMUC LAMER L453 PAEPR HOB OH SILLY ...	AVOID TNCF - EAST
SBGR	KJFK	... UKBEV UL201 ASTOB ABIDE UM782 MTU UQ108 OTAMO UA301 MLY UL417 BORDO B760 ZBV RAMJT AR18 DIW ...	AVOID TNCF - WEST
SBGR	KIAH	... SCB UM415 EVNES ABIDE UM782 TAKUX DCT SUVUM UM782 KEHLI ...	AVOID TNCF - WEST
SKBO	KMIA	... KOMBO UW1 PIE UW34 LFA UW8 BRM UW14 BNA DAREK UA561 GND UA324 FOF UA312 ANU G633 COY RTE4 BQN A636 KATOK UA636 ALBBE ...	AVOID TNCF - EAST
SKBO	KMIA	... GIKPU UQ120 PADUD DAGAN UL542 OTAMO UA301 MLY UL417 NEFTU UR625 ENAMO ...	AVOID TNCF - WEST
SKBO	KMIA	... PIE UW34 LFA UW8 BRM PBL MIQ UDIMA MEGIR POS GND UA324 FOF UA312 ANU G633 COY RTE4 BQN A636 KATOK UA636 ALBBE ...	AVOID TNCF - SOUTH AND EAST -

TNCF = Curacao FIR



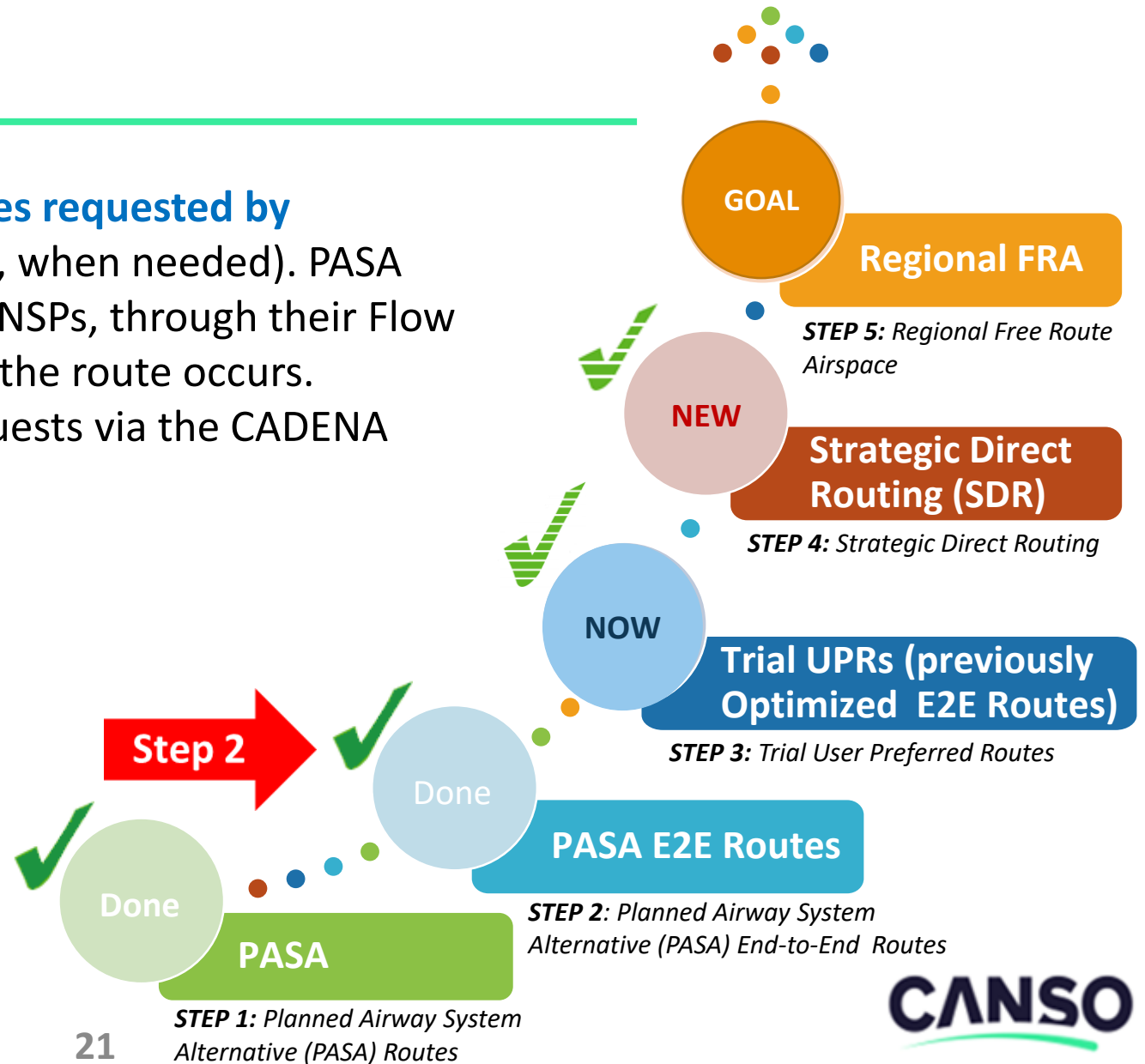
OIS also hosts information such as:

- ATFM Daily Plan
- Contingency Form
- Airport Capacity
- Reroute Data
- LOA List
- Airspace Capacity

Step by Step Approach to FRA:

Step 2 PASA E2E Routes

- **PASA End-to-End Routes** are **temporary routes requested by airlines/stakeholders on an ad hoc basis** (i.e., when needed). PASA End-to-End Routes must be approved by all ANSPs, through their Flow Management Units, in which any segment of the route occurs. Airlines/stakeholders submit these route requests via the CADENA Operational Information System webpage.
- PASA Route risk is mitigated by following a standardized coordination process that involves all impacted ANSPs and by having a centralized point of coordination (i.e. CADENA).



CADENA OIS: PASA E2E Routes



CADENA OIS

- Main
- Weekly Conf
- Hurricane Conf
- Contingency Form
- ADP Link Files
- PASA Route Requests**
- Contact List
- Lessons Learned
- CADENA Manuals

DELTA Delta Air Lines

Español Chat 1 ? Help Settings Logout

▼ Create new PASA Route Request

To ANSP(s) Send to Requestor City Pair SPJC KATL En-Route

Flight # DAL150 Flight Date 22/Apr/2021 Dept Time 22 : 00 UTC

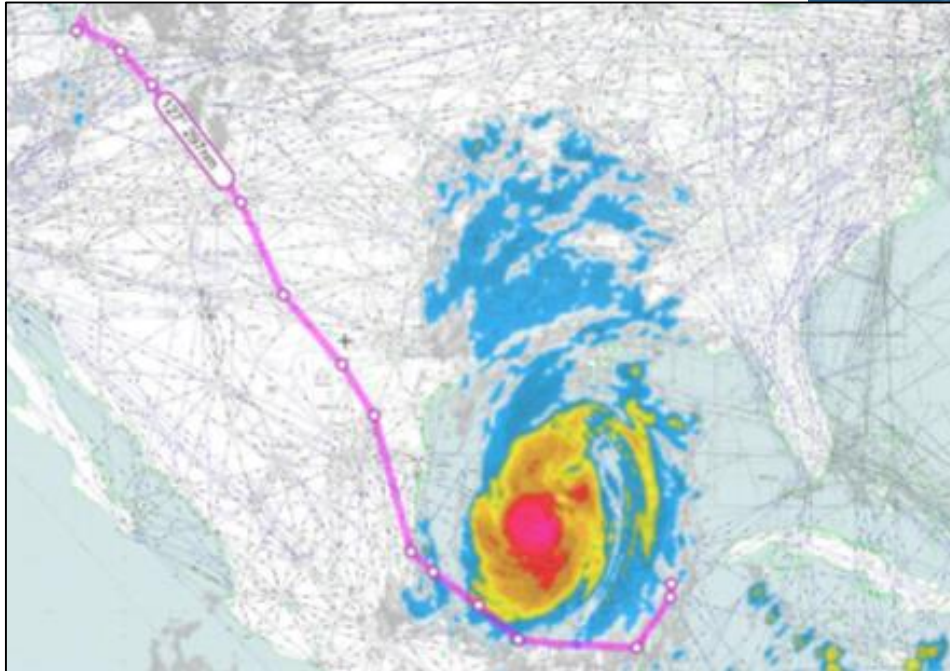
Route SPJC ISREN2F ISREN DCT GYV DCT TINPA DCT LEVOR DCT GCM DCT IKBIX Y183 PEAKY Q87 MATLK Q77 SHRKS DCT LAIRI DCT LARZZ JJEDI2 KATL

Some locations or airways in the route ISREN2F, Y183, Q87, JJEDI2 are not found in the System.
They are ignored in the plotting, but the route request can still be submitted.
If you think they are valid locations or airways and should be part of the System, please let Cadena Support know.

22

Samples: CADENA PASA E2E Routes

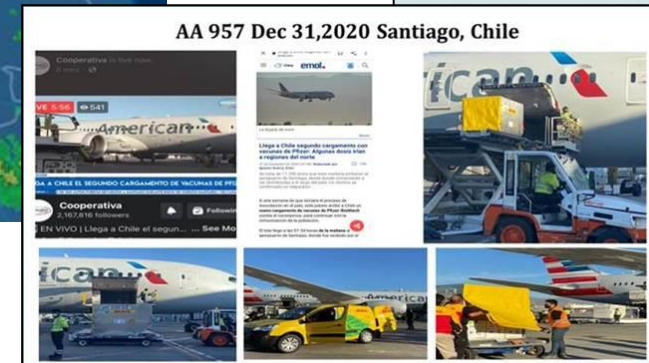
PASA ROUTE REQUEST DEC 31, 2020



PASA ROUTE REQUEST OCT 7, 2020



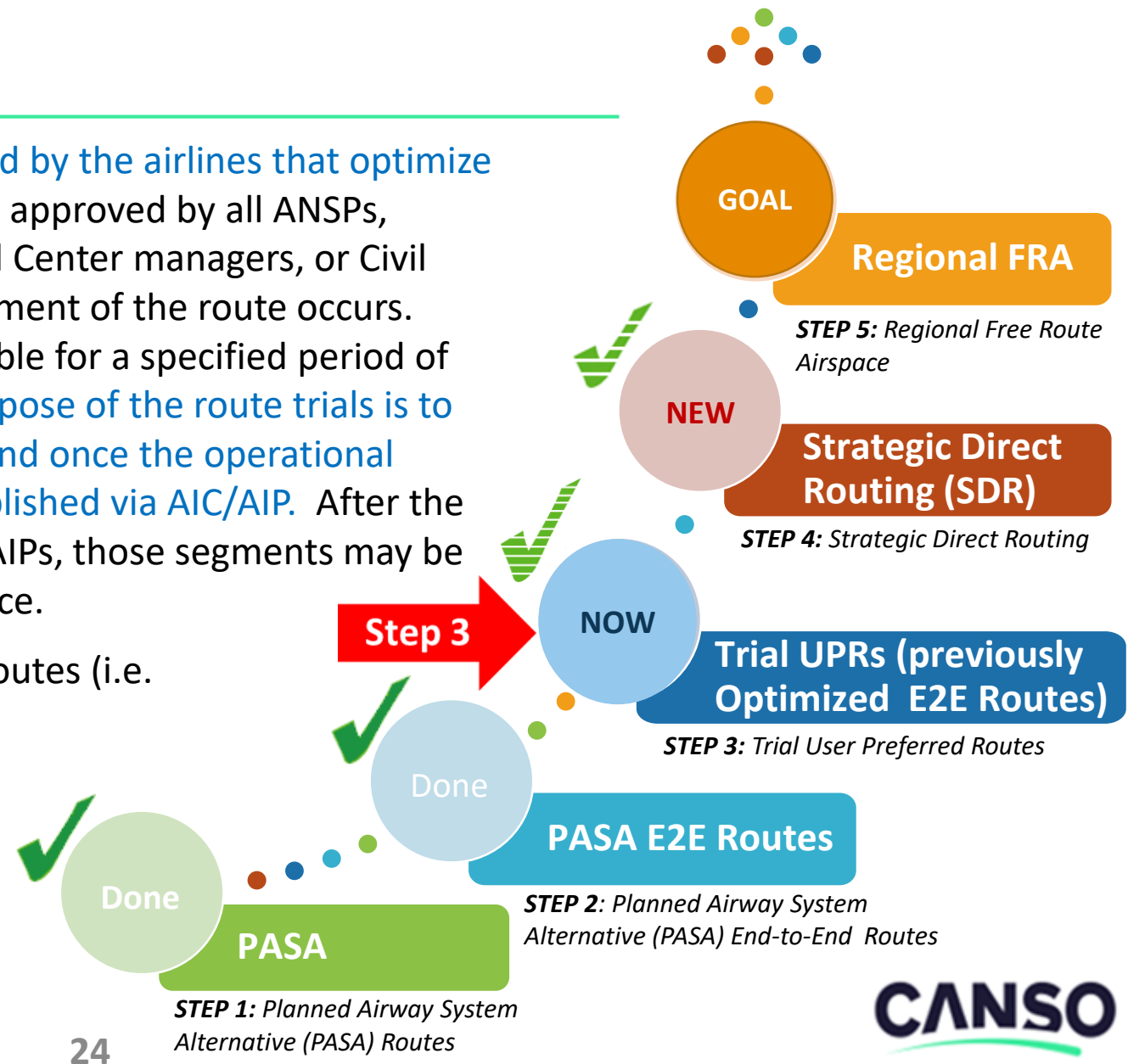
PASA ROUTE REQUEST NOV 16, 2020



Step by Step Approach to FRA:

Step 3 Trial UPRs

- **Trial User Preferred Routes (UPR)** - Routes requested by the airlines that optimize the route between a specific city-pair. UPRs must be approved by all ANSPs, through their Flow Management Units, Area Control Center managers, or Civil Aviation Authorities, as applicable, in which any segment of the route occurs. Once a UPR is approved for the trial, it will be available for a specified period of time (i.e., trial period) and a specific airline. The purpose of the route trials is to determine the operational feasibility of the routes and once the operational feasibility of the routes is verified, to have them published via AIC/AIP. After the States publish the route segments within their AIC/AIPs, those segments may be used by all airlines for any city pair until further notice.
- Trial UPRs mitigate risk associated with optimizing routes (i.e. transitioning to direct routes).
- The risk associated with the development of Trial UPRs is mitigated by coordinating with each ANSP and by starting with short trial periods (e.g., one leg, then round trip, then one week etc.)



Trial UPR - 90-Day Trial Benefits



Delta Airlines

KATL↔SPJC
Jul 9 - Oct 6, 2021

Savings	90-Day	1-Year
Flight min:	515	2,089
Fuel (lb):	145,425	589,779
CO2 (kg):	208,445	845,360
Cost (\$):	94,693	384,033



		1-Year			
		Time (min)	Fuel (kg)	CO2 (kg)	Cost (USD)
KATL<->SPJC	DAL	2,089	267,520	845,360	384,033
KATL<->SBGR	DAL	1,175	140,693	444,590	209,625
TTPP<->KMIA	BWA	1,038	86,055	271,934	160,170
KIAH<->MMPR	UAL	2,263	97,204	307,168	296,027
KATL<->SAEZ	DAL	5,446	461,228	1,457,480	848,135
SAEZ<->KMIA	ARG	1,115	118,970	375,944	209,420
KMIA<->SPJC	AAL	2,089	267,520	845,360	384,033
MMUN-->SAEZ	ARG	410	46,939	148,327	106,347
SKBO-->KATL	DAL	1,837	235,147	743,064	375,528
MPTO-->KLAX	CMP	1,166	40,723	128,684	149,782
KATL<->SAEZ	DAL	3,297	657,546	2,077,844	866,083
KATL<->SCEL	DAL	2,977	434,709	1,373,681	652,274

Trial UPR - 90-Day Trial Benefits

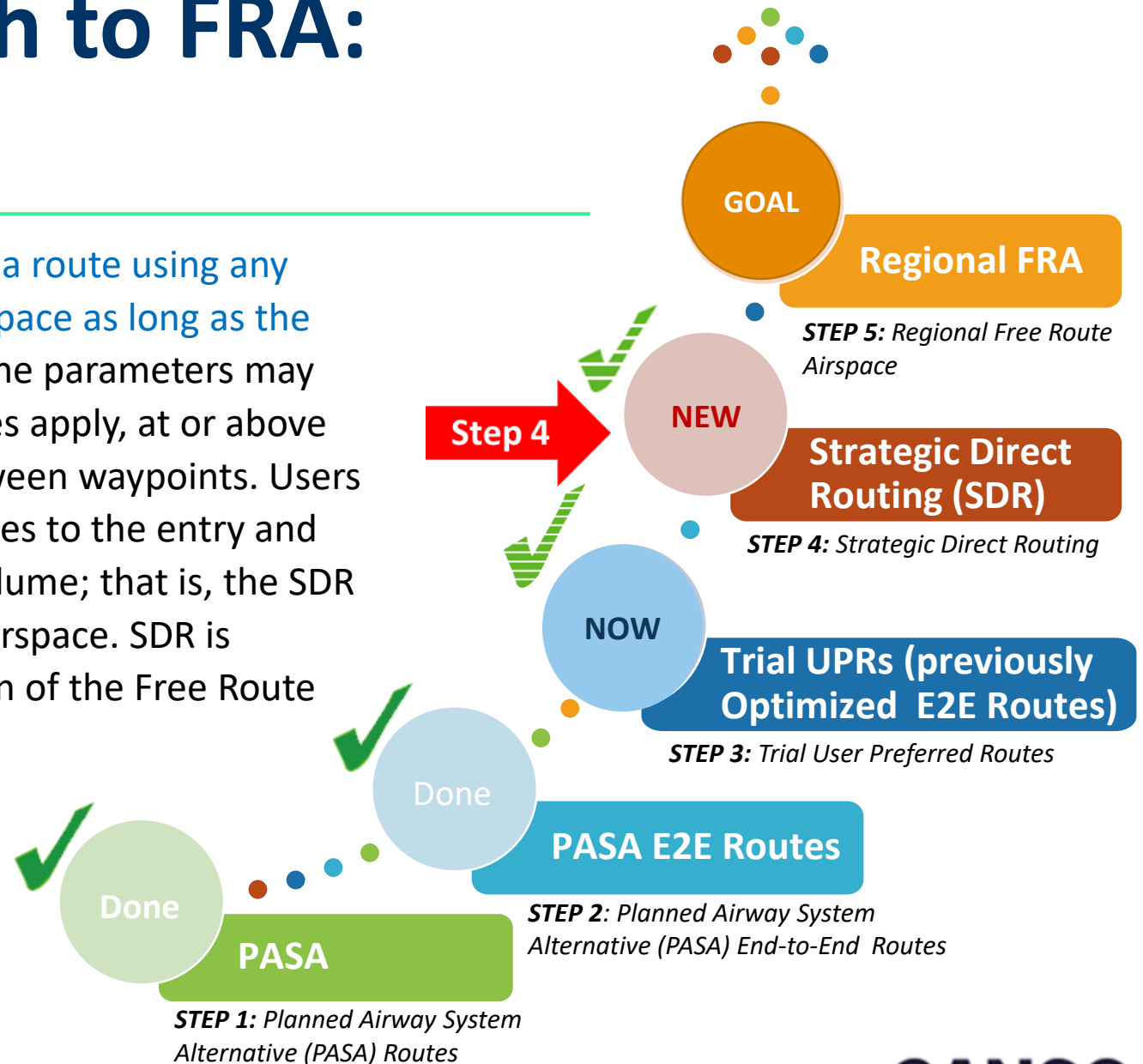
			1-Year			
			Time (min)	Fuel (kg)	CO2 (kg)	Cost (USD)
2021-2022	KATL<->SAEZ	DAL	5,446	461,228	1,457,480	848,135
2022-2023	KATL<->SAEZ	DAL	3,297	657,546	2,077,844	866,083

1-Year			
Time (min)	Fuel (kg)	CO2 (kg)	Cost (USD)
19,455	2,393,025	7,561,957	3,793,322

Step by Step Approach to FRA:

Step 4 SDR

- **Strategic Direct Routing (SDR)** allows users to plan a route using any named waypoints within a specified volume of airspace as long as the route complies with parameters set by the State. The parameters may include restrictions such as hours in which SDR rules apply, at or above altitude requirements and maximum distance between waypoints. Users must file flights via authorized (i.e., published) routes to the entry and exit point at the boundaries of the SDR airspace volume; that is, the SDR system only applies inside the defined volume of airspace. SDR is considered to be a transition to the implementation of the Free Route Airspace (FRA) concept.
- SDR risk is mitigated by limiting the number or participating airlines and the hours of the trial. Also, operational feedback is reviewed weekly.

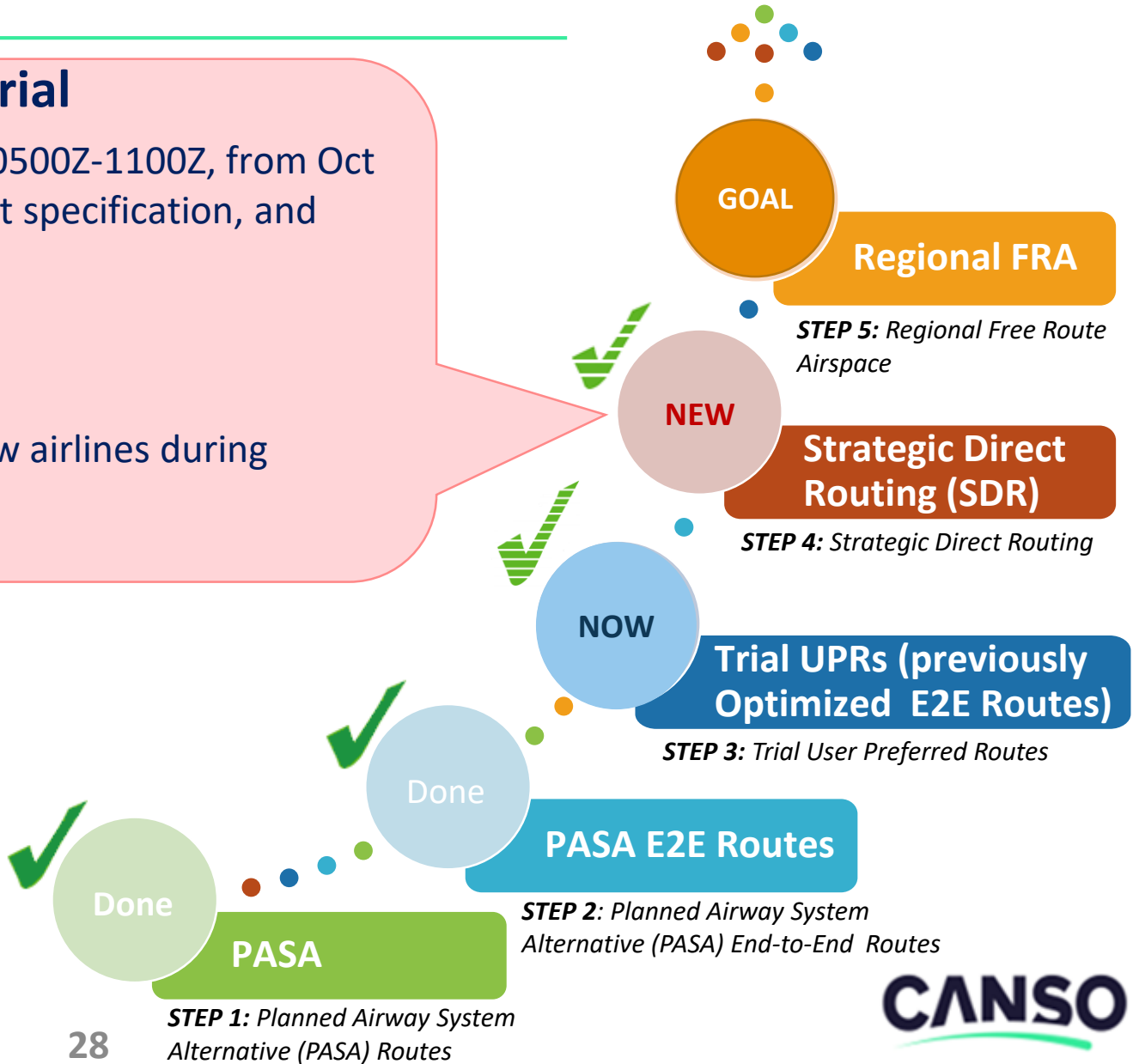


Strategic Direct Routing (SDR) Trial

Mexico's SENEAM SDR Trial

- SENEAM determined the trial requirements (e.g., 0500Z-1100Z, from Oct 3 – 31, 2022, FL290 and above, entry and exit point specification, and airspace specification)
- SDR Trial started with 3 airlines participating
- Currently nine participating airlines
- SDR Trial risk is mitigated by starting with just a few airlines during limited hours with carefully designed rules

Collaboration between



SENEAM SDR Trial – Viva Aerobus Benefits

Nov 1 - Dec 31, 2022									
Nov 1 - Dec 31, 2022		Saved				Per Flight			
City Pair	No.	Time (min)	Fuel (kg)	CO2 (kg)	Cost (\$)	Time (min)	Fuel (lb)	CO2 (kg)	Cost (\$)
KLAX-MMGL	24	88.0	3,592	11,351	11,745	3.7	150	473	489
KLAX-MMMX	28	28.0	1,134	3,583	3,730	1.0	41	128	133
KORD-MMGL	26	67.0	2,358	7,451	8,634	2.6	91	287	332
KORD-MMLO	2	5.0	199	629	663	2.5	100	314	332
MMGL-MMTJ	22	26.0	1,930	6,099	4,183	1.2	88	277	190
MMLO-MMTJ	9	44.0	1,600	5,056	5,712	4.9	178	562	635
MMMD-MMMX	31	93.0	3,254	10,283	11,968	3.0	105	332	386
MMMX-MMMD	25	51.0	1,588	5,018	6,402	2.0	64	201	256
MMMX-MMTJ	11	22.0	1,016	3,211	3,033	2.0	92	292	276
MMTJ-MMGL	111	61.0	8,346	26,373	12,944	0.5	75	238	117
MMTJ-MMMX	48	265.0	6,678	21,102	31,976	5.5	139	440	666
MMTJ-MMMY	35	35.0	2,296	7,255	5,383	1.0	66	207	154
MMTJ-MMUN	24	48.0	2,040	5,095	6,473	2.0	85	212	270
Total	396	833.0	36,031	112,507	112,845				
1 Year		4,998	216,186	675,040	677,073				

SENEAM SDR Trial Benefits Summary



1-yr Estimate	Time (min)	Fuel (kg)	CO2 (kg)	Cost (\$)
AeroMexico	1,168	51,157	161,655	\$ 158,749
Delta	517	51,586	163,012	\$ 93,805
Emirates	76	10,783	34,073	\$ 16,446
United	1,626	178,122	562,865	\$ 278,298
VivaAerobus	4,998	216,186	675,040	\$ 677,073
Total	8,385	507,834	1,596,645	\$1,224,371

Contingency Event Handling

ACCs

- Evacuation
- Radar failure
- Air/Ground (A/G) communication failure
- Telephone or landline failure
- Power failure
- Flight data processing system (FDPS) failure
- Staffing shortages
- Work stoppages (strikes)

15 Contingency Events

Severe weather / natural phenomena

- Hurricanes / tropical storms
- Volcanic eruption
- Earthquakes

Airports

- Aircraft accidents / incidents

FMU outages

- Equipment failure
- FMU services not available

Off-Nominal (Unusual) Events

- Global pandemic (COVID-19, for example)

ANSP Contingency Form to help collect pertinent contingency event information, put all of the available information in one form, and display it on the CADENA OIS for stakeholder situational awareness.

CANSO CADENA
ANSP CONTINGENCY FORM

Impacted Facility / Sector: _____
REF #: _____

Type of Contingency
 Communication Facility Surveillance Staffing Other

Detail
Click here to enter text.

Traffic Management measures
 Miles-in-trail (MIT) Minutes-in-trail (MINIT) Re-routing
 Fix Balancing Level Capping Tunnelling
 Airborne Holding Ground Delay Program (GDP) Ground Stop (GS)
 Airspace Flow Program (AFP)

Detail
Click here to enter text.

FIRs Affected
 TTZP TJZS SVZM TNCF MDZS
 MTEG KZMA KZWH KZHU MUFH
 MKJK MMFR MHCC MPZL SKEC
 SKED SARR SACF SAEF SAVF
 ____ ____

Start Time
Click here to enter text.

End Time
Click here to enter text.

Contingency Event Handling

CADENA Advisory has two types, Urgent and For Your Information (FYI) to notify contingency events.

Contingency Event and Checklists mitigate the impact of such events through a ready-reference checklist when the unexpected happens. It describes the initial and following ATFM actions that the impacted ANSP should take depending on the event.

CADENA Ad Hoc Web Conferences allow participating ANSPs and stakeholders to discuss and work on solutions to pressing operational issues.

1: Evacuation of an ACC	Impacted Facility: ACC (Name)
Initial ATFM Action	Follow-Up ATFM Actions
<ul style="list-style-type: none"> • Whichever FMU receives the information first, notify your adjoining FMUs • Stop departure traffic under your FMU's jurisdiction that is filed to/through the impacted ACC's airspace • Coordinate airborne holding, if necessary • Coordinate re-routes for existing, airborne traffic, if necessary • Notify stakeholders, as able • Post an Urgent Advisory on the CADENA OIS 	<ul style="list-style-type: none"> • Notify CADENA and ICAO leadership as soon as possible • Gather information on: <ul style="list-style-type: none"> ○ How long is the ACC expected to be out of service? ○ What is the impact to demand and capacity? ○ Have aircraft diverted? ○ If so, how many and to which airports? • CADENA leadership will, as soon as possible, schedule and conduct a CADENA CDM web conference, including airspace users, to relay available information and establish next steps <p><i>NOTE: The situation may require scheduling a daily webex for the first few days of the event</i></p> • For a potential long-term evacuation, discuss and coordinate alternate routes • Evaluate potential demand on the alternate routes and coordinate TMMs, as applicable • Ensure the appropriate NOTAM is issued and updated

Contingency Event Training

CADENA ATFM and CDM Procedures Manual consists of sections that describes contingency event handling and contingency related forms and lists.

- CADENA offers annual **hurricane training in every spring** since 2017.
- CADANA also offers **quarterly contingency training**.
- CADENA's contingency training is realistic scenario based and ANSPs, airlines, and other stakeholders plays their role to ensure that they became proficient on their roles.

Our goal is to train like we respond!

- Operational and personnel safety come first!
- Ensure good communication and teamwork among all the stakeholders.
- Use the capabilities of the CADENA Virtual Support Team (VST).
- Use the procedures in the CADENA ATFM/CDM Procedures Manual
- Use the capabilities in the CADENA OIS, Flight Radar 24, and CADENA WhatsApp.

Hurricane Briefing Template

HURRICANE (NAME) UPDATE – 1400 UTC – DATE



ANSP Name

PROJECTED PATH IN YOUR AIRSPACE

- THE CADENA HOST WILL ADD A GRAPHIC OF THE PROJECTED PATH
- ADD SLIDES, IF NEEDED
- Recommend a screenshot from: <https://www.nhc.noaa.gov/>

HURRICANE (NAME) UPDATE – 1400 UTC – DATE



ANSP Name

IMPACTED ROUTES	PLANNED TRAFFIC MANAGEMENT MEASURES
<ul style="list-style-type: none"> • ADD GRAPHICS, IF ABLE • ADD SLIDES, IF NEEDED • Recommend a screenshot from a website like: https://skyvector.com/ <p>Use "World Hi" Add layers, if applicable</p>	<ul style="list-style-type: none"> • FOR EXAMPLE: REROUTES, MIT, MINIT • LIST THE IMPACTED NEIGHBORING ANSPs

HURRICANE (NAME) UPDATE – 1400 UTC – DATE



ANSP Name

PROJECTED IMPACT

DAY 1

AIRPORT CLOSING (DATE/TIME)
STAFFING ISSUES
EQUIPMENT OUTAGES

DAY 2

AIRPORT CLOSING (DATE/TIME)
STAFFING ISSUES
EQUIPMENT OUTAGES

WHEN APPLICABLE

AIRPORT RE-OPENING (DATE/TIME)

HURRICANE (NAME) UPDATE – 1400 UTC – DATE



ANSP Name

OTHER ISSUES

- 1
- 2
- 3

"TELL US WHAT WE DO NOT KNOW"

"PLEASE KEEP YOUR NOTAMS UP-TO-DATE"

Hurricane Event Contingency Training

Exercise: CADENA Hurricane Charlie Planning Web Conference

March 29, 2023
1400 UTC

EXERCISE CADENA Contingency Form

Impacted Facility / Factor: Kingston and Mexico FIR
REF: Hurricane Charlie Update March 29, 2023 at 1400 UTC

Type of Contingency
 Communication Facility Surveillance Staffing Other

Detail
 Hurricane Charlie has passed over Jamaica and is approaching the Yucatan peninsula. The Hurricane is expected to make landfall within the next 24 hours near Cadena

Traffic Management measures
 Miles-in-trail (MIT) Miles-in-trail (MINT) Re-routing Level Capping Towering Airborne Holding Ground Delay Program (GDP) Ground Stop (GS)

Detail
 Expect miles-in-trail, miles-in-trail to select airports and tactical reroutes in the Kingston and Mexico FIR due to the track of Hurricane Charlie.

FIRs Affected
 TFFP TUD NDM TMC MDC MFC GNA GWP KZJL M-PH MEX MEXA MEXC MZL GSC SBD SRR SDF SDFP SDFV

HURRICANE CHARLIE UPDATE – 1400 UTC – March 29th, 2023

ANSP ECNA

HURRICANE CHARLIE NOTICE NO. 15 MARCH 29th, 2023 1100 UTC

CHARLIE is located at 0900 UTC on Lat 18.8N and Long 80.9W. This position places it 40nm (65km) East of Grand Cayman, and 440nm (710km) E of Tulum, Mexico. CHARLIE is forecast to maintain its hurricane category later today. CHARLIE moves near W (200 degrees) at the rate of 34kt (63km / h). A general motion towards W / WNW is expected during the next few days. On the forecast track, CHARLIE's core is away from the W coast of Jamaica. It is forecast to move near or over the Cayman islands this morning and then approach the Yucatan peninsula in Mexico tonight or early on Friday. Maximum winds are in the order of 65kt (121km / h) with higher gusts. Hurricane force winds extend up to 115nm (215km) from the center. The estimated minimum pressure is 983hpa (735.05mm). Tropical storm conditions influence the south of the FIR and along the south coast of Cuba today and early on Thursday.

HURRICANE CHARLIE UPDATE – 1400 UTC – March 29th, 2023

ANSP ECNA

CADENA

CANSO

HURRICANE CHARLIE UPDATE – 1400 UTC – March 29th, 2023

ANSP ECNA

PROJECTED IMPACT

DAY 1
 AIRPORT CLOSING: NONE
 STAFFING ISSUES: NONE
 EQUIPMENT OUTAGES: NIL

DAY 2
 AIRPORT CLOSING: NONE
 STAFFING ISSUES: NONE
 EQUIPMENT OUTAGES: NIL

WHEN APPLICABLE
 AIRPORT RE-OPENING: DOES NOT PROCEED

HURRICANE CHARLIE UPDATE – 1400 UTC – March 29th, 2023

ANSP ECNA

OTHER ISSUES

ECNA WILL KEEP OBSERVING THE EVOLUTION AND TRACK OF HURRICANE "CHARLIE". THE TACTICAL MEASURES TO PUT INTO PRACTICE IN THE COMING DAYS WILL DEPEND ON CHARLIE'S POSITION AND DEVELOPMENT.

HURRICANE CHARLIE UPDATE – 1400 UTC – March 29, 2023

JCAA

PROJECTED PATH

HURRICANE CHARLIE UPDATE – 1400 UTC – MARCH 29, 2023

IMPACTED ROUTES

ROUTES WITHIN THE WEST SECTOR & SOME SECTIONS OF THE EAST SECTOR OF THE FIR IMPACTED; EASTERLY DEVIATIONS ANTICIPATED.

- ✓ UM335
- ✓ UL465
- ✓ URG44
- ✓ UM830
- ✓ UG877
- ✓ UG448
- ✓ UG633
- ✓ UPS36
- ✓ UM782

HURRICANE CHARLIE UPDATE – 1400 UTC – March 29th, 2023

ANSP ECNA

HURRICANE CHARLIE UPDATE – 1400 UTC – March 29th, 2023

ANSP ECNA

IMPACTED ROUTES

LATERAL DEVIATIONS ON:

- A200/UM779
- G430/UP406
- M/UM221
- UG782
- P/URG44
- R230/UM330
- M/UM335
- Q/UG877
- Q/UG448
- M/UM338
- UL345

PLANNED TRAFFIC MANAGEMENT MEASURES

TO BE TACTICALLY TAKEN DEPENDING ON CHARLIE'S TRAJECTORY.

CADENA

CANSO

HURRICANE CHARLIE UPDATE – 1400 UTC – MARCH 29, 2023

HURRICANE CHARLIE UPDATE – 1400 UTC – MARCH 29, 2023

JCAA

AIRCARRIER	CLOSURE DATE	STAFF ISSUES	EQUIPMENT OUTAGES	IMPACT DATE (HH)	STATUS
MKSP	03/29/23	STBY STAFF AVAILABLE	PAPIS, ILS DTS & VOR/DME DTS BY VY DEBRIS	04/02/23	CLOSED
MKCS	03/29/23	EMB STAFF AVAILABLE	NONE	03/30/23	CLOSED EXCEPT HL FLIGHTS
MKCS	03/29/23	NONE	NONE	03/30/23	CLOSED
MWCR	03/29/23	NONE	NONE	03/30/23	CLOSED
MWCB	03/29/23	NONE	GCM VOR/DME US	03/30/23	CLOSED

HURRICANE CHARLIE UPDATE – 1400 UTC – MARCH 29, 2023

JCAA

PLANNED TRAFFIC MANAGEMENT MEASURES (MAR/29/23-MAR/31/23)

BEROUTE

- WEST SECT. TFC. REROUTED TO EAST SECTOR
- NBND TFC (NIBED UM221 COLBY) &
- SBND TFC (PUTUL UP406->SIA->HANCK UL347 KASOR).

NOTES

- 40NM BTW TFC AT DIFF. LVLS, SIM. RTE
- 80NM BTW TFC AT SIM. LVLS, SIM. RTE

IMPACTED NEIGHBORING ANSPs

- HAVANA, CENAMER & NORTHERN SECTION OF PANAMA impacted.

OIS BENEFITS - Operational Examples

La Soufrière Volcano in Saint Vincent and Grenadines

La Soufrière volcano began visibly active in December 2020, before a full-blown eruption on 9 April 2021



Event is Communicated via

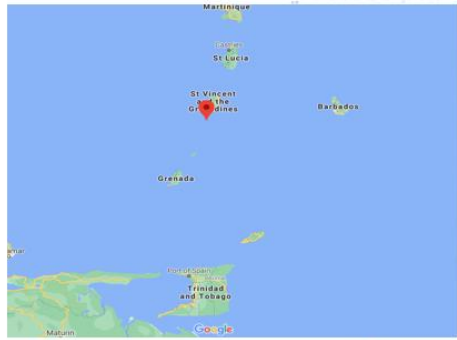
- WhatsApp CADENA Group
- CADENA OIS Urgent Advisories and the associated push email notifications
- CADENA Ops Group email notifications
- Weekly Operational Web Conferences
- Piarco ACC updates posted on the CADENA OIS

CADENA Status Update of La Soufrière Volcano

Status Briefing
uploaded to the
CADENA OIS



CADENA LA SOUFRIERE OVERVIEW



LA SOUFRIERE VOLCANO UPDATE – 1400 UTC – APRIL 10, 2021

PIARCO UTA/CTA/FIR GENERAL INFORMATION

EQUIPMENT OUTAGES	TMMS PLANNED	REMARKS
TBPB A0539/21 NOTAMR A0534/21 Q) TTZP/QNMAW/V/BO/AE/000/99 9/1304N05929W175 A) TBPB B) 2104092325 C) 2104101600 E) DVOR/DME 'BGI' 112.7 MHZ CH74X COMPLETELY WITHDRAWN. DO NOT USE	REROUTES WILL BE IMPLEMENTED TACTICALLY PLEASE REFER TO SLIDE 7 FOR ROUTE IMPACTS	NONE

LA SOUFRIERE VOLCANO UPDATE – 1400 UTC – APRIL 10, 2021

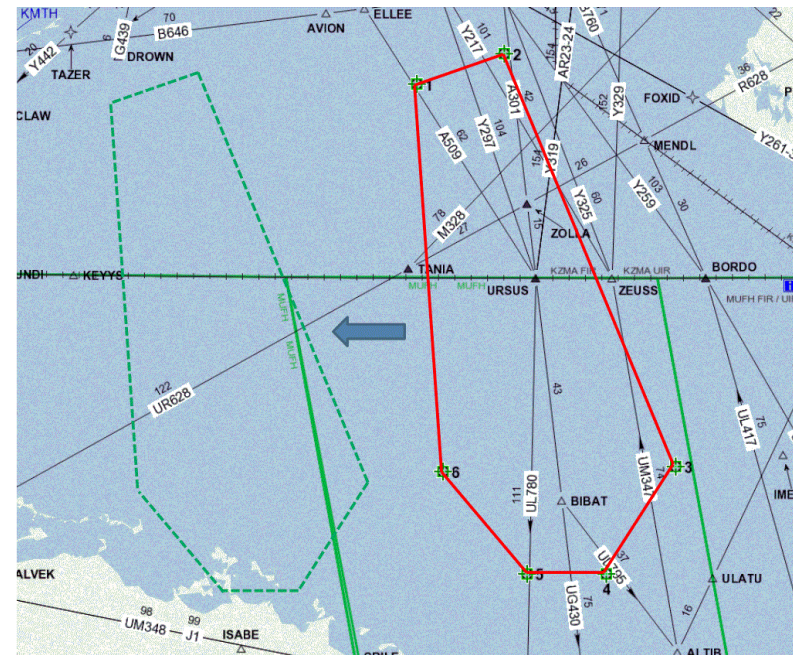
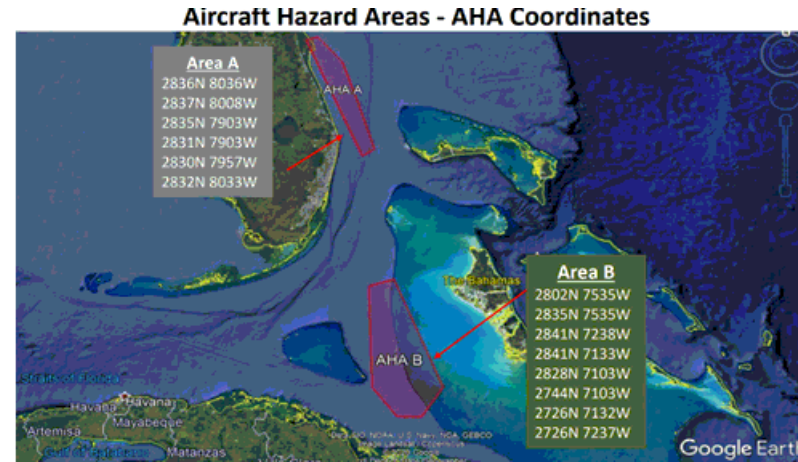
PIARCO UTA/CTA/FIR GENERAL INFORMATION

DEMAND	Weather	Staffing
Low to Medium	VOLCANIC ASH – Affecting large portion of the Piarco UTA/CTA/FIR. Please see SIGMET on next page. No other Significant Weather in the forecast within the Piarco FIR.	Adequate

Coordination - Space Operation



- FAA Space Operations and CNES share operational information, such as:
 - ✓ Launch schedules
 - ✓ Launch sites
 - ✓ Launch AHAs with coordinates
 - ✓ Re-entry AHAs with coordinates



LETTER OF AGREEMENT

EFFECTIVE: DECEMBER 3, 2020

SUBJECT: CANSO ATFM DATA EXCHANGE NETWORK FOR THE AMERICAS (CADENA) SPACE LAUNCH AND RECOVERY PROTOCOLS

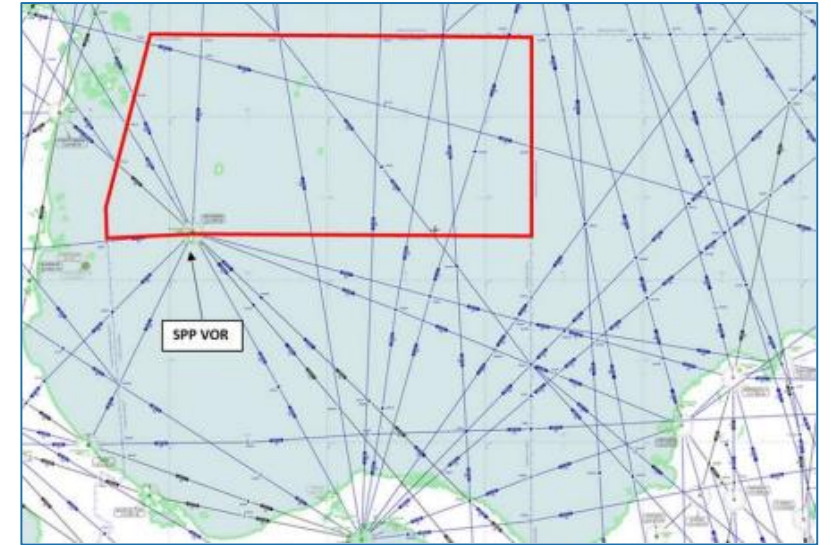
The participating CADENA Air Navigation Service Providers (ANSPs) and the Federal Aviation Administration (FAA) Air Traffic Organization (ATO) Space Operations office (ATO Space Ops) enter into this Letter of Agreement (LOA) to facilitate the safe and efficient movement of space launch and recovery between and through participating ANSP flight information regions (FIRs).

- PURPOSE:** The purpose of this LOA is to facilitate the safe and efficient movement of space launch and recovery operations between and through participating ANSP FIRs. This LOA promotes communication, collaboration, and coordination between the participating ANSPs and ATO Space Ops regarding space launch and recovery operations. The information shared among participating CADENA participating ANSPs and stakeholders is for the sole purpose of aviation safety.
- SCOPE:** This agreement establishes a common regional, cross-border air traffic management (ATM) communications protocol, a seamless operational atmosphere that incorporates common operating procedures and practices, and a performance reporting and review structure and process. The operations described herein are for use by participating CADENA ANSPs and ATO Space Ops to provide space launch and recovery information. This LOA is a non-binding regional operational agreement and is not intended to replace any local agreements or any other LOAs between participating ANSPs.
- BACKGROUND:**
 - CANSO's main objective is to support its Members and participating stakeholders in the provision of safe, efficient and cost-effective air navigation services worldwide. The CANSO Operations Standing Committee (OSC) provides operational leadership and expertise in the implementation of ATM improvements, including commercial space operations, and identifies future technologies and procedures to help transform global ATM performance. The collaborative work of the OSC with the CANSO Regional Directors is instrumental in helping Members achieve seamless airspace globally.
 - The ATO Space Ops main objective is the integration of launch and reentry missions in a safe and efficient manner.



How CADENA helped Radar Outage Situation in Panama

- On March 2, 2023, Panama lost the radar signal leading to a surveillance outage in the Panama FIR north sector. Panama issued MITs to support non-radar operations.
 - MITs caused big issues to neighboring ANSPs.
 - Airlines experience a huge delay.
 - CADENA Contingency Procedure was not followed because Panama is not a CADENA member.
- CADENA held Ad Hoc web conference on March 2, 3, and 6 to facilitate the coordination of reroutes, informed surrounding ANSPs and stakeholders, and provided a forum for questions.
 - Generated the reroutes for airlines to avoid the problem area and coordinated with east bound route with Colombia and west bound with COSECNA.
 - Regional teamwork and cooperation was outstanding!
- The radar was recovered on March 8, 2023.



OIS BENEFITS – Operational Examples

COVID Situation

- Display of:
 - The daily COVID-19 operational limitations report
 - Alternate aerodromes information
 - Airline and ANSP outlook for future air traffic operations
- Coordination regarding:
 - ATC-Zero events (ACC closures)
 - Vaccine Priority Flights
 - PASA Route Requests
- Push email notifications

Background of CADENCE

LOA between CGH Technologies and CANSO



CANSO and CGH Technologies virtual signing – CADENCE
(March 22, 2021)

- CGH Technologies built the CADENA OIS under the contract with the FAA.
- CADENA OIS technology has been transferred from the FAA to CGH Technologies.

- The agreement secures the provision of a purpose-built collaborative software platform based on the successful regional initiative, CADENA.
- CADENA OIS ~~version 3.2 latest~~ is the baseline for the CADENCE OIS v1.0.
- The baseline CADENCE OIS is offered at no cost to regions and functional groups for 20 years.
- CGH Technologies will support the CADENCE OIS for 20 years.



Next Steps

- CADENCE TF is available to discuss with ICAO APAC stakeholders to provide:
 - ✓ Additional operational, technical, and training information.
 - ✓ High level demonstrations to management.
 - ✓ In-depth demonstrations to operational staff.

Thank You!